The National Marine Biological Analytical Quality Control Scheme
www.nmbaqcs.org

Macroalgae Identification Component Report – RM RT06 2012

Emma Wells
Wells Marine Surveys
April 2012
Email: emma@wellsmarine.org

ALGAL COMPONENT REPORT FROM THE CONTRACTOR SCHEME OPERATION – YEAR 6 - 2012

1 Introduction

For a number of years there has been quality control over the submission of biological data. This now extends through all biological elements including macroalgae and seagrass. This ensures consistency of data being reported for management purposes and has been primarily driven by international analytical standards due to the Water Framework Directive. The QC scheme aims to facilitate improvements in biological assessment whilst maintaining the standard of marine biological data. The scheme is able to ensure consistency between laboratories and field staff with improved confidence in ecological quality status.

The National Marine Biological Analytical Quality Control (NMBAQC) Scheme addresses several issues relating to macroalgae and seagrass data collection, this report focuses on one of these:

- The identification of macroalgae species

This is the sixth year in which the identification of macroalgae has been included as an element of the NMBAQC scheme. The test consisted of a single component with the format following that of the fifth year. Test material was labelled and distributed to participating laboratories using previously employed procedures, from which species identification forms were completed and returned for analysis.

Seven laboratories subscribed to the macroalgae ring test with six laboratories submitting results with a total of eleven participants. Three of the participating laboratories were government organisations and three were private consultancies. To ensure consistency between scheme years, each participating laboratory was assigned the same laboratory code as in previous year except where a laboratory was new to the scheme. Individual codes may, however, change slightly due to variations in individual participants. Due to the nature of the exercise there was no limit on the number of participants per lab.

Currently this scheme does not provide a means of qualifying performance levels. It offers 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. There have been no 'Pass' or 'Fail' flags associated with this test and at this stage no levels at which the results may be deemed a high mid or low quality. Until a level of acceptance is agreed within the NMBAQC the results currently have no bearing on the acceptability of data from such participating laboratories.

1.1 Summary of Performance.

This report presents the findings of the macroalgae identification component for the sixth year of operation within the National Marine Biological Analytical Quality Control (NMBAQC) Scheme. This component consisted of a single macroalgae exercise the analytical procedures of which remained consistent with rounds two and three of the scheme (RM RT02 and RT03). The results for the exercise are presented and discussed with comments provided on the overall participant performance.

A macroalgae ring test of twenty macroalgae specimens was distributed to the seven subscribing laboratories. Round six of the ring test produced a high degree of agreement between identification made by participating laboratories and initial identification as made by Wells Marine.

2 Summary of Macroalgae Component

2.1 Introduction

There was one module for the macroalgae identification component for scheme year six. This module is described in full below to include details of distribution and logistics, completion of test result forms and full analysis and comparison of final submitted results.

2.2.1 Logistics

The test material was distributed on CD to each laboratory with labelling and distribution procedures following those of previous years. Each disc contained the full identification module including photos from which to identify specimens, description of methods and data submission forms. Participants were given a month to complete the test and return the results. There were no restrictions on the number of participants per laboratory.

Email has been the primary means of communication for all participating laboratories subsequent to the initial postal distribution of test material.

2.2.2 Analysis and Data Submissions

A prepared results sheet was distributed with the exercise instructions to standardise the format in which the results were submitted as per previous years. All returned data was done so in Excel and has been stored and analysed in this format. In this and previous scheme years slow of missing returns for exercises lead to delays in processing the data and difficulties with reporting and rapid feedback of results therefore reminders were distributed shortly before the exercise deadline.

2.2.3 Confidentiality

To preserve the confidentiality of participating laboratories, each participant is allocated a four digit laboratory code from which they can identify their results. These codes are randomly assigned. The initial letters (MA) refer to the scheme this is followed by the scheme year which refers to the year in which the NMBAQC scheme original commenced, the final two digits represent the laboratory. For those laboratories where multiple submissions were provided the four digit code is followed by a letter allocated to each participant of that laboratory. For example, participant c from laboratory twelve in scheme year nineteen will be recorded as MA1912c.

2.3 Macroalgae Ring Test (RM RT06) Module

2.3.1 Description

This training module enables the inter-laboratory comparisons of participants' ability to correctly identify macroalgae taxa and whether errors may be attributed to inadequate keys, lack of reference material or incorrect use of satisfactory keys.

One set of twenty specimen photographs were distributed in January 2012. The specimens included a range of Chlorophyta, Rhodophyta and Phaeophyta and a mix of macroscopic and microscopic specimens from a variety of habitats including epilithic, epiphytic and endozoic species.

2.3.1.1 Preparation of the Sample

Each specimen was to be identified through a number of in-situ, macroscopic and microscopic photographs. In total a minimum of five photographs were used for each specimen collected by Wells Marine for the purpose of this exercise. Specimen photographs were obtained from a range of

surveys from around the coast of the UK. Photographs were selected to sufficiently represent each specimen including in-situ (where possible), overall structure, branching patterns, cellular arrangements and cell contents making sure to include key characteristics for accurate identification. Attempts were also made to ensure a high quality of photographs primarily focusing on clean specimens with sharp photographs.

Using a photographic test is considered a more effective means of testing macroalgal identification skills. Preserved samples are known to rapidly to lose colour with cells becoming distorted making key characteristics more difficult to distinguish. Equally, fresh samples would not last a sufficient period to enable identification.

2.3.1.2 Analysis Required

The participating laboratories were required to identify each of the macroalgae specimens from the photographs provided. Additional information could also be submitted including brief notes, information on keys used or possible problems with identification or quality of photograph provided. If a laboratory was unfamiliar with the specimen then the level of confidence of identification could also be detailed. Participating laboratories were permitted to supply multiple data entries for each exercise to maximise results and allow sufficient comparisons of data entries. The protocol for circulating and completing the module followed that of previous years with four weeks allowed for the identification and submission of species identification results.

2.3.2 Results

2.3.2.1 General Comments

The scheme has taken on the same format as previous years (RT02 and RT03) this includes the format of the test and method of data analysis and scoring. The macroalgae ring test is designed to act as a training aid in the identification of species allowing those difficult taxa to be revealed and further identifying problematic areas.

For this current round of the scheme (RM RT06) specimen photographs were circulated to a total of seven laboratories. As with previous scheme years, multiple data entries were permitted from each participating laboratory. Six of the seven laboratories returned data entries with a total of eleven individual data sets.

2.3.2.2 Analysis and Scoring of Data Returns

Laboratories returned lists of their species identifications within the format provided, these were compared against AQC identification as determined by Wells Marine to assess the number of differences. The method of data comparison was achieved by comparing both the genus and species names and identifying where these differed with the AQC names. Such comparison included differences in spelling or use of a valid synonym for example:

- Use of different synonym for a taxon, e.g. *Audouinella floridula* for *Rhodothamniella floridula*
- Mis-spelling of taxa name, e.g. *Halurus esquitifola* for *Halurus equisetifolius*

Such differences were not taken into account during calculation of the total number of differences in identification.

Data entries were tabulated (as seen in RM RT06 Preliminary Results Bulletin, Table2) in order of specimen number and laboratory. The individuals' data entries are only given where they differ from

the AQC identification. This includes those entries for which species are incorrectly spelled or where an appropriate synonym is provided as well as those instances in which the specimen has been incorrectly identified. For those entries in which a synonym or mis-spelling was supplied by the participant but for which the identification was consistent with that of the AQC, the name was presented in brackets [species name]. Those entries in which the identification was considered different to the AQC the species or genus name that did not correspond to the AQC was provided in the table. If part or all of the species name entered was correct this was indicated by a dash "-" any incorrect name was included in the table e.g. where *Codium tomentosum* was identified as *Codium vermilara* this would be entered as " – *vermilara*".

The data entries were scored by increasing the score of the individual by one where the entry was consistent with that of the AQC. For instance where text other than a dash "-" or a bracketed name [name] is provided no score was given. This includes differences at both genus and species level, although these can be considered independent values it is often the case that were the generic identification was incorrect then the species identification would usually also be incorrect. Therefore where the full genus and species name was correct a score of two would be given where either genus or species name was incorrect a score of one would be given. The method of scoring applied to those species in which a correct identification was provided and included those instances where synonyms were used or species/genus names incorrectly spelled.

2.3.2.3 Ring Test Results

Results were forwarded to each of the participating laboratories after four weeks of data submission. These results are documented in the preliminary results bulletin (RM RT06) which detailed individual scores and highlighted incorrect identifications, mis-spellings and use of synonyms. The bulletin also outlined reasons for identification discrepancies by comparing incorrect species and genus names with those of the AQC with the aid of photographs to pick out key characteristics.

RM RT06 contained twenty specimens for identification for which there was a good general level of agreement through all eleven participants. At the generic level there were a total of thirteen differences (from a potential two hundred and twenty) across the eleven sets of data received from the six participating laboratories. At the specific level, agreement was also considered as high with a total of twenty two differences. These differences could be attributed to just a few taxa. A total of 34% of all errors were from just one species (*Apoglossum ruscifolium*) contributing to 46% of all generic differences and 27% of all specific differences. *Gelidium pusillum* contributed to a further 20% with three generic and four specific errors. A further two specimens (*Bonnemaisonia hamifera* and *Brongniartella byssoides*) resulted in both generic and specific differences attributing to 23% of overall errors. A final three taxa were responsible for the remaining five specific errors (*Ectocarpus siliculosus*, *Epicladia flustrae* and *Chaetomorpha linum*).

The difference between participants' entries and AQC identifications was well distributed across all laboratories with no one participant responsible for the bulk of errors. Nine of the participants received between one and six errors with just two participants identifying all genera and species correctly (MA1903a and MA1903b). At this stage the levels of low, medium and high have not been established for this particular ring test so participants and laboratories cannot be allocated a level of acceptance based on their overall score.

2.4 Discussion

This is the sixth macroalgae identification ring test as circulated through the NMBAQC scheme. Although the results were comparable with those of previous years RT02 and RT03 there is a

noticeable increase in the level of agreement between participating laboratories and the AQC. However, as intended by the scheme this particular test is still able to provide training to those participants involved and allow problem taxa to be identified stimulating areas for increased inclusion in taxonomic workshops and targeting such taxa within future exercises. It is hoped that the photographs used within each of the ring test are retained within the participating laboratories for future reference with some descriptions allowing the comparison of taxonomically similar species.

The majority of laboratories are using the same literature to identify most specimens as seen in the references section (4.0). Two participants from the same laboratory were able to identify all species correctly. Most incorrect identifications were attributed to two species both of which are considered relatively common throughout the British Isles but for which identification can sometimes be difficult due to lack of conclusive characteristics and morphologically similar species. Those characteristics that are considered more specific and may be used to distinguish such species were detailed within the Bulletin. The most common error was for *Apoglossum ruscifolium* which in six instances was identified as *Hypoglossum hypoglossoides*. For some specimens photographs of their alternative life history stage were used which may have contributed to some errors of identification.

The use of a photographic test is considered a more effective means of testing macroalgal identification skills. Preserved samples are known to rapidly to lose colour with cells becoming distorted making key characteristics more difficult to distinguish. Equally, fresh samples would not last a sufficient period to enable identification. However, it is possible that some photographs were not considered to be of sufficient quality to correctly identify the specimens despite all efforts. This may have attributed to some confusion over the identification of some more cryptic species.

3 Conclusions and Recommendations

1. The sixth macroalgae ring test exercise was successfully implemented and completed by most participants with a general agreement of the format. All feedback has been reviewed and will be considered for subsequent exercises, such feedback is encouraged to enable the protocols to be refined.

2. The high level of agreement within this test provides evidence that the area of macroalgae identification is increasing in skill. The errors that were occurring were generally at the specific level however where generic errors occurred these were most often with taxonomically similar species which share similar characteristics and therefore hard to separate. Such species will be noted for possible future workshops and will be targeting in future exercises.

3. There were still a number of incorrect spellings; therefore more care should be taken prior to submitting results to ensure all species are spelled correctly. This is equally important when submitting data records or reports where scientific names are incorporated.

4. As with some previous tests there was some conflict as to the correct identification of some species. Descriptions of some species have recently changed some of which have resulted in nomenclatural changes or use of more specific characteristics that were previously considered more generic. New studies in species taxonomy are regularly highlighting previously unidentified species, splitting one species into two based on a previously unknown characteristic. In these instances both species identification have been accepted.

5. All laboratories are encouraged to keep all test photographs within a reference collection. This has a number of benefits particularly with regards to improving identification ability, training new staff and maintaining consistency of identification between surveys and staff. This reference collection should also be extended through to literature to ensure current keys are used and up to date nomenclature.

6. During this sixth cycle of the macroalgae identification exercise the majority of participating submitted results within the designated timescale. However, one laboratory was unable to submit their results within the designated time period. In future exercises all laboratories should continue to submit results within the requested deadlines as detailed at the beginning of the exercise. In subsequent years reminders will continue to be distributed prior to the completion of the exercise.

7. There are still some issues over the timing of the test and there are suggestions that the time allowed for completion of the test should be extended to accommodate increased workloads. Although this is still the most appropriate time of year to complete the tests, a longer time scale within which to complete the exercises would allow more laboratories to complete the exercise in full.

8. Although there was generally approval on the quality, detail and use of photographs with most participants agreeing on the levels of difficulty, there were some areas which require some improvement. In some instances the specimen photographs would have benefited further from a scale and some details of habitat, general location, exposure of shore, height present on shore etc. This additional information will be suggested for inclusion on subsequent tests to allow accurate identification and reduce error or confusion.

If anyone has further thoughts on this, or disagrees with any of the interpretation, please pass forward your comments to Dr Emma Wells (emma@wellsmarine.org) or Dr Clare Scanlan (clare.scanlan@sepa.org.uk). This ring test is still only in its second year and very much in its developmental stage but hopes to be continually refined.

4. References

Dixon, P.S. and Irvine, L.M., 1977. Seaweeds of the British Isles. Vol. 1 Rhodophyta. Part 1. Introduction, Nemaliales, Gigartinales. British Museum (Natural History), London.

Brodie, J. & Irvine, L.M., 2003. Seaweeds of the British Isles. Volume 1. Rhodophyta. Part 3B. Bangiophycidae. Pp. i-xiii, 1 – 167, map. Andover: Intercept.

Guiry, M.D., 1997. Benthic red, brown and green algae. In: Howson, C.M. and Picton, B.E. The species directory of the marine fauna and flora of the British Isles and surrounding seas. The Ulster Museum and the Marine Conservation Society, Belfast and Ross-on-Wye.

Hiscock, S., 1979. A field guide to the British brown seaweeds (Phaeophyta). Field Studies. **5**, 1 – 44.

Hiscock, S., 1986. A Field Guide to the British Red Seaweeds (Rhodophyta). Field Studies Council Occasional Publications no. 13.

Irvine, L.M., 1983. Seaweeds of the British Isles. Vol. 1 Rhodophyta. Part 2a. Cryptonemiales (sensu stricto), Palmariales, Rhodymeniales. British Museum (Natural History), London.

Irvine, L.M. and Chamberlain, Y., 1993. Seaweeds of the British Isles. Vol. 1. Rhodophyta. Part 2b. Corallinales. British Museum (Natural History), London.

Kornmann, P. and Sahling, P.H., 1983. Meeresalgen von Helgoland: Erganzung. Helgoländer Wissenschaftliche. Meeresuntersuchungen. **36**, 1 – 65.

Maggs, C.A. and Hommersand, M., 1993. Seaweeds of the British Isles. Vol. 1. Rhodophyta. Part 3a. Ceramiales.

E. Wells, 2007. Water Framework Directive – coastal water rocky shore monitoring: Field guide to British seaweeds. Environment Agency, Bristol.