The National Marine Biological Analytical Quality Control Scheme

Fish Component Report from the Contractor Scheme Operation – Year 14 2007/08

David Hall
davidhall@unicomarine.com

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Unicomarine Ltd.
Head Office
7 Diamond Centre
Works Road
Letchworth
Hertfordshire
SG6 1LW
www.unicomarine.com

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SCHEME OPERATION – YEAR 14 – 2007/08

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Ring Test Bulletin – RTB#33

1. Introduction

The fourteenth year of the National Marine Biological Analytical Quality Control (NMBAQC) Scheme (2007/08) followed the format of the thirteenth year. A series of exercises involved the distribution of test materials to participating laboratories and the centralised examination of returned data and samples. 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).

Seventeen laboratories participated in the fish component of the NMBAQC Scheme. Thirteen participants were government laboratories; four were private consultancies. As in previous years, some laboratories elected to be involved in limited aspects of the Scheme. CSEMP (Clean Seas Environment Monitoring Programme) laboratories were required to participate in all components of the Scheme, although this was not strictly enforced.

1.1 Summary of Performance

This report presents the findings of the Fish component for the fourteenth year of operation of the National Marine Biological Analytical Quality Control (NMBAQC) Scheme.

This component consisted of one module, with a single exercise:

- Identification of one set of twenty-five fish specimens (Fish Ring Test module).

The analytical procedures of this module were the same as for the thirteenth year of the Scheme. The results for this Scheme exercise are presented and discussed. Comments are provided on the performance for each of the participating laboratories.

A **Ring Test (RT)** of twenty-five fish specimens was distributed. This fish ring test (RT33 (F-RT03)) produced good agreement between the identifications made by the participating laboratories and those made by Unicomarine Ltd. On average each participating laboratory recorded 4.2 generic errors and 5.1 specific errors. Seven specimens were responsible for 57% of all generic and 62% of specific errors recorded.

1.1.1 Statement of Performance

Each participating laboratory has received a 'Statement of Performance', which includes a summary of results for each of the Schemes modules and details the resulting flags where appropriate. These statements were first circulated with the 1998/1999 annual report, for the purpose of providing proof of Scheme participation and for ease of comparing year on year progress.

2. Summary of Fish Component

2.1 Introduction

There is currently one module in the fish component; Fish Ring Test identification (RT) module.

This fish module is described in more detail below. A brief outline of the information to be obtained from the 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). Email was the primary means of communication for all participating laboratories. This has considerably reduced the amount of paper required for the administration of the Scheme.

2.1.2 *Data returns*

Return of data to Unicomarine Ltd. followed the same process as in previous years. Spreadsheet based forms (tailored to the receiving laboratory) 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 lead to delays in processing the data and resulted 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. Each Scheme year fourteen participant was given a confidential LabCode in September 2007, these codes were randomly assigned. These codes are prefixed with the Scheme year to reduce the possibility of obsolete codes being used inadvertently by laboratories, *e.g.* Laboratory number four in Scheme year fourteen will be recorded as LB1404.

In the present report all references to Laboratory Codes are the post-August 2007 codes (Scheme year fourteen), unless otherwise stated. To further reduce potential errors and simplify administration, LabCodes were assigned in a single series for all laboratories participating in the benthic invertebrates, fish and particle size analysis components of the NMBAQC Scheme (due to Unicomarine administering these three components).

2.2 Ring Test Specimens (**RT**) Module

2.2.1 *Description*

This training module of the Scheme examined inter-laboratory variation in the participants' ability to identify fish taxa and attempted 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 twenty-five fish specimens (RT33 (F-RT03)) were distributed in 2007. Details of substratum, salinity, depth and geographical location were provided for all ring test specimens to assist identification.

2.2.1.1 *Preparation of the Samples*

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

All specimens were taken from replicate trawls or grabs within a single survey and in most cases they were replicates from a single sampling station.

2.2.1.2 *Analysis required*

The participating laboratories were required to identify each of the RT specimens to species and provide the Species Directory code (Howson & Picton, 1997) for the specimen (where available). If a laboratory would not routinely have identified the specimen to the level of species then this should be detailed in the 'confidence level' field. Laboratories can also add brief notes and information on the keys or other literature used to determine their identifications. The specimens were retained by the participant laboratories for incorporation into their in-house reference collections or training material. **Eight weeks** were allowed for the analysis of the fish RT exercise (RT33 (F-RT03)).

2.2.2 Results

2.2.2.1 General comments

The implementation of this part of the Scheme was the same as previous years and included an additional exercise to specifically address the identification of fish from transitional waters. The RT circulation was accompanied by details of each specimen's habitat details (depth, salinity, substratum, and geographical location). The 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 when assigning 'pass' or 'fail' flags.

For RT33 (F-RT03) twenty-five fish specimens were circulated to seventeen participating laboratories. After a successful trial in the last Scheme year, 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. Participating laboratories were permitted to retain the RT33 (F-RT03) fish specimens as part of their in-house reference collections. All seventeen laboratories returned data for this exercise; fifty-two individual data sets received in total via multiple data submissions.

2.2.2.2 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. A simple character-for-character comparison of the text of the two names (the AQC identification and the laboratory identification) was the starting point for this determination and provided a pointer to all those instances where (for whatever reason) the names differed. Each of these instances was examined to determine the reason for the difference.

As previously found, the main 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 or the use of a valid synonym. There were several examples of these differences:

- Use of a different synonym for a taxon, *e.g. Pleuronectes flesus* for *Platichthys flesus*.
- Simple mis-spelling of a name, *e.g. Gasterostreus aculeatus* for *Gasterosteus aculeatus.*

NB. For the purposes of calculating the total number of differences in identification made by each laboratory a difference was ignored if it was clearly a result of one of the above.

Tables 1 and 2 (Ring Test Bulletin – RTB#33) present the identifications made by each of the participating laboratories for the twenty-five specimens in circulation RT33 (F-RT03), arranged by specimen and by 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 brackets "[name]". Errors of spelling or the use of a different 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. A pair of zeros, "0 0", in the Tables indicates that the subscribing laboratory did not return data.

2.2.2.2.1 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 RTB#33). Two separate scores were maintained; for differences at the level of genus and species. These are not

independent values, if the generic level identification was incorrect then the specific identification would normally also be incorrect, though the reverse is not necessarily the case.

2.2.2.3 Ring Test distribution results

Results were forwarded to the participating laboratories as soon as practicable. Each participant also received a ring test bulletin (RTB33), outlining the reasons for each individual identification discrepancy. These bulletins contained images of the test material. Participating laboratories were instructed to retain their ring test specimens, for addition to in-house reference collections or for future in-house training.

2.2.2.3.1 RT33

RT33 (F-RT03) contained twenty-five fish specimens. Two of the specimens were donated by Mélanie Béguer (Cemagref, Bordeaux). The results from the circulation are presented in Tables 1 and 2 (RTB33) in the same manner as for previous circulations. The agreement at the generic level was very good; just two hundred and sixteen errors (from a potential one thousand three hundred) were recorded from the fifty-two data sets received via the seventeen participating laboratories. Agreement at the specific level was also very good; two hundred and sixty-three errors were recorded. The majority of participating laboratories correctly identified each of the specimens. Only a few of the taxa were responsible for the majority of differences and these are described briefly below.

The bulk of the errors recorded could be attributed to seven specimens. *Platichthys flesus* (3-5cm specimen), *Solea solea* (3.5-6cm specimen), *Microchirus variegatus* (11-18cm specimen), *Rutilus rutilus* (10-11cm specimen), *Gobius niger* (7-9cm specimen), *Sardina pilchardus* (18-23cm specimen) and *Pomatoschistus microps* (3-4cm specimen) accounted for a total of 57% of all generic and 62% of all the specific differences recorded. Two of the twenty-five circulated specimens were correctly identified by all participating laboratories (*Gasterosteus aculeatus* and *Merlangius merlangus*). Further details and analysis of results can be found in the Ring Test Bulletin (Ring Test Bulletin – RTB#33) which was circulated to each laboratory that supplied results for this exercise and was posted on the Scheme's website (www.nmbaqcs.org).

2.2.2.4 Differences between participating laboratories

Figure 1 (RTB33) presents the number of differences recorded at the level of genus and species for each of the participating laboratories. The laboratories are ordered by increasing number of differences at the level of species. The division of laboratories into three bands (Low, Medium and High) on the basis of the number of differences at the level of species is also shown.

2.2.3 Discussion

This is the third fish ring test circulated through the NMBAQC Scheme and the results were comparable with those from the two previous exercises (RT28 (F-RT01) and RT31 (F-RT02)), with a high level of agreement between participating laboratories for the majority of distributed species. The RT component is considered to provide a valuable training mechanism and be an indicator of problem groups and possible areas for further 'targeted' exercises or inclusion at taxonomic workshops. Multiple data entries from each laboratory and the inclusion of images in the ring test bulletins (RTB) have further emphasised the learning aspect of these exercises.

RT33 (F-RT03) identified discrepancies with literature used by some participating laboratories for their identification of the *Pomatoschistus microps* specimens. None of the participants identified all the specimens correctly; however four data submissions contained just one specific error (LB1417a, LB1417b, LB1417C and LB1424j). Several participants mis-identified species that are perceived to be common and readily identifiable (*Platichthys flesus*, *Limanda limanda* and *Pleuronectes platessa*). Deterioration of ring test material may also have contributed to some mis-identifications, for example fin damage due to repeated examination could produce inaccurate fin ray counts. It must be noted that the vast majority of participants in this exercise would not routinely encounter fixed and preserved fish specimens and these results do not necessarily compromise identifications in routine fish monitoring surveys. Further details and analysis of results can be found in the ring test bulletin (Ring Test Bulletin - RTB#33) which was circulated to all participants and is available on the Scheme's website (www.nmbaqcs.org).

3. Conclusions and Recommendations

A number of observations may be made from the results of the exercise described above. The following is a summary of the major points of importance.

1. The maintenance of a comprehensive reference collection has numerous benefits for improving identification ability, training new staff, maintaining consistency of identification between surveys and access to growth series material. The inclusion of growth series material 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 fauna; these collections could include images and physical specimens.
2. Differences in the literature used for identification of invertebrates have been highlighted by the RT exercises. 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.
3. 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 RT exercise a bulletin is circulated, reviewing the literature used and detailing the correct identification of the taxa circulated. Participants are encouraged to review their exercise reports and provide feedback concerning content and format wherever appropriate.
4. The previous fish ring test (RT31 (F-RT02)) highlighted at least one instance of error due to the incorrect translation of an ambiguous common name. A significant number of RT33 (F-RT03) data submissions contained spelling errors and were replicated (presumably via 'cut and paste') throughout several submissions. 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. The RT and proposed Reverse RT modules offer training and baseline data for fish; a quality control module (similar to the invertebrate components Own Sample module) should be devised to provide quantifiable data assurance.
6. This year's fish ring test exercise (RT33 (F-RT03)) produced a vast amount of data due to the submission of multiple data sets from several participating laboratories. Fifty-two data sets were received from the seventeen sets of fish distributed. The option of multiple data submissions per participant laboratory will be extended to all future 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 received specific results and feedback.

4. References

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