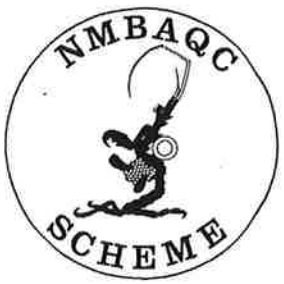

NATIONAL MARINE BIOLOGICAL ANALYTICAL QUALITY CONTROL SCHEME

NATIONAL MARINE BIOLOGICAL AQC REPORT 1996/97

ANNUAL REPORT

APRIL 1996 - MARCH 1997

(Year three)

OCTOBER 1997
National Marine Biological AQC Co-ordinating Committee
Unicomarine Ltd

NATIONAL MARINE BIOLOGICAL ANALYTICAL QUALITY CONTROL SCHEME

Annual Report 1996 / 1997

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1. INTRODUCTION AND SUMMARIES

- The National Marine Biological AQC Scheme (NMBAQC Scheme) has completed its third year in 1996/97. The background to the scheme is described in previous annual reports.

- Components of the scheme continued to be based on Ring Tests (RT), whole samples (MB) and Own Samples (OS) for biological determinands plus Particle size (PS) tests.

- Participation in the scheme remained high with a total of 24 laboratories participating. Sixteen of these were NMP labs, five were consultants or private contractors and the remainder non NMP government labs. Interest had been expressed by non NMP labs in 'selective' participation where particular components of the scheme could be excluded/included for them. NMP labs were required to participate in all components.

- Several laboratories contract out analysis for their own samples and for the NMBAQC Scheme samples. This is recognised as a risk in the potential loss of quality control by members of the scheme. Unless directly participating in the scheme, subcontractors are not recognised as being within it.

- Unicomarine continued to successfully operate the scheme in year three reporting to the AQC Committee and contract manager.

- Overall co-ordination of the scheme is undertaken by the National Co-ordinating Committee (Appendix 1) while the management of the scheme is the responsibility of Mrs A Henderson, SEPA West Region. The roles of the Co-ordinating Committee and SEPA are laid out in Appendices 2 and 3.

- Scheme components in 1996/97 were tackled variably by different laboratories, with some long time delays and some non returns of essential data, presenting reporting and 'flagging' difficulties. 1996/97 provided a second year of own samples on which to develop the standards/targets outlined in 1995/96.

- Detailed results of the circulations are presented in the contractors report (section 3) where individual laboratory performance is described and standards of achievement against the targets tabulated.

- Overall lab performance was found to be fairly good although a variety of problems (different for different labs) reduced the success on several occasions.

- Particle size exercises again demonstrated the high degree of consistency within laboratories using particular techniques. However, it was clear that a number of systematic and reporting difficulties still need to be resolved. It has been decided to consult recognised experts in this field to assist in this matter.

- Problems with biomass analysis were also evident.

- Failure of some NMP laboratories to achieve the necessary overall standards may affect the inclusion of their data submissions to the NMP database.

- Some marginal failures may be improved by standardising subsampling techniques and other problems relating to the development of better standard protocols.
- A workshop on 'problem taxa' was held in the Autumn of 1996, with a second workshop comprising field AQC exercises was held in March 1997.

2. SCOPE OF THE SCHEME

The third year of the scheme was designed to reflect the need to apply the standards derived by the Co-ordinating Committee in 1995/96 . Therefore, there was a much greater emphasis on participant supplied samples. In 1995/96 a single participant supplied sample provided insufficient data to judge standards. A further 3 were analysed in 1996/97.

Scheduled circulations:

a) 3 participant supplied macrobenthic samples to be (re)analysed by Unicomarine;

b) Ring Tests as follows;
i. one normal ring test of twenty five species to be supplied by the contractor;
ii. one participant supplied set of twenty five species to be sent to the contractor for validation;
iii. one ring test targeted at "problem taxa" highlighted throughout the scheme;

c) One contractor supplied macrobenthic sample.

In addition to the routine programme Unicomarine undertook a number of special projects as follows:

i. to develop a standard list of taxonomic references based on information obtained from ring test returns and macrobenthic exercises;
ii. to trial and develop a new key for the *Cirratulidae* which would be linked to PC based images.

A detailed breakdown of the results from the year, are contained in the contractors report in section 3.

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Summary of performance

This report presents the findings of the third year of operation of the National Marine Biological Analytical Quality Control Scheme.

The Scheme consisted of five components:

- Analysis of a single macrobenthic sample.
- Analysis of two sediment samples.
- Identification of two sets of twenty-five animal specimens.
- Re-analysis by Unicomarine Ltd. of samples supplied by each of the participating laboratories.
- Re-identification of a set of twenty-five specimens supplied by each of the participating laboratories.

Analysis of the various components of the Scheme was the same as for the second year of the Scheme. The results for each of the Scheme components are presented and discussed. Comments are provided on the performance of each of the participating laboratories in each of the components.

Analysis of the **Macrobenthic sample** by the participating laboratories and subsequent re-analysis by Unicomarine Ltd. provided information on the efficiency of extraction of the fauna; accuracy of enumeration and identification and the reproducibility of biomass estimations. Overall agreement between the laboratories and Unicomarine Ltd. was generally good. Extraction efficiency in respect of the number of taxa and individuals was better than 80% in all comparisons and better than 90% in approximately 75% of all comparisons.

Comparison of the results from the laboratories with those from analysis by Unicomarine Ltd. was made using the Bray-Curtis similarity index. The value of the index varied between approximately 50% and 97% and was better than 80% in 63% of comparisons and better than 90% in 38% of comparisons.

The results for the **Own samples** were broadly similar to those from the Macrobenthic sample. Agreement between the laboratories and Unicomarine Ltd. was generally good. In over half of the comparisons the value of the Bray-Curtis similarity index was greater than 95% and in most cases (69%) the value of the index was greater than 90%.

The influence of analytical technique on the results returned for the **Particle Size exercises** was marked, as had been found in previous circulations. In most cases there was good agreement between laboratories using the same technique.

Two **Ring Tests** of twenty-five animal specimens were distributed. One set consisted of polychaetes from a single family. For the general set of fauna there was fairly good agreement between the identifications made by the

participating laboratories and those made by Unicomarine Ltd. The 'targeted' set posed more problems and the results were discussed at a practical workshop.

The identification of a set of twenty-five species selected by the participating laboratories from a list distributed by Unicomarine Ltd. were generally accurate. No clear problem areas were identified. There were differences in the approach to this **Laboratory Reference** exercise by the individual laboratories.

Comments are provided on the individual performance of the participating laboratories in each of the above components. A summary of their performance with respect to standards determined for the National Monitoring Plan is presented.

1. Introduction

The Scheme is addressing three main areas relating to benthic biological data collection:

- The processing of macrobenthic samples.
- The identification of fauna.
- The determination of physical parameters of sediments.

The third year of the Scheme (1996/97) followed the main format of the first two years. A series of exercises involved the distribution of test materials to participating laboratories and the centralised examination of returned data and samples. At the start of the year twenty-three laboratories were participating. New laboratories have since joined the Scheme and at the start of the fourth year (April 1997) the number of participants has increased to twenty-seven.

In 1996/97 a new component, termed the Laboratory Reference, was introduced. This exercise took the place of one of the Ring Test (RT) exercises. A further RT exercise was modified to target a single family of polychaetes. These changes were introduced as a result of the findings from the first two years of the Scheme and also in response to comments and suggestions from participating laboratories. Each component of the Scheme is detailed below and the results from 1996/97 are presented and discussed.

Not all laboratories were involved in all aspects of the Scheme; some joined after the samples for a particular exercise had been distributed. Some laboratories chose not to submit samples for the Own Sample component.

In this report attainment targets for the OS and PS components have been set. These targets have been applied to the results from laboratories (Section 5) and "Pass" or "Fail" flags assigned accordingly.

2. Description of the Scheme Components

The three core components; Macrobenthic sample analysis (MB), Ring Test identification (RT), and Particle Size analysis (PS), were continued into the third year. A number of modifications were made, including a change to the nature of some of the RT exercises and the addition of a new exercise.

In the 1995/96 the Own Sample (OS) exercise had been introduced to assess the performance of participating laboratories on familiar material, this being more representative of a laboratory's usual expertise. In a further attempt to take account of regional variations in fauna a new element termed the Laboratory Reference (LR) was introduced. This was in effect a 'reverse' Ring Test with laboratories supplying named specimens, rather than Unicomarine Ltd. Thus the species identified were, by definition, from the laboratories' own collections and so the exercise was not subject to the possible criticism of regional bias in fauna distributed as part of the RT components.

The scheme components are described in more detail below. A brief outline of the information which was to be obtained from each component 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 General

2.1.1 Logistics

The labelling and distribution procedures employed for the first two years were maintained and details may be found in the report for 1994/95.

2.1.2 Data returns

Return of data to Unicomarine Ltd. also followed the same process as in Years One and Two (1994/95 and 1995/6). Pre-formatted discs with spreadsheet based forms (tailored to the receiving laboratory) were distributed with each circulation in addition to hard copies. As had been previously found, a range of file formats were required to cover all applications in use by participating laboratories. All returned data have been converted to Excel v.5.00 for storage and analysis. 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.

2.1.3 Confidentiality

To preserve the confidentiality of participating laboratories the practice of identifying laboratories with a two-digit Laboratory Code was continued. The code was changed in November 1996 and new codes assigned. **In the present report all references to Laboratory Codes are the new (post-November 1996) codes.** The results for all exercises undertaken in the third year are reported under the new codes even though some of the exercises were distributed when the old codes were in force.

2.2 Macrobenthic Samples (MB)

A single unsorted grab sample from coastal waters was distributed to each participating laboratory. This part of the scheme examined differences in sample processing efficiency and identification and their combined influence on the results of multivariate analysis. In addition, an examination of the estimates of biomass made by each of the participating laboratories was undertaken.

2.2.1 Preparation of the Samples

Sample MB04 was collected off Creag Island south-east of Lismore on the west coast of Scotland, in an area of soft muddy sediment. A set of forty samples were collected using a 0.1m^2 Day Grab. Sampling was carried out while at anchor and samples for distribution were collected within a five hour period. All grabs taken were full. Sieving was carried out on-board using a mesh of 1.00mm, followed by fixing in buffered formaldehyde solution. Samples were washed after a week in the fixative, prior to transfer to 70% IMS, in which condition they were distributed.

2.2.2 *Analysis required - MB*

Each participating laboratory was required to carry out sorting, identification and enumeration of the contained macrobenthic fauna in the sample. Precise protocols were not provided; participating laboratories were instructed to employ their normal methods. The extracted fauna was to be separated and stored in individually labelled vials. Labels were provided and cross-referenced to the recording sheets.

In addition, measurements of the biomass of the recorded taxa were requested. More detailed instructions were provided for this component; measurements were to be blotted wet weights to 0.0001g and to be made for each of the taxa recorded during the enumeration.

Ten weeks were allowed for completion of the sample analysis. All sorted and unsorted sediments and extracted fauna were to be returned to Unicomarine Ltd., together with the data on counts and biomass determinations.

2.2.3 *Post-return analysis*

Upon return to Unicomarine Ltd. the various components of the MB samples were re-examined. All extracted fauna was re-identified and re-counted for comparison with the participating laboratory's own counts. The sediment was re-sorted and any missed fauna removed, identified and counted. All fauna weighed by the participating laboratories was re-weighed to 0.0001g by the same member of Unicomarine Ltd. staff using the same technique.

2.3 Own Sample (OS)

This exercise examined laboratory analytical performance on material from their own area. Each laboratory was requested to send a list of samples from which three samples were identified. The selection was returned notified to the laboratories. NMP laboratories were advised to use NMP samples if possible, otherwise there was free choice.

2.3.1 *Analysis required*

Participating laboratories were instructed to carry out macrobenthic analysis of the samples using their normal procedures. Samples requiring sub-sampling were to be avoided where possible. All procedures were to be documented and details returned with the sample components. All material from the sample was to be sent to Unicomarine Ltd. broken down as follows:

- Sorted residue - material from which all animals had been removed and counted.
- Separated taxa - individually labelled vials containing the identified fauna.
- Other fractions - eg. material containing fauna which had been counted in situ.

Identification was to be to the normal taxonomic level employed by the laboratory (usually species). The names and counts of specimens were to be recorded on a matrix and linked to the vials through a specimen code number. Biomass analysis was to be carried out in the same manner as for the MB exercise.

Upon receipt at Unicomarine Ltd. all OS samples were re-analysed by the same operator. The sorted residue was re-examined and any countable material extracted. Identified fauna was checked for the accuracy of enumeration and identification and all specimens were re-weighed using the same procedure as for the MB exercise.

2.4 Particle Size Analysis (PS)

Two samples of sediment, covering a range of particle sizes, were distributed in 1996/97. This component was intended to provide information on the degree of variation between participating laboratories in the production of basic statistics on the sediment characteristics. Both samples were derived from natural sediments and prepared as in previous years. In each case replicates of the distributed samples were analysed using both laser diffraction and sieve analysis techniques.

2.4.1 Preparation of the Samples

2.4.1.1 Natural samples

Sediment for each of the circulations was collected from locations covering a range of sediment types from mud to coarse sand. This was returned to the laboratory and coarse sieved (2.0mm) to remove stones. The sediment for an individual PS circulation was well mixed in a large tray following sieving and allowed to settle for a week. Each sediment was sub-sampled by coring in pairs. One core of a pair was stored as the 'A' component, the other as the 'B'. To ensure sufficient weight for analysis, and to further reduce variation between distributed PS samples, this process was repeated three times for each sample sent, ie. each distributed sample was a composite of three cores.

The numbering of the resulting samples was random. All of the odd-numbered 'B' components (a total of 12) were sent for particle size analysis to assess the degree of inter-sample variation. Half the replicates were analysed using laser and half by sieve and pipette. The 'A' components were assigned randomly and distributed to the participating laboratories.

2.4.2 Analysis required

The participating laboratories were required to carry out particle size analysis on the samples using their normal technique or sub-contractor and to return basic statistics on the sample including mean, median, sorting and skewness. Also requested was a breakdown of the particle size distribution of the sediment, to be expressed as a weight of sediment in half-phi (ϕ) intervals.

2.5 Ring Test Specimens (RT)

This component of the Scheme examined inter-laboratory variation in the ability to identify fauna and attempted to determine whether any errors were the result of inadequate keys, or the incorrect use of satisfactory keys.

Two sets of twenty-five specimens were distributed in 1996/97, one less circulation than in 1995/96. The first of the year's RT circulations (RT08) was of the same form as for the earlier years - the specimens included representatives of the major phyla

and approximately 50% of the taxa were polychaete worms. The second circulation differed in that all specimens were from a single family of polychaetes, the Cirratulidae. This family had been identified from earlier RT circulations as causing laboratories a significant problem with identification. Multiple examples of some species were included in the circulation, adult and juvenile specimens were also included. This circulation (RT09) was termed a 'targeted' Ring Test.

2.5.1 *Preparation of the Samples*

The specimens distributed were obtained from a range of surveys from around the UK. Every attempt was made to provide animals in good condition and of similar size for each laboratory. Each specimen sent was uniquely identifiable by means of a coded label and all material has been retained for subsequent checking. In a number of instances, particularly with small species, two specimens were distributed. Where relevant every effort was made to ensure all specimens of a given species were of the same sex.

For the standard RT circulation (RT08) all specimens were taken from replicate grabs within a single survey and in most cases they were replicates from a single sampling station. To obtain sufficient material for the 'targeted' RT, material from a number of surveys was used.

2.5.2 *Analysis required*

The participating laboratories were required to identify each of the RT specimens to the level of species. Also requested was the Marine Conservation Society code for the specimen (where available) and brief information on the keys or other literature used to determine the identification. All specimens were to be returned to Unicomarine Ltd. for verification and resolution of any disputed identifications. This was the same procedure as for earlier circulations.

2.6 Laboratory Reference (LR)

To address the criticism that some of the taxa circulated in the Ring Tests were unlikely ever to be encountered by some of the laboratories and thus not a valid test of laboratory skills, a variant of the RT exercise was introduced in which each of the participating laboratories submitted a reference collection of twenty-five specimens for re-examination.

2.6.1 *Selection of fauna*

The different geographical distributions of species meant that a contractor request for a single set of species from all laboratories was unlikely to be successful. Accordingly a list of families was distributed to participating laboratories with a request that an example of a named species selected from each of the listed taxonomic groups be sent to Unicomarine Ltd. Thus, for example, although all laboratories were requested to send an identified specimen of a polychaete from the genus *Nephtys,* different species were sent by the laboratories. The groups listed included the major families typically encountered in marine benthic surveys. The list of groups as distributed is given in Appendix 1.

2.6.2 *Analysis*

A prepared results sheet was distributed with the list with attached labels for the laboratories to identify each of the specimens. All specimens were re-identified and the identification made by Unicomarine Ltd. compared with that made by the participating laboratories. All specimens were returned to the laboratories after analysis. Results for the exercise were recorded separately at the generic and specific level, in the same manner as for the Ring Test.

3. Results

Most of the exercises in 1996/97 were undertaken by approximately twenty-four laboratories. Changes in the number of participants during the year and differences in the number of exercises in which laboratories participated meant that some exercises had more data returned than others. There were again large differences between laboratories in their ability to meet the target deadlines, due to variations between laboratories in workload. Sub-contracting by participating laboratories of certain sample analyses may also have contributed to delays. Some laboratories did not submit returns for a number of the exercises.

3.1 Macrobenthic Samples (MB)

3.1.1 *General comments*

The distributed sediment (MB04) was from a soft mud taken from a depth of approximately 50m. The samples were moderately diverse with an average of twenty-three species in generally small numbers, covering a variety of phyla. The composite list from all samples was approximately 90 species. A number of samples had been stained with Rose Bengal. Overall, 16 laboratories returned samples and data; 8 non-returns.

3.1.2 *Efficiency of sample sorting*

Table 1 presents for sample MB04, a summary of the estimate of numbers of taxa and individuals made by each of the participating laboratories together with the corresponding count made by Unicomarine Ltd. following re-analysis of the same samples. Comparison of the number of taxa and number of individuals between the participating laboratory and Unicomarine Ltd. is given as percentage values in Table 1.

3.1.2.1 *Number of Taxa*

It may be seen from Table 1 (column 5) that there was considerable variation between laboratories in the percentage of taxa identified in the samples. Up to five taxa (17% of the total in the sample) were not extracted. On average 1.4 taxa were missed.

Re-sorting of the sample residue following analysis by the participating laboratories retrieved small numbers of individuals from most samples. These data are presented in columns 10 to 12 of Table 1. Up to 9 individuals were not extracted from the samples (19% of the total in the sample), though in most cases five or fewer individuals were missed.

The values presented for the number of taxa not extracted (column 10) represent taxa not recorded or extracted (even if mis-identified) elsewhere in the results ie. these are taxa completely missed by the laboratory.

3.1.2.2 Number of Individuals

The number of individuals not extracted from the sample (column 11) is given as a percentage of the total number in the sample (including those missed) in column 12 (ie. column 12 = column 11 / column 7 %). The proportion of missed individuals represented in most cases less than 5% of the true total number in the sample (9 out of 16 laboratories), though between 10% and 14% were missed in a few instances. A breakdown of the missed individuals by taxonomic group is presented in Table 2.

3.1.2.3 Uniformity of identification

Although most of the species in the distributed sample were identified correctly by the participating laboratories there were some problems with approximately 13% of all identifications. Some problems were evident among the smaller bivalve mollusc specimens including *Abra nitida* (often identified as *A. alba*), *Nucula sulcata* (identified as *Nucula nitidosa*) and *Tellimya ferruginosa* (as *Abra* or *Mysella*). Also mis-identified were *Chaetoderma nitidulum* and *Falcidens crossotus*. The polychaetes *Ancistrosyllis groenlandica* and *Lumbrineris hibernica* were also mis-identified. Some of the smaller molluscs such as *Hyala vitrea* and *Alvania abyssicola* were missed in the sample residue.

3.1.3 Comparison of Similarity Indices (Bray-Curtis)

The fauna list for each sample obtained by the participating laboratory was compared with the list obtained for the same sample following its re-examination by Unicomarine Ltd. The comparison was made by calculating the Bray-Curtis similarity index for the pair of samples using non-transformed data. The results of this calculation are presented in Table 1 (column 14). There was considerable variation among laboratories in the values calculated for the index, from 49% to 97%, with an average value of 82%. The index for the majority of laboratories (10 of 16) was in excess of 80%. The variation and relatively low average Bray-Curtis similarity indices can be attributed in most cases to new and previously extracted taxa found in the residue by Unicomarine and several identification differences. An indication of the reason for the relatively poor agreement between the analysis of the sample by Unicomarine Ltd. and the participating laboratories is given where relevant in Section 6.

3.1.4 Biomass determinations

A comparison of the estimates of the biomass made by the participating laboratories and Unicomarine Ltd. broken down by major taxonomic group for the MB04 circulation is presented in Table 3. The average difference between the two values was +20%, with the measurement made by Unicomarine Ltd. typically being less (*ie.* lighter) than that made by the participating laboratory. In eleven of fourteen instances the difference in measurements was less than 40%. The range was -67% (measurements by laboratory were greater than those made by Unicomarine Ltd.) to +57% (measurements by laboratory were less than those made by Unicomarine Ltd.).

3.2 Own Sample (OS)

3.2.1 General comments

Following the request to participating laboratories to submit a list of samples for re-analysis thirty-eight samples were received from fourteen laboratories, together with descriptions of their origin and the collection and analysis procedures employed. Samples were identified as OS02, OS03 and OS04 on receipt. Ten laboratories did not participate in this component, including five NMP laboratories. The nature of the samples varied markedly. Samples were received from estuarine and marine locations, both intertidal and subtidal. The sediment varied from mud to gravel and from 10ml to 31 of residue. The associated fauna of the samples was also very varied; the number of taxa recorded ranged from 1 to 75, and the number of individuals from 2 to 3828.

3.2.2 Efficiency of sample sorting

Table 4 displays a summary of the data obtained from the analysis of the Own Sample exercise. All taxa identified by the participating laboratory were included in the analysis. In eighteen cases (approximately half of the comparisons) the number of taxa recorded by the participating laboratories was identical to that obtained by Unicomarine Ltd. (Table 4, column 4). In the twenty exceptions, the difference was at most nine taxa and the average difference was less than two taxa.

The data for the numbers of individuals recorded (Table 4, columns 6 & 7) shows a range of differences from the value obtained from re-analysis of between 0% and 88%. The average difference is 8.5% (only nine samples exceeded this average). Thirteen of the samples received showed 100% extraction of fauna from residue (Table 4, column 12), and in nineteen samples various numbers of individuals (but no new taxa) were missed during sorting (Table 4, column 11). The remaining samples contained taxa in the residue which were not previously extracted, the worst example being nine new taxa found in the residue (Table 4, column 10).

3.2.3 Uniformity of identification

Taxonomic differences between participating laboratory and Unicomarine Ltd. results were found in half the samples received. An average of two taxonomic differences per laboratory were recorded; in the worst instance eleven differences in identification occurred. A great variety of samples (and hence fauna) was received and no particular faunal group was found to cause problems.

3.2.4 Comparison of Similarity Indices (Bray-Curtis)

The procedure for the calculation of the similarity index was as used for the MB exercise. The Bray-Curtis similarity index figures (Table 4, column 14) ranged from 28% to 100%, with an average of 92%. This indicates that, with the exception of two samples, there was a generally high degree of similarity between the data-sets produced separately from the same sample by the participating laboratories and Unicomarine Ltd. Seven samples gave similarity figures of 100%, this included all three samples from LB13. It is worth noting that a small number of differences between samples can result in a large difference in the Bray-Curtis index. This difference does not necessarily reflect the laboratory's interpretative ability.

3.2.5 *Biomass determinations*

It was not possible to make a comparison of the biomass determination in all cases; in some no data were provided, in others it was in a different format from that requested. Table 5 shows the comparison of the participating laboratory and Unicomarine Ltd. biomass figures by major taxonomic groups. The total biomass values obtained by all the participating laboratories were generally higher than those obtained by Unicomarine Ltd. The average was a 34% difference between the two sets of results, the range was from 3% to 76%. The reason for these large differences is unknown but is presumably a combination of variations in apparatus (*eg.* calibration) and operator technique (*eg.* period of, and effort applied to, drying). Further analysis of biomass results by major taxonomic groups indicated an average difference of 48% for polychaetes, 54% for crustaceans and 19% for molluscs. These figures emphasise the variability caused by duration and method of drying. The hard bodied mollusc showed somewhat less variation presumably because of the lesser effect on them of more rigorous drying.

3.3 Particle Size Analysis (PS)

3.3.1 *General comments*

As commented upon previously, variations in the format of returned data again presented some problems in comparing the results of the analysis of the PS08 and PS09 samples. Some laboratories continued to submit results in micrometres rather than the requested half-phi intervals, though the situation had improved somewhat.

As previously reported the results presented are for a limited number of analytical laboratories as this component of the Scheme was not uncommonly sub-contracted to the same specialist laboratory.

3.3.2 *Analysis of sample replicates*

Following the approach adopted 1995/96, replicate samples of the sediment used for the two PS distributions were analysed using both sieve and laser techniques. This was adopted after the earlier results indicated a clear difference according to the analytical technique used to obtain them. Half of the replicates (six or seven samples) were analysed using the Malvern laser (as for the first year of the Scheme) and half by the sieve and pipette technique.

There was a high degree of similarity between the replicates for sample PS08 (see Table 6 and Figure 1), though as previously observed the distribution curves produced by the two techniques clearly differed. The agreement between the replicates was less good for sample PS09 (see Table 7 and Figure 2) analysed using the laser technique. The agreement for the replicates analysed by sieve was comparable to that for PS08. Sample PS09 was prepared from a number of natural sediments and this may have resulted in more variation, though it is unclear why this should have been reflected more in the results from the laser analysis than those from sieve analysis.

3.3.3 *Results from participating laboratories*

Summary statistics for the two PS circulations are presented in Tables 8 and 9. After resolution of the differences in format, the size distribution curves for each of the sediment samples were plotted and are presented in Figures 3 and 4. Included on each of these Figures for comparison is the mean distribution curve(s) for the replicate samples as obtained by Unicomarine Ltd.

3.3.3.1 *PS08*

The circulation appeared to pose few problems and the results formed two fairly close groups reflecting the two major analytical techniques.

3.3.3.2 *PS09*

There was more variation in the results for this sample although the difference between the analytical techniques was still apparent. Results for one laboratory were clearly anomalous; it seems possible that a recording error was responsible. The results for two other laboratories (LB10 and LB18, both using laser analysis) were also slightly unusual. For these two laboratories the results for the finer components appeared somewhat depressed compared to those from the other laboratories and the replicate analyses.

3.4 Ring Test Circulations (RT)

3.4.1 *General comments*

The implementation of this part of the Scheme was the same as for the first two years. Two circulations of twenty-five specimens were made. For RT08 the species were from a variety of Phyla (as for years One and Two) while for RT09 all specimens were from the polychaete family Cirratulidae. In addition for RT09 a version of a new key to the family Cirratulidae was circulated together with other information relating to the family. A trial version of a PC-based image collection was also distributed. This consisted of a small Windows application which displayed images of cirratulid species to accompany the key. The aim of this circulation was for all participating laboratories to attempt the identification of the specimens using the same key. Part of a workshop addressing some of the problems identified by the NMBAQC Scheme was used to follow up the results and problems encountered with RT09. Other aspects of the two circulations, in particular the method of scoring results, were the same as for previous circulations. Overall for RT08, 16 laboratories returned samples and data; 8 non-returns. For RT09, 15 laboratories returned samples and data; 9 non-returns

3.4.2 *Returns from participating laboratories*

Each laboratory returned a list of their identifications of the taxa together with the specimens. The identifications made by the participating laboratories were then compared with the AQC identification 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 'flag' 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 'flagged' (ie. different from the AQC identification) was through differences in spelling of what was clearly intended to be the same species. There were three main reasons for these differences

- Variation in the 'accepted' spellings, eg. *Nepthys*, *Nephtys*, *hombergi & hombergii*.
- Use of a different synonym for a species, eg. *Nucula turgida* for *Nucula nitidosa.*
- Simple mis-spelling of a name, eg. *Erichonius* for *Ericthonius*.

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 10 and 11, respectively, present the identifications made by each of the participating laboratories for each of the twenty-five specimens in RT circulations RT08 and RT09. 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.

3.4.2.1 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 ie. for each instance where text other than a dash or a bracketed name appears in the appropriate column in Tables 10 and 11. 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.

3.4.3 Ring Test distribution results

The RT component of the Scheme differed in 19967/97 as there was only a single 'standard' exercise (RT08). RT09 was targeted on a single family, the Cirratulidae. The circulation was designed as more of a learning exercise, making use of a key specially prepared for the circulation.

3.4.3.1 Eighth distribution - RT08

Table 10 presents the results for the RT08. For the majority of the distributed taxa there was good agreement between participating laboratories and the identification made by Unicomarine Ltd. A small number of taxa were again responsible for the majority of differences and these are described briefly below.

A single species (*Pista cristata*) accounted for 50% of the differences at the level of genus. Three species (*Pista cristata*, *Corophium insidiosum* and *C. acherusicum*) accounted for 25 of 48 differences (52%) at the level of species. There is variation in the distribution and number of spines within species in the genus *Corophium*. Small specimens may be difficult to identify without a satisfactory growth series with which to compare animals.

3.4.3.2 Ninth distribution - RT09

RT09 contained only Cirratulidae and was accompanied by a new key to the family and also a trial version of a PC-based database of images of the species. The results from the circulation are presented in Table 11 in the same manner as for the other circulations. It is clear that some problems still remain with identification of members of the family. Follow-up examination of the group was made at a workshop in November 1996 (Millport, Isle of Cumbrae) and the key has since been revised. A further examination of the group is planned.

Every species and most specimens caused some problems (some species were represented by multiple specimens) and every laboratory had some different identifications from the AQC identification. This was expected as it is a difficult family and many of the specimens were small or incomplete. This was a deliberate investigation of the effect of these factors on identification. Also, single specimens were often used whereas samples generally contain many specimens, which allow for more comparison of features. This was due to limited material for use in the ring test. A knowledge of habitat is also useful, especially in separating the species types of *Tharyx* and *Aphelochaeta*. The *Chaetozone setosa* complex was not split for the purposes of the analysis. All segregates (*eg.* Type A*)* were regarded as correct identifications for the taxon.

In spite of these problems, most species were correctly identified by the majority of laboratories. The exception was *Tharyx killariensis*, which was often recorded as an *Aphelochaeta* or as *Tharyx* A. This is probably due to the subjectivity of the features available for identifying incomplete specimens, and to the poor quality of some of the specimens. Other problem areas highlighted by the test included the distinctions between the two forms of *Aphelochaeta* and of *Tharyx* as well as those between *Caulleriella zetlandica*, *Chaetozone setosa* agg. and *C. gibber*. The small specimens of *Aphelochaeta marioni* were more troublesome than the large ones in spite of the fact that they had their tails, which were absent from the large ones. Most were recorded as *Aphelochaeta* but many were assigned to type A (or B, for the small specimens). For *Chaetozone setosa* agg. small size caused more problems than lack of tails but for *Tharyx* spp. complete specimens proved to be much easier than front ends. Nearly all participants mis-identified the tail-less *T. killariensis*.

Some of these problems have been addressed in a revision of the key but it is likely that not much more is possible in some cases. It may be that the key should be made for complete specimens, with comments on identification of damaged specimens given in a more descriptive format. There will also be a few taxonomic changes in the light of new literature and observations made at the workshop and by experts. For

example, *Caulleriella* cf. *viridis* may be only a form of *C. bioculata*. *C. parva* has been included in the revised edition of the work by Hartmann-Schröder and *Tharyx vivipara* transferred to the genus *Aphelochaeta*. There are also many problems yet to be resolved in the genera *Dodecaceria*, *Cirratulus* and *Aphelochaeta*.

3.4.4 *Differences between participating laboratories*

Figure 5 presents the number of differences recorded for the RT08 circulation 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.

3.4.5 *Differences by taxonomic group*

Most of the differences of identification were of the two amphipods, *Corophium insidiosum* and *C. acherusicum*. These two species resulted in approximately 46% of the total number of differences being attributable to Crustacea. Polychaeta were responsible for 40% of the total number of differences. For this circulation the Mollusca and Echinodermata appeared to pose few problems.

3.5 Laboratory Reference (LR)

3.5.1 *General comments*

The value of reference material in assisting the process of identification cannot be over-emphasised. Accordingly the LR component of the Scheme was introduced to assess the ability of participating laboratories to identify material from their own area, or with which they were familiar. Overall, 17 laboratories returned samples and data; 7 non-returns

3.5.2 *Returns from participating laboratories*

The identification of the specimens received from the participating laboratories was checked and the number of differences at the level of genus and species calculated, in the same manner as for the RT exercises. The results to date for this component are presented in Table 13. There was generally good agreement between the identifications made by the participating laboratories and those made by Unicomarine Ltd.

4. Discussion of Results

The results presented in the Tables and the discussions below should be read in conjunction with the comments on individual laboratories made in Section 6.

4.1 Macrobenthic Analyses

The sample distributed as MB04 posed rather different problems to participating laboratories compared to the samples of previous circulations. The extraction of fauna from the sediment was relatively straightforward due its very fine muddy consistency. However, after sieving the samples, laboratories were left with a mixture consisting of countable fauna and numerous sections of animals. At this stage many laboratories failed to extract all the countable material and in other cases

recorded headless specimens. Identification caused some problems, probably due to unfamiliarity with the fauna of the north-western offshore mud sample.

There was considerable variation between the estimates of total biomass made by the participating laboratories and Unicomarine Ltd. In most cases measurements made by the participating laboratories were greater than those made by Unicomarine Ltd., up to a maximum of 57% heavier. In one instance (Laboratory 08) the measurement was considerably lighter (-67%). Overall the average difference between the values determined by the participating laboratories Unicomarine Ltd. was 20% (ie. laboratory measurements were heavier than those made by Unicomarine Ltd.).

It seems likely that the main reason for the observed difference between the measurements is more thorough drying by Unicomarine Ltd. prior to weighing. A similar observation was made in previous years of the Scheme.

4.2 Own Sample analyses

Considering just the Bray-Curtis index as a measure of similarity between the results obtained by the participating laboratories and those obtained from the same sample by Unicomarine Ltd. participating laboratories performed better in the OS exercises than in the MB04 exercise. The average value of the index was 92% for the OS, compared with 82% for MB04. The average values of the other individual measures of processing performance (% of taxa extracted and identified, % individuals extracted) were comparable to, or slightly worse than those obtained for the MB04 exercise. The differences in these measures were out-weighed by the generally better identification of the fauna in the samples. This was to be expected considering that in most cases participating laboratories would be much more familiar with the fauna of the OS samples. Bray-Curtis index is influenced more by differences in the identification of a number of taxa than by relatively small differences in the estimated abundance of any given taxon.

4.3 Particle Size Analyses

As has been observed on previous circulations there was a clear difference between the two main techniques employed for analysis of the samples (laser and sieve). The sample distributed as PS08 appeared from an analysis of replicates (Figure 1) to be very uniform and indeed the results from participating laboratories (Figure 3) were quite closely grouped.

The agreement between the PS09 replicates analysed by sieve was also good though there was more scatter in the results from the laser for replicates from the same sample. This sample appeared to pose more problems for the participating laboratories and there was somewhat more spread in the results.

Given the obvious difference between the analytical techniques as illustrated in these and earlier PS circulations it is clear that there can be no single 'correct' determination of the particle size distribution of a sediment sample. It is essential that the analytical method is stated when attempting to compare results.

4.4 Ring Test distributions

The results were in general comparable with those from the first two years of the Scheme 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.

4.5 Laboratory Reference

In view of the different species sent by laboratories for identification it is inappropriate to make detailed inter-lab comparisons. Some overall assessment of the performance is considered of value however. For the laboratories returning a collection, the average number of differences at the level of genus was 0.7 and in most cases (15 of 17) laboratories had no differences or only a single difference. The situation was similar for identification at the level of species where at most a single difference in identification was recorded (12 of 17 laboratories). In view of the range of species submitted it was not possible to identify a single taxon causing the majority of problems. Small molluscs and Syllidae (Polychaeta) were fairly frequent in the list of differences however and may be the subject of a future targeted Ring Test.

The results from this new component were very encouraging with good performance from all laboratories. It was apparent from comments received from some laboratories that there had been differences in approach to this component of the Scheme. Some laboratories elected to send material from their collections, representing common species in the samples with which they were familiar. As such these species were well known to the laboratory in question and problems of identification had been resolved. Other laboratories chose to utilise the exercise to obtain a 'second opinion' on some of the more problematic species encountered in their samples, or on identifications made by sub-contractors to the laboratory concerned. Laboratories adopting the latter approach appeared to have recorded more differences from the NMBAQC identification than those submitting more 'straightforward' taxa particularly at the specific level.

The results for this exercise should be viewed with this difference of approach in mind. The results presented in Table 13 are arranged by LabCode; it is not considered appropriate to assign any rank to the laboratories. Each participant should deliberate therefore on the aim of this component in terms of data quality assessment.

5. Application of NMBAQC Scheme standards

The primary purpose of the NMBAQC Scheme is to assess the reliability of data collected as part of the National Monitoring Plan. With this aim a target standard has been defined for certain of the Scheme components (see below and 1995/96 report). Laboratories meeting or exceeding the required standard for a given component would be considered to have performed satisfactorily for that particular component. A flag indicating a 'Pass' or 'Fail' would be assigned to each laboratory for each of the components concerned. It should be noted that only the OS and PS exercise have

been used in 1996/97 for 'flagging' for the purposes of the National Monitoring Plan. As the Scheme progresses, additional components may be included. In the mean time, the other components of the Scheme as presented above are considered of value as more general indicators of laboratory performance, or as training. The application of the "quartiles" approach proposed in 1995/96 for general performance is not presented.

5.1 Description of Standards

The required level of performance as set by the NMBAQC steering committee for the Own Sample and Particle Size Analysis exercises is described briefly below. The flags applied to the various exercise are based on a comparison of the results from sample analysis by Unicomarine Ltd. and those from the laboratory. The OS exercise has several aspects, each with a separate standard. Each of the standards has been calculated independently for each of the three OS exercise. The PS standard is based solely upon the determination of the Silt-Clay fraction in the sample and has been calculated independently for the two PS exercises. The process of assigning the flags for each component is described below. The target standards and recommended protocols may be modified in the future. A single standard 'averaged' value calculated across several components was found to be impracticable.

The target values for each components and the corresponding laboratory results are presented in Table 13 (OS) and Table 14 (PS). The assigned flags for each laboratory for each component are also given. An assessment is performed separately for each of the three OS samples. Pooling the results for the samples and applying a single flag was inappropriate because of the wide variation in the nature of the samples received from an individual laboratory.

5.1.1 Own Sample - Extraction efficiency - Total Taxa target

This flag relates to the performance of the laboratory with respect to the efficiency with which the animals were extracted from the OS samples. The 'correct' total number of taxa is assumed to be that resulting from re-analysis of the samples by Unicomarine Ltd. To achieve a pass the number of taxa extracted should be within ±10% or ±2 taxa (whichever is greater) of this total. In Table 13, target values for each sample are shown in column 3 and the actual value determined by the laboratory in column 2.

5.1.2 Own Sample - Extraction efficiency - Total Individuals target

This flag reflects the efficiency with which the laboratories estimated the number of individuals in the sample. The total should be within ±10% or ±2 individuals (whichever is greater) of the total resulting from re-analysis of the samples by Unicomarine Ltd. In Table 13, target values for each sample are shown in column 6 and the actual value determined by the laboratory in column 5.

5.1.3 Own Sample - Total Biomass target

The total value should be within ±20% of the value obtained from re-analysis of the sample. In Table 13, target values for each sample are shown in column 9 and the actual value determined by the laboratory in column 8.

5.1.4 Own Sample - Bray-Curtis comparison

Comparison of the two data sets, from re-analysis by Unicomarine Ltd. and by the participating laboratory, should result in a Bray-Curtis similarity index of ≥90%.

5.1.5 Own sample - Overall flag

In view of the variation in the estimation of biomass (reported in Section 3.2.5) the flag for this component has not been included in the determination of the overall flag for the OS exercises. An overall flagging mechanism (Table 13. column 14) has been agreed and set by examining the flags for the individual components. To attain an overall "Pass" flag for the OS exercise on which to base a filtering system for the NMP data base, it is required that laboratories obtain passes for six of the nine individually flagged exercises *ie.* 3 samples x 3 flagged items (number of taxa, individuals, Bray-Curtis).

5.1.6 Particle Size Analysis - Silt-Clay fraction

Only a single aspect of the PS exercises has been considered when preparing the table of flags. Laboratories are required to determine the silt-clay (<63μm) fraction to within ±10 percentage points of the mean of the results from all laboratories. Table 14 presents the actual values provided by laboratories and the acceptable range based upon the mean from all laboratories. This analysis has been made separately for PS08 and PS09.

In some cases, although returns for the PS exercises were made by laboratories, only data for the production of the particle size distribution curves was provided. No flag has been assigned if the required summary statistics were not also provided by the laboratory. This is indicated as "not supplied" in the table. Where no returns were made for the exercise this is indicated with a "-".

5.2 Laboratory Performance

The standards described above have been applied to the results detailed in Section 4 and the performance of each of the participating laboratories with respect to these standards is summarised in Tables 13 and 14 (OS and PS exercises respectively). The tables should be should be read in conjunction with the comments on individual laboratories' results made in Section 6.

It can be seen from Table 13 that for the OS exercise the majority of laboratories are considered to have met or exceeded the required standard for three of the OS targets - the enumeration of taxa and individuals and the Bray-Curtis comparison. Overall 84% of the comparisons were considered to have passed the enumeration of taxa standard; 82% exceeded the enumeration of individuals standard and 72% passed the Bray-Curtis comparison standard. Performance with respect to the biomass standard was less good however with almost three-quarters of the participating laboratories (72%) failing to meet the standard. This particular aspect of analysis is under examination in an attempt to minimise the variation due to technique.

It may be seen from Table 14 that all but one of the laboratories were considered to have passed the current standard. The same result is obtained if the required range is

restricted further such that a laboratory must be within ±5 percentage points of the mean of the results from all laboratories.

6. Comments on individual laboratories

Brief comments on the results for individual laboratories are provided below. These are not intended to be detailed discussion of all aspects of the results but provide an indication of the main issues arising for each of the exercises.

In the comments below the results for RT08 are expressed in terms of their position with respect to the results from all laboratories. The overall range of differences at the level of species was 0 to 6. Three ranges have been recognised according to the number of differences: Low (0 to 2 differences), Mid (>2 to 4 differences), High > 4 differences). Each laboratory has been placed into a group for information only, on this basis. Only the results from RT08 have been used, RT09 was the 'targeted' circulation and is considered more valuable as a training exercise.

Laboratory - LB01

Macrobenthos

One specimen not picked from residue. Minor count variance due to laboratory counting two headless *Rhodine loveni*. Bray-Curtis similarity index high (97%).

Own Sample

OS02-Count variance of three individuals. Bray-Curtis similarity index of 98%.
OS03-Bray-Curtis similarity index of 100%.
OS04-Two *Mytilus edulis* juveniles individuals not picked from residue. Bray-Curtis similarity index of 89%

Particle size

PS08 - No major differences in size distribution curve.
PS09 - No major differences in size distribution curve, non-standard intervals.

Ring Test

RT08 - Number of differences from AQC identification in Low group.

Laboratory Reference

One generic and one specific difference.

Laboratory - LB02

Macrobenthos

No sample returned.

Own Sample

OS02-Count variance of twenty individuals. Nine individuals not picked from residue. Bray-Curtis similarity index of 99%. Taxa not split, therefore biomass not comparable.
OS03-Sub-sampled residue. Count variance of two hundred and forty-four individuals. Bray Curtis similarity index of 97%. Biomass not comparable due to sub-sampling procedures.

OS04-Sub-sampled residue. Count variance of one hundred and sixteen individuals. Twenty-four individuals not picked from sub-sample residue. Bray-Curtis similarity index of 98%. Biomass not comparable due to sub-sampling procedures.

Particle size

PS08 - No major differences in size distribution curve.
PS09 - No major differences in size distribution curve.

Ring Test

RT08 - Number of differences from AQC identification in Low group.

Laboratory Reference

One specimen pot contained a mixture of species.

Laboratory - LB03

Macrobenthos

No sample returned.

Own Sample

OS02-No sample received.
OS03-No sample received.
OS04-No sample received.

Particle size

PS08 - No results received.
PS09 - No results received.

Ring Test

No results received.

Laboratory Reference

No specimens received.

Laboratory - LB04

Macrobenthos

One taxonomic difference (Mollusca). Eight individuals not picked from residue including four previously unpicked taxa. Two spelling errors. Bray-Curtis similarity index comparatively high (91%).

Own Sample

OS02-Sub-sampled residue. Eleven taxonomic differences. Count variance of twelve individuals. Eighty-six individuals not picked from residue including seven previously unpicked taxa. Bray-Curtis similarity index of 73%.
OS03-Sub-sampled residue. Five taxonomic differences. Count variance of eighty-two individuals. Three hundred and eighty individuals missed in residue including two previously unpicked taxa. Bray-Curtis similarity index of 69%.
OS04-Three taxonomic differences. Count variance of one individual. Twenty-one individuals not picked from residue including five previously unpicked taxa. Bray-Curtis similarity index of 96%.

Particle size

PS08 - No major differences in size distribution curve.
PS09 - No major differences in size distribution curve.

Ring Test

RT08 - Number of differences from AQC identification in Mid group.

Laboratory Reference

One generic and two specific differences. One spelling error.

Laboratory - LB05

Macrobenthos

No sample returned.

Own Sample

OS02-No sample received.
OS03-No sample received.
OS04-No sample received.

Particle size

PS08 - No results received.
PS09 - No results received.

Ring Test

No results received.

Laboratory Reference

One specimen pot contained a mixture of species. Three specific differences. One specimen name change.

Laboratory - LB06

Macrobenthos

No sample returned.

Own Sample

OS02-Ten individuals not picked from residue. Three vials contained obvious accidental mixtures of species. Bray-Curtis similarity index of 98%.
OS03-Bray-Curtis similarity index of 100%.
OS04-Bray-Curtis similarity index of 100%.

Particle size

PS08 - No major differences in size distribution curve.
PS09 - No major differences in size distribution curve.

Ring Test

No results received.

Laboratory Reference

No specimens received.

Laboratory - LB07

Macrobenthos

One taxonomic difference (Mollusca). Nine individuals not picked from residue including five previously unpicked taxa. Two spelling errors. Count variance of three individuals. Bray-Curtis similarity index comparatively high (88%). Biomass barely comparable (<0.01).

Own Sample

OS02-No sample received.
OS03-No sample received.
OS04-No sample received.

Particle size

PS08 - No major differences in size distribution curve.
PS09 - No major differences in size distribution curve.

Ring Test

RT08 - Number of differences from AQC identification in Mid group.

Laboratory Reference

No specimens received.

Laboratory - LB08

Macrobenthos

One taxonomic difference (Mollusca). Three individuals not picked from residue including one previously unpicked taxon. One spelling error. Bray-Curtis similarity index comparatively high (94%).

Own Sample

OS02-Twenty-one individuals not picked from residue including two previously unpicked taxa. Bray-Curtis similarity index of 28%. Taxa not individually split.
OS03-Two taxonomic differences. Twenty-six individuals not picked from residue including seven previously unpicked taxa. Bray-Curtis similarity index of 80%. Taxa not individually split therefore biomass not comparable.
OS04-One taxonomic difference. Fifteen individuals not picked from residue including nine previously unpicked taxa. Bray-Curtis similarity index of 73%. Taxa not individually split therefore biomass not comparable.

Particle size

PS08 - No major differences in size distribution curve.
PS09 - No results received.

Ring Test

RT08 - Number of differences from AQC identification in Mid group.

Laboratory Reference

Only twenty specimen pots received. All correctly identified.

Laboratory - LB09

Macrobenthos

No sample returned.

Own Sample

OS02-No sample received.
OS03-No sample received.
OS04-No sample received.

Particle size

PS08 - No major differences in size distribution curve.
PS09 - No results received.

Ring Test

RT08 - Number of differences from AQC identification in Mid group.

Laboratory Reference

No specimens received.

Laboratory - LB10

Macrobenthos

Four taxonomic differences. Five individuals not picked from residue including one previously unpicked taxon. 'Polychaete Fragments' vial contained two countable new taxa. Count variance of one individual. Bray-Curtis similarity index below the average figure attained (79%).

Own Sample

OS02-Forty-nine individuals not picked from residue including one previously unpicked taxon. Count variance of three individuals. Two vials contained a mixture of species. Bray-Curtis similarity index of 96%.
OS03-Two taxonomic differences. Forty-eight individuals not picked from residue including two previously unpicked taxa. Count variance of two individuals. Two vials contained a mixture of species. Bray-Curtis similarity index of 86%.
OS04-Three taxonomic differences. Thirteen individuals not picked from residue including three previously unpicked taxa. Count variance of one individual. Two vials contained a mixture of species. Bray-Curtis similarity index of 90%.

Particle size

PS08 - No major differences in size distribution curve.
PS09 - No major differences in size distribution curve.

Ring Test

RT08 - Number of differences from AQC identification in Low group.

Laboratory Reference

All correctly identified. One specimen name change and one spelling error.

Laboratory - LB11

Macrobenthos

Two taxonomic differences. Two headless specimens incorrectly enumerated. Bray-Curtis similarity index slightly above the average figure attained (88%).

Own Sample

OS02-No sample received.

OS03-Twelve individuals not picked from residue including one previously unpicked taxon. Count variance of twelve individuals. Bray-Curtis similarity index of 99%.

OS04-Three individuals not picked from residue. Count variance of twenty-four individuals. One vial contained a mixture of species. Bray-Curtis similarity index of 99%.

Particle size

PS08 - No major differences in size distribution curve.

PS09 - No major differences in size distribution curve.

Ring Test

RT08 - Number of differences from AQC identification in Low group.

Laboratory Reference

All correctly identified. One spelling error.

Laboratory - LB12

Macrobenthos

Seven taxonomic differences. Two individuals not picked from residue including one previously unpicked taxon. 'Polychaete Bits' vial contained three countable individuals from two previously unidentified taxa. One spelling error. Count variance of one individual. Bray-Curtis similarity index very low (63%).

Own Sample

OS02-Several vials damaged in transport. Two taxonomic differences. Seven individuals not picked from residue including one previously unpicked taxon. Five vials contained mixtures of species. Count variance of three individuals. Bray-Curtis similarity index of 97%.

OS03-Several vials damaged in transport. Five taxonomic differences. Twenty-four individuals not picked from residue including two previously unpicked taxa. Three vials contained mixtures of species. Count variance of two individuals. Bray-Curtis similarity index of 94%.

OS04-Several vials damaged in transport. Six taxonomic differences. Forty-eight individuals not picked from residue including four previously unpicked taxa. Two vials contained mixtures of species. Count variance of one individual. Bray-Curtis similarity index of 84%.

Particle size

PS08 - No major differences in size distribution curve.

PS09 - No results received.

Ring Test

RT08 - Number of differences from AQC identification in Mid group.

Laboratory Reference

One generic and three specific differences. One spelling error.

Laboratory - LB13

Macrobenthos

Three taxonomic differences. Two individuals not picked from residue. Bray-Curtis similarity index comparatively high (90%).

Own Sample

OS02-Bray-Curtis similarity of 100%.
OS03-Bray-Curtis similarity of 100%.
OS04-Bray-Curtis similarity of 100%. Very small volume of residue.

Particle size

PS08 - No major differences in size distribution curve.
PS09 - Size distribution curve depressed.

Ring Test

RT08 - Number of differences from AQC identification in High group.

Laboratory Reference

One specific difference. Two spelling errors and one specimen name change.

Laboratory - LB14

Macrobenthos

Eight taxonomic differences. Three individuals not picked from residue including two previously unpicked taxa. Bray-Curtis similarity index low (73%).

Own Sample

OS02-Four taxonomic differences. Three vials contained mixtures of species. Count variance of seventeen individuals. Bray-Curtis similarity index of 94%.
OS03-One taxonomic difference. Two individuals not picked from residue including one previously unpicked taxon. Four vials contained mixtures of species. Three vials contained specimens in water. Count variance of two individuals. Bray-Curtis similarity index of 99%.
OS04-One vial contained an obvious accidental mixture of species. Count variance of one individual. Bray-Curtis similarity index of 98%.

Particle size

PS08 - No major differences in size distribution curve.
PS09 - Size distribution curve markedly shifted to finer fractions.

Ring Test

RT08 - Number of differences from AQC identification in High group.

Laboratory Reference

Two generic and three specific differences. One specimen name change.

Laboratory - LB15

Macrobenthos

No sample returned.

Own Sample

OS02-No sample received.
OS03-No sample received.
OS04-No sample received.

Particle size

PS08 - No results received.
PS09 - No results received.

Ring Test

No results received.

Laboratory Reference

No specimens received.

Laboratory - LB16

Macrobenthos

One taxonomic difference (Mollusca). Three individuals not picked from residue including two previously unpicked taxa. Bray-Curtis similarity index comparatively high (89%). Biomass barely comparable (<0.001).

Own Sample

OS02-Two taxonomic differences. Two individuals not picked from residue. Count variance of one individual. Bray-Curtis similarity index of 93%. No biomass data available.
OS03-No sample received.
OS04-Three taxonomic differences. Eleven individuals not picked from residue including two previously unpicked taxa. Two vials contained mixtures of species. Count variance of three individuals. Bray-Curtis similarity index of 99%. No biomass data available.

Particle size

PS08 - No results received.
PS09 - No results received.

Ring Test

RT08 - Number of differences from AQC identification in High group.

Laboratory Reference

Twenty-four specimens received. All correctly identified.

Laboratory - LB17

Macrobenthos

One taxonomic difference (Mollusca). One individual not picked from residue, this being a taxon not previously picked. One spelling error. Bray-Curtis similarity index is below the average figure attained (71%).

Own Sample

OS02-No sample received.
OS03-Eleven taxonomic differences. Five individuals not picked from residue. Nine vials contained mixtures of species. Count variance of eight individuals. Bray-Curtis similarity index of 92%.
OS04-No sample received.

Particle size

PS08 - No major differences in size distribution curve.
PS09 - Size distribution curve depressed.

Ring Test

RT08 - Number of differences from AQC identification in High group.

Laboratory Reference

Three generic and five specific differences - laboratory indicated that exercise had been used to obtain second opinion on problem specimens.

Laboratory - LB18

Macrobenthos

Two taxonomic differences. One spelling error. Bray-Curtis similarity index comparatively high (95%).

Own Sample

OS02-Bray-Curtis similarity of 100%.
OS03-Two individuals not picked from residue including one previously unpicked taxon. One vial contained a mixture of species. Bray-Curtis similarity index 83%.
OS04-One taxonomic difference. Eleven individuals not picked from residue including one previously unpicked taxon. Two vials contained mixtures of species. Count variance of two individuals. Bray-Curtis similarity index of 96%.

Particle size

PS08 - No major differences in size distribution curve.
PS09 - Size distribution curve depressed above 3 phi.

Ring Test

RT08 - Number of differences from AQC identification in Mid group.

Laboratory Reference

All correctly identified.

Laboratory - LB19

Macrobenthos

No sample returned.

Own Sample

OS02-No sample received.
OS03-No sample received.
OS04-No sample received.

Particle size

PS08 - No major differences in size distribution curve.
PS09 - No major differences in size distribution curve.

Ring Test

RT08 - Number of differences from AQC identification in Low group.

Laboratory Reference

One generic and one specific difference.

Laboratory - LB20

Macrobenthos

Four taxonomic differences. Four individuals not picked from residue. '*Monticellina dorsobranchialis* ' vial also contained one *Tharyx killariensis*. Count variance of one individual. Bray-Curtis similarity index comparatively high (91%).

Own Sample

OS02-One taxonomic difference. **No residue provided for re-analysis**. Bray-Curtis similarity index of 99%. No biomass data available.
OS03-One taxonomic difference. One individual not picked from residue this being a previously unpicked taxon. Count variance of one individual. Bray-Curtis similarity index of 90%. No biomass data available.
OS04-One taxonomic difference. **No residue provided for re-analysis**. Bray-Curtis similarity index of 99.7%. No biomass data available.

Particle size

PS08 - No major differences in size distribution curve.
PS09 - No major differences in size distribution curve.

Ring Test

RT08 - Number of differences from AQC identification in Low group.

Laboratory Reference

One generic and one specific difference. Three spelling errors.

Laboratory - LB21

Macrobenthos

No sample returned.

Own Sample

OS02-No sample received.
OS03-No sample received.
OS04-No sample received.

Particle size

PS08 - No results received.
PS09 - No results received.

Ring Test

No results received.

Laboratory Reference

No specimens received.

Laboratory - LB22

Macrobenthos

One taxonomic difference (Polychaete). Six individuals not picked from residue including three previously unpicked taxa. One empty and incorrectly identified gastropod. One spelling error. Count variance of one individual. Bray-Curtis similarity index relatively high (89%).

Own Sample

OS02-No sample received.
OS03-No sample received.
OS04-No sample received.

Particle size

PS08 - Curve could not be plotted because of presentation format.
PS09 - No major differences in size distribution curve.

Ring Test

No results received.

Laboratory Reference

No specimens received.

Laboratory - LB23

Macrobenthos

Four taxonomic differences. One spelling error. Bray-Curtis similarity index considerably below the average figure attained (63%).

Own Sample

OS02-No sample received.
OS03-No sample received.
OS04-No sample received.

Particle size

PS08 - No results received.
PS09 - No major differences in size distribution curve.

Ring Test

No results received.

Laboratory Reference

One generic and one specific difference.

Laboratory - LB24

Macrobenthos

Ten taxonomic differences. Two individuals not picked from residue including one previously unpicked taxon. Count variance of one individual. Bray-Curtis similarity index very low (50%).

Own Sample

OS02-Not applicable.
OS03-Not applicable.
OS04-Not applicable.

Particle size

PS08 - Not applicable.
PS09 - Not applicable.

Ring Test

Not applicable.

Laboratory Reference

One specific difference. Two specimen name changes.

7. Conclusions and Recommendations

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

1. There was considerable variation in the speed with which samples and data were returned by participating laboratories and this adversely influenced the ability to report on the results. Laboratories should endeavour to report within the requested time; this would greatly facilitate the analysis of results and effective feedback.
2. Laboratories involved in NMP data submission should endeavour to return data on ALL necessary components of the Scheme in the format requested. This will be required to allow the setting of "flags". Non-return of data could result in assignment of a "Fail" flag.
3. There were problems associated with the measurement of biomass for individual species. Additional consideration needs to be given to the preparation of a standardised protocol and reporting format.
4. There is still considerable variation in the format used to submit results for the PS exercises. This will need to be addressed to improve analysis of this component of the Scheme.
5. Clear differences in the results obtained by different analytical methods make it essential that the technique employed (*eg.*. Laser, sieve) is stated for each PS submission.
6. Laboratories are strongly recommended to implement an in-house reference collection of fauna. The maintenance of a comprehensive collection has numerous benefits for improving identification ability, maintaining consistency of identification between surveys and access to growth series material.
7. Some of the problems with identification including small mollusca may be the subject of a targeted RT. Other groups under consideration are Syllidae and certain Amphipoda.
8. There are some serious problems of taxa missed at the sorting stage. In the MB exercise up to 5 taxa (17% of the actual total in the sample) were not extracted.

The situation was worse for some of the OS samples where a maximum of 9 taxa (43%) were not extracted. On average however, only 1.4 taxa were not extracted. Enumeration of individuals is generally good.

9. The limitations of the Bray-Curtis similarity index should be recognised when interpreting the results from the OS and MB exercises. Of particular importance is the potential for a relatively large effect on the index of few differences in identification and the associated danger of mis-interpreting a low index in terms of quality of service.
10. Protocols should be developed to standardise the approach to headless and partial specimens. This may influence enumeration and biomass estimations.
11. The "averaged" pass / fail standard originally proposed is considered to be unworkable. It is recommended that the OS components are flagged individually and suggested that an overall flag is assigned on this basis.
12. For the RT exercises, the "quartiles" approach proposed in 1995/96 to indicate general performance has not been adopted in the present report. Laboratories have been grouped into three bands with Low, Mid and High number of differences instead.

8. References

Howson, C.M. (ed), 1987. Directory of the British marine fauna and flora. A coded checklist of the marine fauna and flora of the British Isles and its surrounding seas. Marine Conservation Society.

Table 1. Results from the analysis of Macrobenthic sample MB04 by the participating laboratories.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Number of Taxa				Number of Individuals				Not extracted			Individuals	Similarity	Taxonomic
LabCode	PL	UM	Diff (n)	%max	PL	UM	Diff (n)	%max	New Taxa	Ind	%ind	Count Error	index	errors
LB01	21	20	1	4.8	58	57	1	1.7	0	1	1.8	2	97.39	0
LB02	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LB03	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LB04	22	26	-4	15.4	63	71	-8	11.3	4	8	11.3	0	91.05	1
LB05	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LB06	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LB07	24	29	-5	17.2	53	65	-12	18.5	5	9	13.8	-3	88.14	1
LB08	21	22	-1	4.5	37	40	-3	7.5	1	3	7.5	0	93.51	1
LB09	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LB10	27	30	-3	10.0	65	69	-4	5.8	1	5	7.2	1	79.10	4
LB11	21	21	0	0.0	44	42	2	4.5	0	0	0.0	2	88.37	2
LB12	14	16	-2	12.5	32	35	-3	8.6	1	2	5.7	-1	62.69	7
LB13	21	21	0	0.0	39	41	-2	4.9	0	2	4.9	0	90.00	3
LB14	20	22	-2	9.1	55	58	-3	5.2	2	3	5.2	0	72.57	8
LB15	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LB16	30	32	-2	6.3	60	63	-3	4.8	2	3	4.8	0	89.43	1
LB17	10	11	-1	9.1	36	37	-1	2.7	1	1	2.7	0	71.23	1
LB18	19	19	0	0.0	40	40	0	0.0	0	0	0.0	0	95.00	2
LB19	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LB20	31	31	0	0.0	86	89	-3	3.4	0	4	4.5	1	91.43	4
LB21	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LB22	17	19	-2	10.5	38	43	-5	11.6	3	6	14.0	1	88.89	1
LB23	21	21	0	0.0	60	60	0	0.0	0	0	0.0	0	63.33	4
LB24	20	22	-2	9.1	53	56	-3	5.4	1	2	3.6	-1	49.54	10

Key: PL - participating laboratory
UM - Unicomarine Ltd.

Table 2. Comparison of the efficiency of extraction of fauna by the participating laboratories for the major taxonomic groups present in sample MB04.

LabCode		Polychaeta	Oligochaeta	Crustacea	Echinodermata	Mollusca	Other	Overall
LB01	UM count	31	1	-	4	21	-	57
	PL missed	0	0	-	0	1	-	1
	%missed	0.0	0.0	-	0.0	4.8	-	1.8
LB02	UM count	-	-	-	-	-	-	0
	PL missed	-	-	-	-	-	-	0
	%missed	-	-	-	-	-	-	-
LB03	UM count	-	-	-	-	-	-	0
	PL missed	-	-	-	-	-	-	0
	%missed	-	-	-	-	-	-	-
LB04	UM count	30	-	2	2	37	-	71
	PL missed	6		0	1	1	-	8
	%missed	20.0	-	0.0	50.0	2.7	-	11.3
LB05	UM count	-	-	-	-	-	-	0
	PL missed	-	-	-	-	-	-	0
	%missed	-	-	-	-	-	-	-
LB06	UM count	-	-	-	-	-	-	0
	PL missed	-	-	-	-	-	-	0
	%missed	-	-	-	-	-	-	-
LB07	UM count	40	-	2	6	17	-	65
	PL missed	5	-	0	1	3	-	9
	%missed	12.5	-	0.0	16.7	17.6	-	13.8
LB08	UM count	20	1	1	5	13	-	40
	PL missed	2	0	0	0	1	-	3
	%missed	10.0	0.0	0.0	0.0	7.7	-	7.5
LB09	UM count	-	-	-	-	-	-	0
	PL missed	-	-	-	-	-	-	0
	%missed	-	-	-	-	-	-	-
LB10	UM count	43	1	2	4	18	1	69
	PL missed	0	0	0	0	5	0	5
	%missed	0.0	0.0	0.0	0.0	27.8	0.0	7.2
LB11	UM count	26	-	3	3	3	7	42
	PL missed	0	-	0	0	0	0	0
	%missed	0.0	-	0.0	0.0	0.0	0.0	0.0
LB12	UM count	23	-	1	3	8	-	35
	PL missed	0	-	0	0	2	-	2
	%missed	0.0	-	0.0	0.0	25.0	-	5.7

Table 2. Comparison of the efficiency of extraction of fauna by the participating laboratories for the major taxonomic groups present in sample MB04.

LabCode		Polychaeta	Oligochaeta	Crustacea	Echinodermata	Mollusca	Other	Overall
LB13	UM count	21	-	-	7	12	1	41
	PL missed	1	-	-	0	1	0	2
	%missed	4.8	-	-	0.0	8.3	0.0	4.9
LB14	UM count	30	-	2	6	12	8	58
	PL missed	1	-	0	0	2	0	3
	%missed	3.3	-	0.0	0.0	16.7	0.0	5.2
LB15	UM count	-	-	-	-	-	-	0
	PL missed	-	-	-	-	-	-	0
	%missed	-	-	-	-	-	-	-
LB16	UM count	36	-	2	9	13	3	63
	PL missed	0	-	0	0	3	0	3
	%missed	0.0	-	0.0	0.0	23.1	0.0	4.8
LB17	UM count	20	-	1	5	11	-	37
	PL missed	0	-	0	1	0	-	1
	%missed	0.0	-	0.0	20.0	0.0	-	2.7
LB18	UM count	25	1	-	3	11	-	40
	PL missed	0	0	-	0	0	-	0
	%missed	0.0	0.0	-	0.0	0.0	-	0.0
LB19	UM count	-	-	-	-	-	-	0
	PL missed	-	-	-	-	-	-	0
	%missed	-	-	-	-	-	-	-
LB20	UM count	47	-	1	6	23	12	89
	PL missed	1	-	0	0	0	3	4
	%missed	2.1	-	0.0	0.0	0.0	25.0	4.5
LB21	UM count	-	-	-	-	-	-	0
	PL missed	-	-	-	-	-	-	0
	%missed	-	-	-	-	-	-	-
LB22	UM count	26	-	-	4	13	-	43
	PL missed	0	-	-	0	6	-	6
	%missed	0.0	-	-	0.0	46.2	-	14.0
LB23	UM count	20	1	-	9	30	-	60
	PL missed	0	0	-	0	0	-	0
	%missed	0.0	0.0	-	0.0	0.0	-	0.0
LB24	UM count	33	-	-	9	14	-	56
	PL missed	1	-	-	0	1	-	2
	%missed	3.1	-	-	0.0	7.1	-	3.6

Table 3. Comparison of the estimates of biomass made by the participating laboratories with those made by Unicomarine Ltd. for the major taxonomic groups present in sample MB04. Values are in grams (g).

LabCode		Nemertea	Polychaeta	Oligochaeta	Crustacea	Echinodermata	Mollusca	Other	Overall
LB01	PL	-	2.6582	0.0001	-	1.7597	0.0479	-	4.4659
	UM	-	1.7248	0.0001	-	1.4365	0.0358	-	3.1972
	%diff.	-	35.1	0.0	-	18.4	25.3	-	28.4
LB02	PL	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-
LB03	PL	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-
LB04	PL	-	1.3387	-	3.0818	0.6346	0.0811	-	5.1362
	UM	-	0.8123	-	2.1925	0.5143	0.0696	-	3.5887
	%diff.	-	39.3	-	28.9	19.0	14.2	-	30.1
LB05	PL	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-
LB06	PL	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-
LB07	PL	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-
LB08	PL	-	0.1992	0.0001	0.1884	0.7468	0.0192	-	1.1537
	UM	-	0.3377	0.0001	0.3681	1.2043	0.0211	-	1.9313
	%diff.	-	-69.5	0.0	-95.4	-61.3	-9.9	-	-67.4
LB09	PL	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-
LB10	PL	-	1.3760	0.0003	0.0792	0.3626	0.1152	0.0013	1.9346
	UM	-	0.4519	0.0001	0.0226	0.2641	0.0969	0.0008	0.8364
	%diff.	-	67.2	66.7	71.5	27.2	15.9	38.5	56.8
LB11	PL	-	0.7923	-	0.0061	0.4356	0.0019	0.0001	1.2360
	UM	-	0.4226	-	0.0024	0.306	0.0016	0.0001	0.7327
	%diff.	-	46.7	-	60.7	29.8	15.8	0.0	40.7
LB12	PL	-	1.2037	-	0.0533	0.9828	0.0553	-	2.2951
	UM	-	0.5881	-	0.0198	0.8252	0.0470	-	1.4801
	%diff.	-	51.1	-	62.9	16.0	15.0	-	35.5

Table 3. Comparison of the estimates of biomass made by the participating laboratories with those made by Unicomarine Ltd. for the major taxonomic groups present in sample MB04. Values are in grams (g).

LabCode		Nemertea	Polychaeta	Oligochaeta	Crustacea	Echinodermata	Mollusca	Other	Overall
LB13	PL	0.0011	1.7916	-	-	1.6673	0.0210	-	3.4810
	UM	0.0006	0.9611	-	-	1.2807	0.0107	-	2.2531
	%diff.	45.5	46.4	-	-	23.2	49.0	-	35.3
LB14	PL	-	0.1180	-	0.0360	22.057	0.1646	0.0001	22.3757
	UM	-	0.1159	-	0.0359	21.743	0.1232	0.0001	22.0181
	%diff.	-	1.8	-	0.3	1.4	25.2	0.0	1.6
LB15	PL	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-
LB16	PL	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-
LB17	PL	-	1.1059	-	10.1200	0.5075	0.0099	-	11.7433
	UM	-	0.2285	-	10.0434	0.4403	0.0072	-	10.7194
	%diff.	-	79.3	-	0.8	13.2	27.3	-	8.7
LB18	PL	-	0.5002	0.0001	-	1.229	0.0441	-	1.7734
	UM	-	0.2760	0.0001	-	1.0084	0.0358	-	1.3203
	%diff.	-	44.8	0.0	-	17.9	18.8	-	25.5
LB19	PL	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-
LB20	PL	-	0.9331	-	0.0029	0.7894	0.2670	0.0016	1.9940
	UM	-	0.4936	-	0.0013	0.5619	0.2235	0.0004	1.2807
	%diff.	-	47.1	-	55.2	28.8	16.3	75.0	35.8
LB21	PL	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-
LB22	PL	-	0.6394	-	-	0.8937	0.0146	-	1.5477
	UM	-	0.4771	-	-	0.9499	0.0109	-	1.4379
	%diff.	-	25.4	-	-	-6.3	25.3	-	7.1
LB23	PL	-	1.4240	0.0001	-	18.51	0.6290	-	20.5631
	UM	-	0.7765	0.0001	-	15.2207	0.6187	-	16.6160
	%diff.	-	45.5	0.0	-	17.8	1.6	-	19.2
LB24	PL	-	0.9674	-	-	0.851	1.2960	-	3.1144
	UM	-	0.5279	-	-	0.645	1.2654	-	2.4383
	%diff.	-	45.4	-	-	24.2	2.4	-	21.7

Table 4. Results from the analysis of samples OS02 - OS04 supplied by participating laboratories.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
		Number of Taxa			Number of Individuals				Not extracted			Count	Similarity	Taxonomic	
LabCode	PL	UM	Diff (n)	%max	PL	UM	Diff (n)	%max	NewTaxa	Ind	%ind	Error	index	differences	Note
LB01_OS02	21	21	0	0.0	100	97	3	3.0	0	0	0.0	3	98.48	0	
LB01_OS03	5	5	0	0.0	31	31	0	0.0	0	0	0.0	0	100.00	0	
LB01_OS04	6	6	0	0.0	8	10	-2	20.0	1	2	20.0	0	88.89	0	
LB02_OS02	8	7	-1	12.5	706	695	11	1.6	0	9	1.3	20	98.93	0	Taxa not split
LB02_OS03	12	12	0	0.0	3950	3706	244	6.2	0	0	0.0	244	96.58	0	Biomass not comparable, sub-sampled
LB02_OS04	18	18	0	0.0	3920	3828	92	2.3	0	24	0.6	116	98.40	0	Biomass not comparable, sub-sampled
LB03_OS02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LB03_OS03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LB03_OS04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LB04_OS02	46	55	9	16.4	923	1021	-98	9.6	7	86	8.4	-12	73.15	11	Sub-sampled
LB04_OS03	54	54	0	0.0	2935	3397	-462	13.6	2	380	11.2	-82	68.70	5	Sub-sampled
LB04_OS04	57	62	5	8.1	299	319	-20	6.3	5	21	6.6	1	96.12	3	
LB05_OS02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LB05_OS03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LB05_OS04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LB06_OS02	11	11	0	0.0	555	565	-10	1.8	0	10	1.8	0	98.39	0	
LB06_OS03	5	5	0	0.0	32	32	0	0.0	0	0	0.0	0	100.00	0	
LB06_OS04	3	3	0	0.0	3	3	0	0.0	0	0	0.0	0	100.00	0	
LB07_OS02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LB07_OS03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LB07_OS04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LB08_OS02	3	5	2	40.0	3	24	-21	87.5	2	21	87.5	0	27.59	0	
LB08_OS03	25	32	7	21.9	82	108	-26	24.1	7	26	24.1	0	80.20	2	Biomass not comparable
LB08_OS04	13	21	8	38.1	26	41	-15	36.6	9	15	36.6	0	72.50	1	Biomass not comparable

Table 4. Results from the analysis of samples OS02 - OS04 supplied by participating laboratories.

	Number of Taxa				Number of Individuals				Not extracted			Count	Similarity	Taxonomic	
LabCode	PL	UM	Diff (n)	%max	PL	UM	Diff (n)	%max	NewTaxa	Ind	%ind	Error	index	differences	Note
LB09_OS02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LB09_OS03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LB09_OS04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LB10_OS02	15	17	2	11.8	704	756	-52	6.9	1	49	6.5	-3	96.30	0	
LB10_OS03	28	30	2	6.7	314	360	-46	12.8	2	48	13.3	2	85.80	2	
LB10_OS04	49	53	4	7.5	219	233	-14	6.0	3	13	5.6	-1	89.82	3	
LB11_OS02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LB11_OS03	15	16	1	6.3	935	935	0	0.0	1	12	1.3	12	98.50	0	
LB11_OS04	14	14	0	0.0	1525	1504	21	1.4	0	3	0.2	24	99.01	0	
LB12_OS02	42	44	2	4.5	318	328	-10	3.0	1	7	2.1	-3	96.75	2	
LB12_OS03	61	62	1	1.6	464	490	-26	5.3	2	24	4.9	-2	94.13	5	
LB12_OS04	38	44	6	13.6	138	187	-49	26.2	4	48	25.7	-1	84.31	6	
LB13_OS02	17	17	0	0.0	73	73	0	0.0	0	0	0.0	0	100.00	0	
LB13_OS03	20	20	0	0.0	72	72	0	0.0	0	0	0.0	0	100.00	0	
LB13_OS04	1	1	0	0.0	2	2	0	0.0	0	0	0.0	0	100.00	0	Very small volume
LB14_OS02	46	44	-2	4.3	447	430	17	3.8	0	0	0.0	17	94.19	4	
LB14_OS03	63	65	2	3.1	521	525	-4	0.8	1	2	0.4	-2	99.04	1	
LB14_OS04	6	6	0	0.0	24	25	-1	4.0	0	0	0.0	-1	97.96	0	
LB15_OS02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LB15_OS03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LB15_OS04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LB16_OS02	40	40	0	0.0	173	174	-1	0.6	0	2	1.1	1	92.80	2	No biomass data
LB16_OS03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LB16_OS04	73	75	2	2.7	878	892	-14	1.6	2	11	1.2	-3	98.76	3	No biomass data

Table 4. Results from the analysis of samples OS02 - OS04 supplied by participating laboratories.

	Number of Taxa				Number of Individuals				Not extracted			Count	Similarity	Taxonomic	
LabCode	PL	UM	Diff (n)	%max	PL	UM	Diff (n)	%max	NewTaxa	Ind	%ind	Error	index	differences	Note
LB17_OS02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LB17_OS03	62	65	3	4.6	3403	3400	3	0.1	0	5	0.1	8	92.08	11	
LB17_OS04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LB18_OS02	1	1	0	0.0	3	3	0	0.0	0	0	0.0	0	100.00	0	
LB18_OS03	4	6	2	33.3	5	7	-2	28.6	1	2	28.6	0	83.33	0	
LB18_OS04	19	22	3	13.6	218	231	-13	5.6	1	11	4.8	-2	95.77	1	
LB19_OS02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LB19_OS03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LB19_OS04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LB20_OS02	41	41	0	0.0	114	114	0	0.0	0	0	0.0	0	99.12	1	No residue, biomass not comparable
LB20_OS03	15	16	1	6.3	98	100	-2	2.0	1	1	1.0	-1	89.90	1	Biomass not comparable
LB20_OS04	49	49	0	0.0	386	386	0	0.0	0	0	0.0	0	99.74	1	No residue, biomass not comparable
LB21_OS02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LB21_OS03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LB21_OS04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LB22_OS02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LB22_OS03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LB22_OS04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LB23_OS02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LB23_OS03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LB23_OS04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LB24_OS02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LB24_OS03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
LB24_OS04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Table 5. Comparison of the estimates of biomass made by the participating laboratories with those made by Unicomarine Ltd. for the major taxonomic groups present in samples OS02-OS04.

Sample OS02

LabCode		Nemertea	Polychaeta	Oligochaeta	Pycnogonida	Crustacea	Echinodermata	Mollusca	Other	Overall
LB01	PL	0.0129	0.3880	0.0010	-	0.0135	0.616	2.6294	0.0036	3.6644
	UM	0.0092	0.2127	0.0005	-	0.0080	0.4411	2.4587	0.0024	3.1326
	%diff.	28.7	45.2	50.0	-	40.7	28.4	6.5	33.3	14.5
LB02	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB03	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB04	PL	0.0005	3.7131	0.0040	0.0002	0.0345	-	33.4543	-	37.2066
	UM	0.0004	1.1218	0.0017	0.0002	0.0111	-	32.1577	-	33.2929
	%diff.	20.0	69.8	57.5	0.0	67.8	-	3.9	-	10.5
LB05	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB06	PL	-	1.0744	0.0008	-	0.0109	-	3.5593	-	4.6454
	UM	-	0.5001	0.0005	-	0.0093	-	3.4444	-	3.9543
	%diff.	-	53.5	37.5	-	14.7	-	3.2	-	14.9
LB07	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB08	PL	-	0.0001	-	-	-	-	0.0024	-	0.0025
	UM	-	0.0001	-	-	-	-	0.0019	-	0.0020
	%diff.	-	0.0	-	-	-	-	20.8	-	20.0
LB09	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB10	PL	-	2.1734	0.0018	-	-	-	0.0251	-	2.2004
	UM	-	0.9617	0.0007	-	-	-	0.0119	-	0.9743
	%diff.	-	55.8	62.0	-	-	-	52.7	-	55.7
LB11	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB12	PL	0.0056	1.4580	-	-	0.0260	0.4568	76.5628	0.3452	78.8544
	UM	0.0027	0.7378	-	-	0.0086	0.3426	74.9950	0.1526	76.2393
	%diff.	51.8	49.4	-	-	66.9	25.0	2.0	55.8	3.3

Table 5. Comparison of the estimates of biomass made by the participating laboratories with those made by Unicomarine Ltd. for the major taxonomic groups present in samples OS02-OS04.

Sample OS03

LabCode		Nemertea	Polychaeta	Oligochaeta	Pycnogonida	Crustacea	Echinodermata	Mollusca	Other	Overall
LB01	PL	-	-	0.0001	-	0.0118	-	0.3959	0.0006	0.4084
	UM	-	-	0.0001	-	0.0071	-	0.2356	0.0003	0.2431
	%diff.	-	-	0.0	-	39.8	-	40.5	50.0	40.5
LB02	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB03	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB04	PL	-	6.7296	0.0005	-	1.8060	-	261.0229	0.0013	269.5603
	UM	-	3.6525	0.0002	-	1.3182	-	237.2151	0.0005	242.1865
	%diff.	-	45.7	60.0	-	27.0	-	9.1	61.5	10.2
LB05	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB06	PL	-	0.0238	0.0019	-	-	-	-	-	0.0257
	UM	-	0.0122	0.0011	-	-	-	-	-	0.0133
	%diff.	-	48.7	42.1	-	-	-	-	-	48.2
LB07	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB08	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB09	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB10	PL	0.0144	0.0744	0.0473	-	-	-	409.2329	0.00498	409.3740
	UM	0.0072	0.0357	0.0222	-	-	-	328.0445	0.0030	328.1126
	%diff.	50.0	52.0	53.1	-	-	-	19.8	39.8	19.9
LB11	PL	0.0005	0.3658	0.0060	-	0.9737	-	0.5925	0.0014	1.9399
	UM	0.0002	0.1372	0.0040	-	0.4675	-	0.3974	0.0006	1.0069
	%diff.	60.0	62.5	-	-	52.0	-	32.9	57.1	48.1
LB12	PL	0.0327	3.2339	0.0001	-	0.0104	0.549	2.5438	1.1637	7.5336
	UM	0.0159	1.5847	0.0001	-	0.0020	0.2909	2.1355	0.6674	4.6965
	%diff.	51.4	51.0	0.0	-	80.8	47.0	16.1	42.6	37.7

Table 5. Comparison of the estimates of biomass made by the participating laboratories with those made by Unicomarine Ltd. for the major taxonomic groups present in samples OS02-OS04.

Sample OS04

LabCode		Nemertea	Polychaeta	Oligochaeta	Pycnogonida	Crustacea	Echinodermata	Mollusca	Other	Overall
LB01	PL	-	0.0815	-	-	0.0011	-	0.0539	-	0.1365
	UM	-	0.0491	-	-	0.0003	-	0.0286	-	0.0780
	%diff.	-	39.8	-	-	72.7	-	46.9	-	42.9
LB02	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB03	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB04	PL	-	0.1307	-	-	0.4958	0.0654	3.1221	0.0229	3.8369
	UM	-	0.0566	-	-	0.1028	0.0418	2.9299	0.0097	3.1408
	%diff.	-	56.7	-	-	79.3	36.1	6.2	57.6	18.1
LB05	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB06	PL	-	0.0394	0.0001	-	-	-	-	-	0.0395
	UM	-	0.0169	0.0001	-	-	-	-	-	0.0170
	%diff.	-	57.1	0.0	-	-	-	-	-	57.0
LB07	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB08	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB09	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB10	PL	0.0567	5.7778	0.0015	-	0.0410	0.90133	78.1466	0.0445	84.9694
	UM	0.0265	2.7660	0.0012	-	0.0148	0.6841	71.9514	0.0179	75.4619
	%diff.	53.3	52.1	21.1	-	63.9	24.1	7.9	59.7	11.2
LB11	PL	0.0001	0.4372	0.0044	-	0.9619	-	0.5029	0.0034	1.9099
	UM	0.0001	0.1634	0.0059	-	0.4052	-	0.3631	0.0050	0.9427
	%diff.	0.0	62.6	-34.1	-	57.9	-	27.8	-47.1	50.6
LB12	PL	-	0.3952	-	-	0.7875	0.0051	11.0968	0.0506	12.3352
	UM	-	0.1785	-	-	0.5597	0.0016	10.0858	0.0305	10.8561
	%diff.	-	54.8	-	-	28.9	68.6	9.1	39.7	12.0

Table 5. Comparison of the estimates of biomass made by the participating laboratories with those made by Unicomarine Ltd. for the major taxonomic groups present in samples OS02-OS04.

Sample OS02

LabCode		Nemertea	Polychaeta	Oligochaeta	Pycnogonida	Crustacea	Echinodermata	Mollusca	Other	Overall
LB13	PL	-	0.4158	0.0006	-	-	-	0.1047	0.5679	1.0891
	UM	-	0.1609	0.0003	-	-	-	0.0700	0.2114	0.4426
	%diff.	-	61.3	53.1	-	-	-	33.1	62.8	59.4
LB14	PL	0.0158	0.6584	-	-	0.0045	1.5358	1.9272	0.0013	4.1430
	UM	0.0079	0.4474	-	-	0.0028	1.1268	1.8908	0.0012	3.4769
	%diff.	50.0	32.0	-	-	37.8	26.6	1.9	7.7	16.1
LB15	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB16	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB17	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB18	PL	-	-	-	-	0.0084	-	-	-	0.0084
	UM	-	-	-	-	0.0041	-	-	-	0.0041
	%diff.	-	-	-	-	51.2	-	-	-	51.2
LB19	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB20	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB21	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB22	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB23	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB24	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-

Table 5. Comparison of the estimates of biomass made by the participating laboratories with those made by Unicomarine Ltd. for the major taxonomic groups present in samples OS02-OS04.

Sample OS03

LabCode		Nemertea	Polychaeta	Oligochaeta	Pycnogonida	Crustacea	Echinodermata	Mollusca	Other	Overall
LB13	PL	0.0053	0.2709	0.0003	-	0.0077	-	0.0377	-	0.3218
	UM	0.0026	0.1216	0.0002	-	0.0033	-	0.0225	-	0.1502
	%diff.	50.5	55.1	37.5	-	57.0	-	40.3	-	53.3
LB14	PL	0.1024	3.2881	-	-	0.0104	0.7086	0.2954	0.0293	4.4342
	UM	0.1219	2.0332	-	-	0.0036	0.5365	0.2033	0.0215	2.9200
	%diff.	-19.0	38.2	-	-	65.4	24.3	31.2	26.6	34.1
LB15	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB16	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB17	PL	-	14.7015	0.0035	-	1.6441	0.0001	1.8674	0.0001	18.2167
	UM	-	10.1479	0.0019	-	0.7462	0.0001	1.6369	0.0001	12.5331
	%diff.	-	31.0	45.7	-	54.6	0.0	12.3	0.0	31.2
LB18	PL	-	0.1621	-	-	0.0271	-	-	-	0.1892
	UM	-	0.0865	-	-	0.0086	-	-	-	0.0951
	%diff.	-	46.6	-	-	68.3	-	-	-	49.7
LB19	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB20	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB21	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB22	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB23	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB24	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-

Table 5. Comparison of the estimates of biomass made by the participating laboratories with those made by Unicomarine Ltd. for the major taxonomic groups present in samples OS02-OS04.

Sample OS04

LabCode		Nemertea	Polychaeta	Oligochaeta	Pycnogonida	Crustacea	Echinodermata	Mollusca	Other	Overall
LB13	PL	-	-	0.0008	-	-	-	-	-	0.0008
	UM	-	-	0.0002	-	-	-	-	-	0.0002
	%diff.	-	-	75.6	-	-	-	-	-	75.6
LB14	PL	-	0.0198	-	-	0.0099	-	0.2170	0.0001	0.2468
	UM	-	0.0123	-	-	0.0041	-	0.1886	0.0001	0.2051
	%diff.	-	37.9	-	-	58.6	-	13.1	0.0	16.9
LB15	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB16	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB17	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB18	PL	-	0.5298	-	0.0001	0.0038	-	0.0002	-	0.5339
	UM	-	0.2660	-	0.0001	0.0016	-	0.0002	-	0.2679
	%diff.	-	49.8	-	0.0	57.9	-	0.0	-	49.8
LB19	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB20	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB21	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB22	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB23	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB24	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-

Table 6. Summary of the results of particle size analysis of the replicate samples from sediment circulation PS08.

PS08	% Clay & Silt	Median (phi)	Mean (phi)	Sorting	Skew
PS08 - 01 - laser	5.07	3.08	3.04	0.48	0.081
PS08 - 02 - laser	4.94	3.09	3.04	0.48	0.063
PS08 - 03 - laser	5.17	3.08	3.04	0.49	0.075
PS08 - 04 - laser	5.43	3.11	3.07	0.48	0.086
PS08 - 05 - laser	4.27	3.07	3.02	0.48	0.051
PS08 - 06 - laser	4.77	3.08	3.02	0.51	0.039
PS08 - 07 - sieve	1.68	3.29	3.32	0.33	0.090
PS08 - 08 - sieve	2.09	3.32	3.36	0.37	0.110
PS08 - 09 - sieve	1.96	3.35	3.39	0.36	0.100
PS08 - 10 - sieve	1.99	3.32	3.35	0.36	0.080
PS08 - 11 - sieve	1.98	3.32	3.36	0.34	0.100
PS08 - 12 - sieve	2.06	3.33	3.38	0.35	0.140

Table 7. Summary of the results of particle size analysis of the replicate samples from sediment circulation PS09.

PS09	% Clay & Silt	Median (phi)	Mean (phi)	Sorting	Skew
PS09 - 01A - laser	11.94	2.62	2.50	1.09	0.305
PS09 - 02A - laser	6.64	2.57	2.49	0.77	0.195
PS09 - 03A - laser	5.92	2.27	1.98	0.92	0.102
PS09 - 04A - laser	4.61	2.28	2.02	0.62	0.100
PS09 - 05A - laser	4.98	2.47	2.30	0.74	0.131
PS09 - 06A - laser	5.36	2.43	2.14	0.76	0.143
PS09 - 07A - laser	7.23	2.42	2.05	1.05	0.019
PS09 - 01B - sieve	3.19	2.73	2.78	0.55	0.083
PS09 - 02B - sieve	3.14	2.73	2.77	0.53	0.067
PS09 - 03B - sieve	2.74	2.71	2.75	0.54	0.074
PS09 - 04B - sieve	3.22	2.72	2.77	0.54	0.093
PS09 - 05B - sieve	2.45	2.72	2.77	0.54	0.084
PS09 - 06B - sieve	3.73	2.70	2.76	0.54	0.103
PS09 - 07B - sieve	2.37	2.66	2.69	0.50	0.060

Table 8. Summary of the particle size information received from participating laboratories for the eighth particle size distribution - PS08.

Lab	Method	% < 63μm	Median	Mean	Sort	IGS (SKi)
LB01	L	5.20	3.02	3.01	0.70	-0.010
LB02	L	9.50	3.25	3.23	0.57	0.150
LB03						
LB04	L	n/d	n/d	n/d	n/d	n/d
LB05						
LB06	L	10.00	3.26	3.24	0.56	0.130
LB07	S	3.23	3.25	3.18	0.56	-2.810
LB08	L	6.51	3.10	3.05	0.53	0.074
LB09		n/d	n/d	n/d	n/d	n/d
LB10	L	8.77	3.12	2.95	0.78	0.232
LB11	S	8.48	3.47	3.46	0.46	-0.190
LB12	L	5.65	2.89	3.36	0.46	0.486
LB13	DS/L	6.65	3.22	3.22	0.44	0.150
LB14	L	9.53	3.25	3.22	0.58	0.057
LB15						
LB16						
LB17	FD/DS	6.00	3.30	3.37	0.44	0.130
LB18	L	5.95	3.09	3.03	0.52	0.060
LB19		5.94	3.34	3.37	0.42	-0.211
LB20	S/Pipette	3.77	3.44	3.44	0.45	-0.160
LB21						
LB22	S/L	5.04	2.89	3.05	0.80	1.000
LB23						
LB24						

Key to methods:

L - Laser analysis
S - Sieve
DS - Dry sieve
FD - Freeze dried

Summary	% < 63μm	Median	Mean	Sort	IGS (SKi)
Number of values	15	15	15	15	15
Mean of laboratories	6.68	3.19	3.21	0.55	-0.06
Mean of 6 replicates (laser)	4.94	3.09	3.04	0.49	0.07
Mean of 6 replicates (sieve)	1.96	3.32	3.36	0.35	0.10
Laboratory minimum	3.23	2.89	2.95	0.42	-2.81
Laboratory maximum	10.00	3.47	3.46	0.80	1.00

Table 9. Summary of the particle size information received from participating laboratories for the ninth particle size distribution - PS09.

Lab	Method	% < 63μm	Median	Mean	Sort	IGS (SKi)
LB01	L	4.70	2.55	2.54	0.87	-0.040
LB02	L	4.40	2.51	2.50	0.83	-0.010
LB03						
LB04	L	n/d	n/d	n/d	n/d	n/d
LB05						
LB06	L	4.80	2.51	2.52	0.82	0.050
LB07	S	1.70	2.58	2.57	0.68	-0.270
LB08						
LB09						
LB10	L	9.19	2.54	2.42	1.12	0.295
LB11	S	4.84	2.69	2.76	0.73	-0.110
LB12						
LB13	DS/L	4.91	2.66	2.68	0.57	0.130
LB14	L	6.53	2.61	2.64	0.84	0.020
LB15						
LB16						
LB17	FD/DS	2.80	2.70	2.73	0.69	-0.004
LB18	L	17.53	2.68	2.66	1.39	0.510
LB19		2.52	2.72	2.70	0.69	-0.790
LB20	S/Pipette	2.20	2.68	2.78	0.73	0.118
LB21						
LB22	S/L	2.79	2.47	2.60	-1.07	-0.110
LB23		n/d	n/d	n/d	n/d	n/d
LB24						

Key to methods:

L - Laser analysis
S - Sieve
DS - Dry sieve
FD - Freeze dried

Summary	% < 63μm	Median	Mean	Sort	IGS (SKi)
Number of values	13	13	13	13	13
Mean of laboratories	5.30	2.61	2.62	0.68	-0.02
Mean of 7 replicates (laser)	6.67	2.44	2.21	0.85	0.14
Mean of 7 replicates (sieve)	2.98	2.71	2.75	0.53	0.08
Laboratory minimum	1.70	2.47	2.42	-1.07	-0.79
Laboratory maximum	17.53	2.72	2.78	1.39	0.51

Table 10. The identifications of the fauna made by participating laboratories for RT08. Names are given only where different from the AQC identification.

RT08	Taxon	LB01	LB02	LB03	LB04	LB05
RT0801	Schistomysis spiritus	- -	- -	n/d	- -	n/d
RT0802	Hyale nilssoni	- -	- -	n/d	- -	n/d
RT0803	Fabulina fabula	- -	- -	n/d	[Fabulina (Tellina)] -	n/d
RT0804	Mysella bidentata	- -	- -	n/d	- -	n/d
RT0805	Thyasira flexuosa	- -	- -	n/d	- -	n/d
RT0806	Corophium insidiosum	- -	- -	n/d	- bonnellii	n/d
RT0807	Lagis koreni	- -	- -	n/d	[Pectmaria (Lagis)] -	n/d
RT0808	Corophium acherusicum	- -	- -	n/d	- -	n/d
RT0809	Heterochaeta costata	- -	[Tubifex] [costatus]	n/d	- -	n/d
RT0810	Pomatoceros triqueter	- -	- -	n/d	[Pomatocerus] -	n/d
RT0811	Mya arenaria	- -	- -	n/d	- -	n/d
RT0812	Corophium volutator	- -	- -	n/d	- [volulator]	n/d
RT0813	Streptosyllis bidentata	- -	- -	n/d	- -	n/d
RT0814	Nebalia bipes	- -	- -	n/d	- -	n/d
RT0815	Scalibregma inflatum	- -	- -	n/d	- -	n/d
RT0816	Pista cristata	Nicolea venustula	- -	n/d	Nicolea venustula	n/d
RT0817	Hydroides norvegica	- -	- -	n/d	- -	n/d
RT0818	Scoloplos armiger	- -	- -	n/d	- -	n/d
RT0819	Helcion pellucidum	- -	- -	n/d	- [pellucidum var pellucidum]	n/d
RT0820	Platynereis dumerilii	- -	- -	n/d	- -	n/d
RT0821	Haustorius arenarius	- -	- -	n/d	- -	n/d
RT0822	Amphiura filiformis	- -	- -	n/d	Amphipholis squamata	n/d
RT0823	Prionospio multibranchiata	[Minuspio] [cf. multibranchiata]	[Minuspio] [cf. multibranchiata]	n/d	- -	n/d
RT0824	Echinocardium cordatum	- -	- -	n/d	- -	n/d
RT0825	Crepidula fornicata	- -	- -	n/d	- -	n/d

RT08	Taxon	LB13	LB14	LB15	LB16	LB17
RT0801	Schistomysis spiritus	- -	- -	n/d	- ornata	- [spirtus]
RT0802	Hyale nilssoni	- -	- stebbingi	n/d	- -	- -
RT0803	Fabulina fabula	- -	- -	n/d	Angulus tenuis	- -
RT0804	Mysella bidentata	- -	- -	n/d	- -	- -
RT0805	Thyasira flexuosa	- equalis	- -	n/d	- -	[Thysira] ferruginea
RT0806	Corophium insidiosum	- bonnellii	- acherusicum	n/d	- acutum	- acutum (female)
RT0807	Lagis koreni	- -	- -	n/d	[Pectinaria] -	[Pectinaria] -
RT0808	Corophium acherusicum	- crassicorne	- -	n/d	- lacustre	- acutum (male)
RT0809	Heterochaeta costata	[Tubifex] [costatus]	Tubificoides pseudogaster	n/d	Tubificoides pseudogaster	Tubificoides pseudogaster
RT0810	Pomatoceros triqueter	- -	- -	n/d	- -	- -
RT0811	Mya arenaria	- -	- -	n/d	- -	- -
RT0812	Corophium volutator	- -	- -	n/d	- -	- -
RT0813	Streptosyllis bidentata	- websteri	- -	n/d	- -	- -
RT0814	Nebalia bipes	- -	- -	n/d	- -	- -
RT0815	Scalibregma inflatum	- -	- -	n/d	- celticum	- -
RT0816	Pista cristata	Axionice maculata	- maculata	n/d	- -	Axionice maculata
RT0817	Hydroides norvegica	- -	- -	n/d	- -	- -
RT0818	Scoloplos armiger	- -	- -	n/d	- -	- -
RT0819	Helcion pellucidum	- -	- -	n/d	- [pellucidum pellucidum]	- [pellucidium]
RT0820	Platynereis dumerilii	- -	- [dumerilli]	n/d	- [dumerilli]	- -
RT0821	Haustorius arenarius	- -	- -	n/d	- -	- -
RT0822	Amphiura filiformis	- -	- -	n/d	- -	- -
RT0823	Prionospio multibranchiata	[Minuspio] -	[Minuspio] cirrifera	n/d	- -	[Prionospiro] -
RT0824	Echinocardium cordatum	- -	- -	n/d	- -	- -
RT0825	Crepidula fornicata	- -	- -	n/d	- -	- -

Table 10. The identifications of the fauna made by participating laboratories for RT08. Names are given only where different from the AQC identification.

RT08	Taxon	LB06	LB07	LB08	LB09	LB10
RT0801	Schistomysis spiritus	n/d	--	--	--	--
RT0802	Hyale nilssoni	n/d	--	--	--	--
RT0803	Fabulina fabula	n/d	Moerella donacina	--	--	--
RT0804	Mysella bidentata	n/d	--	--	Tellimya ferruginosa	--
RT0805	Thyasira flexuosa	n/d	--	--	--	--
RT0806	Corophium insidiosum	n/d	--	--	--	--
RT0807	Lagis koreni	n/d	--	--	--	--
RT0808	Corophium acherusicum	n/d	- sextonae	- lacustre	--	--
RT0809	Heterochaeta costata	n/d	[Tubifex] [costatus]	Tubificoides pseudogaster	[Tubifex] [costatus]	--
RT0810	Pomatoceros triqueter	n/d	--	--	[Pomatocerus] -	--
RT0811	Mya arenaria	n/d	--	--	--	--
RT0812	Corophium volutator	n/d	--	--	- arenarium	--
RT0813	Streptosyllis bidentata	n/d	- [websteri + bidentata]	--	--	--
RT0814	Nebalia bipes	n/d	- borealis	--	--	- herbstii
RT0815	Scalibregma inflatum	n/d	--	--	--	--
RT0816	Pista cristata	n/d	--	Nicolea venustula	--	--
RT0817	Hydroides norvegica	n/d	--	--	--	--
RT0818	Scoloplos armiger	n/d	--	--	--	--
RT0819	Helcion pellucidum	n/d	--	--	--	--
RT0820	Platynereis dumerilii	n/d	- [dumerilli]	--	- [dumerillii]	--
RT0821	Haustorius arenarius	n/d	--	--	--	--
RT0822	Amphiura filiformis	n/d	--	--	--	--
RT0823	Prionospio multibranchiata	n/d	- sp.	[Minuspio] [cf. multibranchiata]	[Prionospio (Minuspio)] cirrifera	[Minuspio] -
RT0824	Echinocardium cordatum	n/d	--	--	--	--
RT0825	Crepidula fornicata	n/d	--	--	--	--

RT08	Taxon	LB18	LB19	LB20	LB21	LB22
RT0801	Schistomysis spiritus	--	--	--	n/d	n/d
RT0802	Hyale nilssoni	--	--	--	n/d	n/d
RT0803	Fabulina fabula	--	--	--	n/d	n/d
RT0804	Mysella bidentata	--	Tellimya ferruginosa	--	n/d	n/d
RT0805	Thyasira flexuosa	--	--	--	n/d	n/d
RT0806	Corophium insidiosum	- ascherusicum	--	- sextonae	n/d	n/d
RT0807	Lagis koreni	--	--	--	n/d	n/d
RT0808	Corophium acherusicum	- acutum	- insidiosum	--	n/d	n/d
RT0809	Heterochaeta costata	--	[Tubifex] [costatus]	[Tubifex] [costatus]	n/d	n/d
RT0810	Pomatoceros triqueter	--	--	--	n/d	n/d
RT0811	Mya arenaria	--	--	--	n/d	n/d
RT0812	Corophium volutator	--	--	--	n/d	n/d
RT0813	Streptosyllis bidentata	--	--	--	n/d	n/d
RT0814	Nebalia bipes	--	--	--	n/d	n/d
RT0815	Scalibregma inflatum	--	--	--	n/d	n/d
RT0816	Pista cristata	Axionice maculata	--	Scionella lornensis	n/d	n/d
RT0817	Hydroides norvegica	--	--	--	n/d	n/d
RT0818	Scoloplos armiger	--	--	--	n/d	n/d
RT0819	Helcion pellucidum	--	--	--	n/d	n/d
RT0820	Platynereis dumerilii	--	- [dunnerilli]	--	n/d	n/d
RT0821	Haustorius arenarius	--	--	--	n/d	n/d
RT0822	Amphiura filiformis	--	--	--	n/d	n/d
RT0823	Prionospio multibranchiata	--	[Minuspio] -	--	n/d	n/d
RT0824	Echinocardium cordatum	- [chordatum]	--	--	n/d	n/d
RT0825	Crepidula fornicata	--	--	--	n/d	n/d

Table 10. The identifications of the fauna made by participating laboratories for RT08. Names are given only where different from the AQC identification.

RT08	Taxon	LB11	LB12
RT0801	Schistomysis spiritus	- -	- -
RT0802	Hyale nilssoni	- -	- perieri
RT0803	Fabulina fabula	- -	- -
RT0804	Mysella bidentata	- -	- -
RT0805	Thyasira flexuosa	- -	- -
RT0806	Corophium insidiosum	- acherusicum	- -
RT0807	Lagis koreni	- -	- -
RT0808	Corophium acherusicum	- -	- -
RT0809	Heterochaeta costata	[Tubifex] [costatus]	[Tubifex] [costatus]
RT0810	Pomatoceros triqueter	- -	- -
RT0811	Mya arenaria	- -	- -
RT0812	Corophium volutator	- -	- arenarium
RT0813	Streptosyllis bidentata	- -	- -
RT0814	Nebalia bipes	- -	- -
RT0815	Scalibregma inflatum	- -	- -
RT0816	Pista cristata	Eupolymnia nebulosa	Nicolea venustula
RT0817	Hydroides norvegica	- -	- -
RT0818	Scoloplos armiger	- -	- -
RT0819	Helcion pellucidum	- -	- -
RT0820	Platynereis dumerilii	- -	- -
RT0821	Haustorius arenarius	- -	- -
RT0822	Amphiura filiformis	- -	- -
RT0823	Prionospio multibranchiata	[Minuspio] [cf. multibranchiata]	[Minuspio] [cf. multibranchiata]
RT0824	Echinocardium cordatum	- -	- -
RT0825	Crepidula fornicata	- -	- -

RT08	Taxon	LB23	LB24
RT0801	Schistomysis spiritus	n/d	n/d
RT0802	Hyale nilssoni	n/d	n/d
RT0803	Fabulina fabula	n/d	n/d
RT0804	Mysella bidentata	n/d	n/d
RT0805	Thyasira flexuosa	n/d	n/d
RT0806	Corophium insidiosum	n/d	n/d
RT0807	Lagis koreni	n/d	n/d
RT0808	Corophium acherusicum	n/d	n/d
RT0809	Heterochaeta costata	n/d	n/d
RT0810	Pomatoceros triqueter	n/d	n/d
RT0811	Mya arenaria	n/d	n/d
RT0812	Corophium volutator	n/d	n/d
RT0813	Streptosyllis bidentata	n/d	n/d
RT0814	Nebalia bipes	n/d	n/d
RT0815	Scalibregma inflatum	n/d	n/d
RT0816	Pista cristata	n/d	n/d
RT0817	Hydroides norvegica	n/d	n/d
RT0818	Scoloplos armiger	n/d	n/d
RT0819	Helcion pellucidum	n/d	n/d
RT0820	Platynereis dumerilii	n/d	n/d
RT0821	Haustorius arenarius	n/d	n/d
RT0822	Amphiura filiformis	n/d	n/d
RT0823	Prionospio multibranchiata	n/d	n/d
RT0824	Echinocardium cordatum	n/d	n/d
RT0825	Crepidula fornicata	n/d	n/d

Table 11. The identifications of the fauna made by participating laboratories for RT09. Names are given only where different from the AQC identification.

RT09	Taxon	LB01	LB02	LB03	LB04	LB05	LB06	LB07
RT0901	Tharyx killariensis	n/d	Protocirrineris chrysoderma	n/d	Aphelochaeta marioni	n/d	- A	- -
RT0902	Chaetozone setosa agg.	n/d	- [sp. B]	n/d	- [setosa Type B]	n/d	Caulleriella zetlandica	- [setosa]
RT0903	Chaetozone gibber	n/d	- -	n/d	- -	n/d	- -	- -
RT0904	Caulleriella alata	n/d	- -	n/d	- -	n/d	- -	- -
RT0905	Caulleriella zetlandica	n/d	- -	n/d	- -	n/d	Chaetozone setosa agg.	- -
RT0906	Chaetozone gibber	n/d	- -	n/d	- -	n/d	- -	- -
RT0907	Chaetozone setosa agg.	n/d	- [sp. B]	n/d	- [setosa (agg)]	n/d	- -	- [setosa]
RT0908	Caulleriella zetlandica	n/d	- -	n/d	- -	n/d	- -	- -
RT0909	Aphelochaeta marioni	n/d	- -	n/d	Caulleriella A	n/d	- -	- -
RT0910	Aphelochaeta marioni	n/d	- -	n/d	- B	n/d	- A or B	- -
RT0911	Tharyx A	n/d	- -	n/d	- killariensis	n/d	- -	- killariensis
RT0912	Tharyx A	n/d	- killariensis	n/d	Caulleriella zetlandica	n/d	Chaetozone setosa agg.	Aphelochaeta "A"
RT0913	Monticellina dorsobranchialis	n/d	- -	n/d	- -	n/d	- -	- -
RT0914	Aphelochaeta marioni	n/d	- -	n/d	- -	n/d	- -	- -
RT0915	Tharyx vivipara	n/d	- -	n/d	- -	n/d	- -	- -
RT0916	Tharyx A	n/d	- -	n/d	- -	n/d	- -	- ["A"]
RT0917	Cirratulus caudatus	n/d	- -	n/d	- cirratus	n/d	- -	- -
RT0918	Tharyx killariensis	n/d	- -	n/d	- -	n/d	- -	- -
RT0919	Aphelochaeta marioni	n/d	- -	n/d	- -	n/d	- -	- -
RT0920	Tharyx A	n/d	- -	n/d	- -	n/d	- killariensis	- ["A"]
RT0921	Chaetozone setosa agg.	n/d	- [sp. B]	n/d	- [setosa Type B]	n/d	- -	- [setosa]
RT0922	Tharyx vivipara	n/d	- -	n/d	Caulleriella zetlandica	n/d	- -	- -
RT0923	Caulleriella zetlandica	n/d	- -	n/d	- -	n/d	Chaetozone gibber	- -
RT0924	Caulleriella alata	n/d	- -	n/d	- -	n/d	- -	- -
RT0925	Chaetozone setosa agg.	n/d	Tharyx killariensis	n/d	- [setosa agg ?]	n/d	Tharyx killariensis	- [setosa]

RT09	Taxon	LB13	LB14	LB15	LB16	LB17	LB18	LB19
RT0901	Tharyx killariensis	n/d	Aphelochaeta A	n/d	Chaetozone gibber	Aphelochaeta B	Aphelochaeta A	Aphelochaeta B
RT0902	Chaetozone setosa agg.	n/d	- [setosa (agg.)]	n/d	- [setosa agg (type 'B')]	Tharyx vivipara	- [B/C]	- [setosa B/C]
RT0903	Chaetozone gibber	n/d	- -	n/d	- -	- -	- -	Caulleriella zetlandica
RT0904	Caulleriella alata	n/d	- -	n/d	- -	- -	- -	- -
RT0905	Caulleriella zetlandica	n/d	- -	n/d	- -	- -	Chaetozone B/C	- -
RT0906	Chaetozone gibber	n/d	- setosa (agg.)	n/d	- -	- -	- -	- -
RT0907	Chaetozone setosa agg.	n/d	- [setosa (agg.)]	n/d	- [setosa agg (type 'B')]	- [setosa agg. "A"]	- [B/C]	- [setosa]
RT0908	Caulleriella zetlandica	n/d	- -	n/d	- -	- -	- -	- -
RT0909	Aphelochaeta marioni	n/d	- -	n/d	- A	- A	- -	- -
RT0910	Aphelochaeta marioni	n/d	- -	n/d	- -	- B	- B	- A
RT0911	Tharyx A	n/d	- killariensis	n/d	- -	- killariensis	- -	- -
RT0912	Tharyx A	n/d	Chaetozone setosa	n/d	- -	Aphelochaeta marioni	- -	- killariensis
RT0913	Monticellina dorsobranchialis	n/d	Aphelochaeta marioni	n/d	- -	- -	- [cf. dorsobranchialis]	- -
RT0914	Aphelochaeta marioni	n/d	Caulleriella zetlandica	n/d	- A	- -	- A	- -
RT0915	Tharyx vivipara	n/d	- [vivipera]	n/d	Caulleriella zetlandica	Chaetozone setosa	["Tharyx"] -	- -
RT0916	Tharyx A	n/d	- -	n/d	- -	- -	- -	- -
RT0917	Cirratulus caudatus	n/d	- -	n/d	- [cf. caudatus]	- juv.	- [cf. caudatus]	- -
RT0918	Tharyx killariensis	n/d	Aphelochaeta marioni	n/d	Prionospio fallax	- -	- -	- -
RT0919	Aphelochaeta marioni	n/d	- A	n/d	- A	- [maroni]	- -	- -
RT0920	Tharyx A	n/d	Aphelochaeta "A"	n/d	- -	- -	- -	- -
RT0921	Chaetozone setosa agg.	n/d	- [setosa (agg.)]	n/d	- [setosa agg (type 'B')]	- [setosa agg. "B"]	- [B/C]	- [setosa B/C]
RT0922	Tharyx vivipara	n/d	- [vivipera]	n/d	- -	- -	["Tharyx"] -	- -
RT0923	Caulleriella zetlandica	n/d	Chaetozone setosa (agg.)	n/d	- -	haetozone setosa agg. "B	Chaetozone A	Chaetozone setosa agg.
RT0924	Caulleriella alata	n/d	Cirriformia tentaculata	n/d	- -	- viridis	- -	- -
RT0925	Chaetozone setosa agg.	n/d	Monicellina dorsobranchialis	n/d	- [setosa agg (type 'B')]	- [setosa agg. "A"]	- [A]	Tharyx killariensis

Table 11. The identifications of the fauna made by participating laboratories for RT09. Names are given only where different from the AQC identification.

RT09	Taxon	LB08	LB09	LB10	LB11	LB12
RT0901	Tharyx killariensis	Aphelochaeta type A	n/d	Aphelochaeta "A"	- A	Aphelochaeta sp.
RT0902	Chaetozone setosa agg.	- [setosa agg. (type B/C)]	n/d	- [setosa agg. Type "A"]	- [setosa]	- [setosa B]
RT0903	Chaetozone gibber	- -	n/d	- -	- -	Caulleriella zetlandicus
RT0904	Caulleriella alata	- -	n/d	- -	- -	- -
RT0905	Caulleriella zetlandica	- -	n/d	["Caulleriella"] -	- -	Chaetozone setosa B
RT0906	Chaetozone gibber	- -	n/d	- [gibber?]	- -	- -
RT0907	Chaetozone setosa agg.	- [setosa agg. (type B)]	n/d	- -	- [setosa]	- [setosa B]
RT0908	Caulleriella zetlandica	Tharyx multibranchialis	n/d	["Caulleriella"] -	- -	Chaetozone gibber
RT0909	Aphelochaeta marioni	- -	n/d	- -	- -	- -
RT0910	Aphelochaeta marioni	- type A	n/d	- -	- -	- -
RT0911	Tharyx A	- [type A]	n/d	- killariensis	- -	- killariensis
RT0912	Tharyx A	- [type A]	n/d	Chaetozone setosa agg.Type "A"	- -	- killariensis
RT0913	Monticellina dorsobranchialis	[Monticellinia] [cf. dorsobranchialis]	n/d	- -	- -	- -
RT0914	Aphelochaeta marioni	- -	n/d	- [marioni?]	- -	- -
RT0915	Tharyx vivipara	- -	n/d	["Tharyx"] -	- -	- -
RT0916	Tharyx A	- [type A]	n/d	Chaetozone setosa agg. Type"C"	- -	- -
RT0917	Cirratulus caudatus	- cirratus	n/d	- [cf.caudatus]	- -	- -
RT0918	Tharyx killariensis	- -	n/d	- -	- -	- -
RT0919	Aphelochaeta marioni	- -	n/d	- [marioni?]	- -	- -
RT0920	Tharyx A	- [type A]	n/d	Chaetozone setosa agg.Type"C"	- -	- killariensis
RT0921	Chaetozone setosa agg.	- [setosa agg. (type A)]	n/d	- [setosa agg. Type"A"]	- [setosa]	- [setosa A]
RT0922	Tharyx vivipara	- -	n/d	["Tharyx"] -	- -	- -
RT0923	Caulleriella zetlandica	- -	n/d	Chaetozone "D"	Chaetozone setosa	Chaetozone setosa A
RT0924	Caulleriella alata	- -	n/d	- -	- -	- -
RT0925	Chaetozone setosa agg.	- [setosa agg. (type C)]	n/d	- [setosa agg. Type"C"?]	- [setosa]	- [setosa B/C]

RT09	Taxon	LB20	LB21	LB22	LB23	LB24
RT0901	Tharyx killariensis	Aphelochaeta B	n/d	n/d	- A	n/d
RT0902	Chaetozone setosa agg.	- [setosa type B]	n/d	n/d	- -	n/d
RT0903	Chaetozone gibber	- -	n/d	n/d	- -	n/d
RT0904	Caulleriella alata	- -	n/d	n/d	- -	n/d
RT0905	Caulleriella zetlandica	- -	n/d	n/d	- -	n/d
RT0906	Chaetozone gibber	- setosa type A	n/d	n/d	- -	n/d
RT0907	Chaetozone setosa agg.	- [setosa type B]	n/d	n/d	- -	n/d
RT0908	Caulleriella zetlandica	- -	n/d	n/d	- -	n/d
RT0909	Aphelochaeta marioni	- -	n/d	n/d	- -	n/d
RT0910	Aphelochaeta marioni	- ?B	n/d	n/d	- B	n/d
RT0911	Tharyx A	- killariensis	n/d	n/d	- -	n/d
RT0912	Tharyx A	Aphelochaeta "A"	n/d	n/d	Aphelochaeta "A"	n/d
RT0913	Monticellina dorsobranchialis	- -	n/d	n/d	Tharyx killariensis	n/d
RT0914	Aphelochaeta marioni	- "A"	n/d	n/d	- -	n/d
RT0915	Tharyx vivipara	- -	n/d	n/d	- -	n/d
RT0916	Tharyx A	Aphelochaeta "A"	n/d	n/d	- -	n/d
RT0917	Cirratulus caudatus	- -	n/d	n/d	- cirratulus	n/d
RT0918	Tharyx killariensis	Aphelochaeta sp.	n/d	n/d	Chaetozone setosa agg.	n/d
RT0919	Aphelochaeta marioni	- [?marioni]	n/d	n/d	- -	n/d
RT0920	Tharyx A	Aphelochaeta "A"	n/d	n/d	- -	n/d
RT0921	Chaetozone setosa agg.	- [setosa ?type A]	n/d	n/d	- -	n/d
RT0922	Tharyx vivipara	- -	n/d	n/d	- -	n/d
RT0923	Caulleriella zetlandica	- -	n/d	n/d	Chaetozone setosa agg.	n/d
RT0924	Caulleriella alata	- -	n/d	n/d	- -	n/d
RT0925	Chaetozone setosa agg.	Tharyx sp.	n/d	n/d	Tharyx killariensis	n/d

Table 12. Summary results from the identification of specimens supplied by participating laboratories for LR01.

	Differences	
LabCode	Generic	Specific
01	1	1
02	0	0
03	-	-
04	1	2
05	0	3
06	-	-
07	-	-
08	0	0
09	-	-
10	0	0
11	0	0
12	1	3
13	0	1
14	2	3
15	-	-
16	0	0
17	3	5
18	0	0
19	1	1
20	1	1
21	-	-
22	-	-
23	1	1
24	0	1

"-": indicates no data

Table 13. NMP performance standards for Own Sample exercises OS02 to OS04.

1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Estimation of Taxa			Estimation of Abundance			Estimation of Biomass			Similarity Index			Overall
LabCode	Lab.	Target	Flag	Lab.	Target	Flag	Lab. result	Target	Flag	Target	Lab.	Flag	NMP Flag
LB01_OS02	21	18.9 - 23.1	PASS	100	87.3 - 106.7	PASS	3.6644	2.5061 - 3.7591	*PASS*	90.0	98.48	PASS	
LB01_OS03	5	3.0 - 7.0	PASS	31	27.9 - 34.1	PASS	0.4084	0.1945 - 0.2917	***Fail***	90.0	100.00	PASS	PASS
LB01_OS04	6	4.0 - 8.0	PASS	8	8.0 - 12.0	PASS	0.1365	0.0624 - 0.0936	***Fail***	90.0	88.89	**Fail**	
LB02_OS02	8	5.0 - 9.0	PASS	706	625.5 - 764.5	PASS	-	-	-	90.0	98.93	PASS	
LB02_OS03	12	10.0 - 14.0	PASS	3950	3335.4 - 4076.6	PASS	-	-	-	90.0	96.58	PASS	PASS
LB02_OS04	18	16.0 - 20.0	PASS	3920	3445.2 - 4210.8	PASS	-	-	-	90.0	98.40	PASS	
LB03_OS02	-	-	-	-	-	-	-	-	-	90.0	-	-	
LB03_OS03	-	-	-	-	-	-	-	-	-	90.0	-	-	-
LB03_OS04	-	-	-	-	-	-	-	-	-	90.0	-	-	
LB04_OS02	46	49.5 - 60.5	**Fail**	923	918.9 - 1123.1	PASS	37.2066	26.6343 - 39.9515	*PASS*	90.0	73.15	**Fail**	
LB04_OS03	54	48.6 - 59.4	PASS	2935	3057.3 - 3736.7	**Fail**	269.5603	193.7492 - 290.6238	*PASS*	90.0	68.70	**Fail**	Fail
LB04_OS04	57	55.8 - 68.2	PASS	299	287.1 - 350.9	PASS	3.8369	2.5126 - 3.7690	***Fail***	90.0	96.12	PASS	
LB05_OS02	-	-	-	-	-	-	-	-	-	90.0	-	-	
LB05_OS03	-	-	-	-	-	-	-	-	-	90.0	-	-	-
LB05_OS04	-	-	-	-	-	-	-	-	-	90.0	-	-	
LB06_OS02	11	9.0 - 13.0	PASS	555	508.5 - 621.5	PASS	4.6454	3.1634 - 4.7452	*PASS*	90.0	98.39	PASS	
LB06_OS03	5	3.0 - 7.0	PASS	32	28.8 - 35.2	PASS	0.0257	0.0106 - 0.0160	***Fail***	90.0	100.00	PASS	PASS
LB06_OS04	3	1.0 - 5.0	PASS	3	1.0 - 5.0	PASS	0.0395	0.0136 - 0.0204	***Fail***	90.0	100.00	PASS	
LB07_OS02	-	-	-	-	-	-	-	-	-	90.0	-	-	
LB07_OS03	-	-	-	-	-	-	-	-	-	90.0	-	-	-
LB07_OS04	-	-	-	-	-	-	-	-	-	90.0	-	-	
LB08_OS02	3	3.0 - 7.0	PASS	3	21.6 - 26.4	**Fail**	0.0025	0.0016 - 0.0024	***Fail***	90.0	27.59	**Fail**	
LB08_OS03	25	28.8 - 35.2	**Fail**	82	97.2 - 118.8	**Fail**	-	-	-	90.0	80.20	**Fail**	Fail
LB08_OS04	13	18.9 - 23.1	**Fail**	26	36.9 - 45.1	**Fail**	-	-	-	90.0	72.50	**Fail**	

Table 13. NMP performance standards for Own Sample exercises OS02 to OS04.

	Estimation of Taxa			Estimation of Abundance			Estimation of Biomass			Similarity Index			Overall
LabCode	Lab.	Target	Flag	Lab.	Target	Flag	Lab. result	Target	Flag	Target	Lab.	Flag	NMP Flag
LB09_OS02	-	-	-	-	-	-	-	-	-	90.0	-	-	
LB09_OS03	-	-	-	-	-	-	-	-	-	90.0	-	-	-
LB09_OS04	-	-	-	-	-	-	-	-	-	90.0	-	-	
LB10_OS02	15	15.0 - 19.0	PASS	704	680.4 - 831.6	PASS	2.2004	0.7794 - 1.1692	***Fail***	90.0	96.30	PASS	
LB10_OS03	28	27.0 - 33.0	PASS	314	324.0 - 396.0	**Fail**	409.3740	262.4901 - 393.7351	***Fail***	90.0	85.80	**Fail**	PASS
LB10_OS04	49	47.7 - 58.3	PASS	219	209.7 - 256.3	PASS	84.9694	60.3695 - 90.5543	*PASS*	90.0	89.82	**Fail**	
LB11_OS02	-	-	-	-	-	-	-	-	-	90.0	-	-	
LB11_OS03	15	14.0 - 18.0	PASS	935	841.5 - 1028.5	PASS	1.9399	0.8055 - 1.2083	***Fail***	90.0	98.50	PASS	PASS
LB11_OS04	14	12.0 - 16.0	PASS	1525	1353.6 - 1654.4	PASS	1.9099	0.7542 - 1.1312	***Fail***	90.0	99.01	PASS	
LB12_OS02	42	39.6 - 48.4	PASS	318	295.2 - 360.8	PASS	78.8544	60.9914 - 91.4872	*PASS*	90.0	96.75	PASS	
LB12_OS03	61	55.8 - 68.2	PASS	464	441.0 - 539.0	PASS	7.5336	3.7572 - 5.6358	***Fail***	90.0	94.13	PASS	PASS
LB12_OS04	38	39.6 - 48.4	**Fail**	138	168.3 - 205.7	**Fail**	12.3352	8.6849 - 13.0273	*PASS*	90.0	84.31	**Fail**	
LB13_OS02	17	15.0 - 19.0	PASS	73	65.7 - 80.3	PASS	1.0891	0.3541 - 0.5311	***Fail***	90.0	100.00	PASS	
LB13_OS03	20	18.0 - 22.0	PASS	72	64.8 - 79.2	PASS	0.3218	0.1202 - 0.1802	***Fail***	90.0	100.00	PASS	PASS
LB13_OS04	1	-1.0 - 3.0	PASS	2	.0 - 4.0	PASS	0.0008	0.0002 - 0.0002	***Fail***	90.0	100.00	PASS	
LB14_OS02	46	39.6 - 48.4	PASS	447	387.0 - 473.0	PASS	4.1430	2.7815 - 4.1723	*PASS*	90.0	94.19	PASS	
LB14_OS03	63	58.5 - 71.5	PASS	521	472.5 - 577.5	PASS	4.4342	2.3360 - 3.5040	***Fail***	90.0	99.04	PASS	PASS
LB14_OS04	6	4.0 - 8.0	PASS	24	22.5 - 27.5	PASS	0.2468	0.1641 - 0.2461	***Fail***	90.0	97.96	PASS	
LB15_OS02	-	-	-	-	-	-	-	-	-	90.0	-	-	
LB15_OS03	-	-	-	-	-	-	-	-	-	90.0	-	-	-
LB15_OS04	-	-	-	-	-	-	-	-	-	90.0	-	-	
LB16_OS02	40	36.0 - 44.0	PASS	173	156.6 - 191.4	PASS	-	-	-	90.0	92.80	PASS	
LB16_OS03	-	-	-	-	-	-	-	-	-	90.0	-	-	PASS
LB16_OS04	73	67.5 - 82.5	PASS	878	802.8 - 981.2	PASS	-	-	-	90.0	98.76	PASS	

Table 13. NMP performance standards for Own Sample exercises OS02 to OS04.

	Estimation of Taxa			Estimation of Abundance			Estimation of Biomass			Similarity Index			Overall
LabCode	Lab.	Target	Flag	Lab.	Target	Flag	Lab. result	Target	Flag	Target	Lab.	Flag	NMP Flag
LB17_OS02	-	-	-	-	-	-	-	-	-	90.0	-	-	
LB17_OS03	62	58.5 - 71.5	PASS	3403	3060.0 - 3740.0	PASS	18.2167	10.0265 - 15.0397	***Fail***	90.0	92.08	PASS	?Fail
LB17_OS04	-	-	-	-	-	-	-	-	-	90.0	-	-	
LB18_OS02	1	-1.0 - 3.0	PASS	3	1.0 - 5.0	PASS	0.0084	0.0033 - 0.0049	***Fail***	90.0	100.00	PASS	
LB18_OS03	4	4.0 - 8.0	PASS	5	5.0 - 9.0	PASS	0.1892	0.0761 - 0.1141	***Fail***	90.0	83.33	**Fail**	PASS
LB18_OS04	19	19.8 - 24.2	**Fail**	218	207.9 - 254.1	PASS	0.5339	0.2143 - 0.3215	***Fail***	90.0	95.77	PASS	
LB19_OS02	-	-	-	-	-	-	-	-	-	90.0	-	-	
LB19_OS03	-	-	-	-	-	-	-	-	-	90.0	-	-	-
LB19_OS04	-	-	-	-	-	-	-	-	-	90.0	-	-	
LB20_OS02	41	36.9 - 45.1	PASS	114	102.6 - 125.4	PASS	-	-	-	90.0	99.12	PASS	
LB20_OS03	15	14.0 - 18.0	PASS	98	90.0 - 110.0	PASS	-	-	-	90.0	89.90	**Fail**	PASS
LB20_OS04	49	44.1 - 53.9	PASS	386	347.4 - 424.6	PASS	-	-	-	90.0	99.74	PASS	
LB21_OS02	-	-	-	-	-	-	-	-	-	90.0	-	-	
LB21_OS03	-	-	-	-	-	-	-	-	-	90.0	-	-	-
LB21_OS04	-	-	-	-	-	-	-	-	-	90.0	-	-	
LB22_OS02	-	-	-	-	-	-	-	-	-	90.0	-	-	
LB22_OS03	-	-	-	-	-	-	-	-	-	90.0	-	-	-
LB22_OS04	-	-	-	-	-	-	-	-	-	90.0	-	-	
LB23_OS02	-	-	-	-	-	-	-	-	-	90.0	-	-	
LB23_OS03	-	-	-	-	-	-	-	-	-	90.0	-	-	-
LB23_OS04	-	-	-	-	-	-	-	-	-	90.0	-	-	
LB24_OS02	-	-	-	-	-	-	-	-	-	90.0	-	-	
LB24_OS03	-	-	-	-	-	-	-	-	-	90.0	-	-	-
LB24_OS04	-	-	-	-	-	-	-	-	-	90.0	-	-	

Table 14. NMP performance standards for Particle Size analysis exercises PS08 and PS09.

PS08 Target range = 0.0 - 16.7

	PS08	
LabCode	Actual	Flag
LB01	5.2	PASS
LB02	9.5	PASS
LB03	-	-
LB04	n/s	n/s
LB05	-	-
LB06	10.0	PASS
LB07	3.2	PASS
LB08	6.5	PASS
LB09	n/s	n/s
LB10	8.8	PASS
LB11	8.5	PASS
LB12	5.7	PASS
LB13	6.7	PASS
LB14	9.5	PASS
LB15	-	-
LB16	-	-
LB17	6.0	PASS
LB18	6.0	PASS
LB19	5.9	PASS
LB20	3.8	PASS
LB21	-	-
LB22	5.0	PASS
LB23	-	-
LB24	-	-

PS09 Target range = 0.0 - 15.3

	PS09	
LabCode	Actual	Flag
LB01	4.7	PASS
LB02	4.4	PASS
LB03	-	-
LB04	n/s	n/s
LB05	-	-
LB06	4.8	PASS
LB07	1.7	PASS
LB08	-	-
LB09	-	-
LB10	9.2	PASS
LB11	4.8	PASS
LB12	-	-
LB13	4.9	PASS
LB14	6.5	PASS
LB15	-	-
LB16	-	-
LB17	2.8	PASS
LB18	17.5	**Fail**
LB19	2.5	PASS
LB20	2.2	PASS
LB21	-	-
LB22	2.8	PASS
LB23	n/s	n/s
LB24	-	-

"-" : no return from laboratory
"n/s" : statistic not supplied

Figures

Figure 1. Particle size distribution curves resulting from analysis of twelve replicate samples of sediment distributed as PS08. Six analysed by Laser (solid lines, diamonds) six by Sieve + Pipette (dashed lines, triangles).

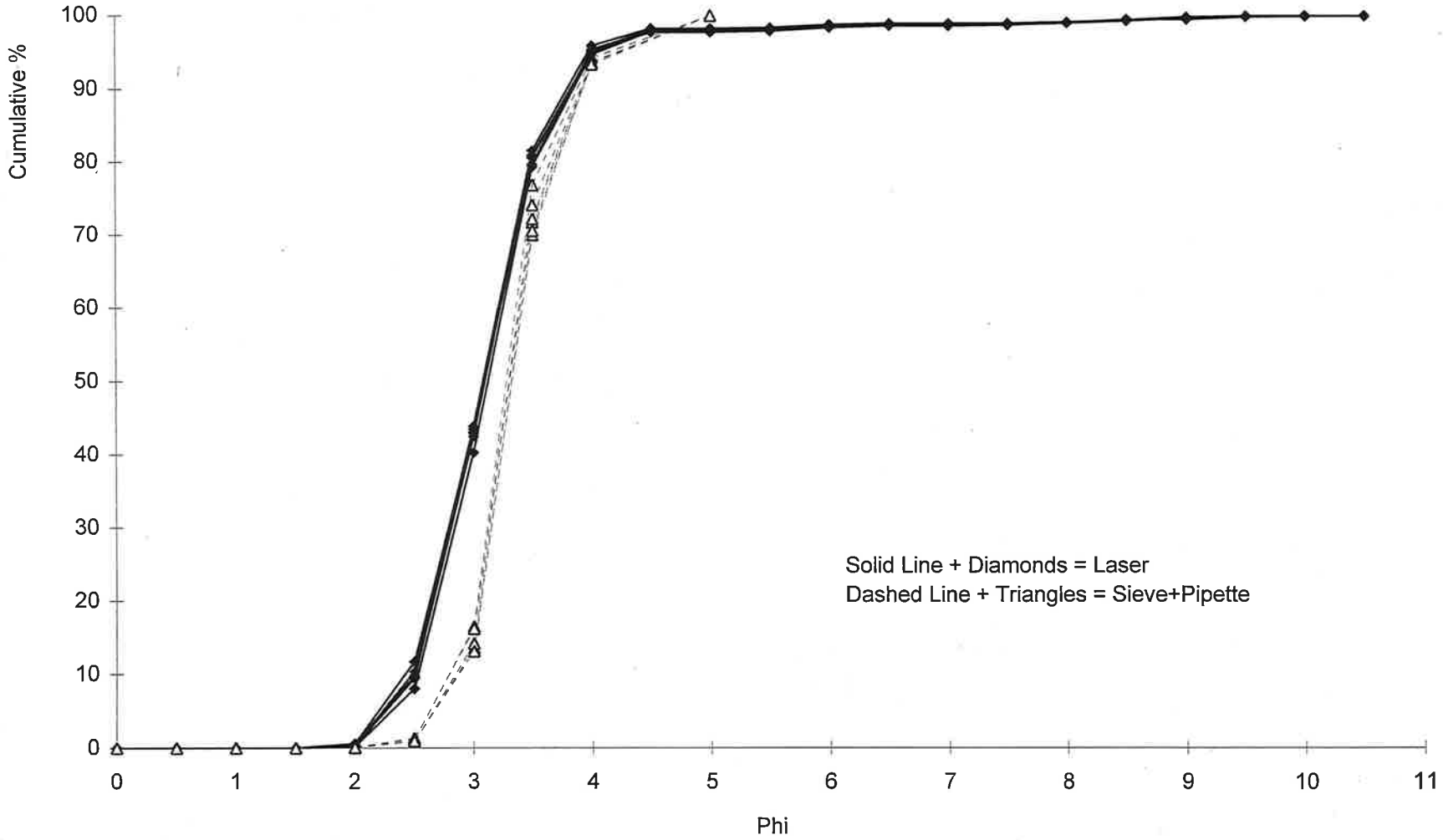


Figure 2. Particle size distribution curves resulting from analysis of replicate samples of sediment distributed as PS09. Seven samples analysed by sieve-pipette and seven samples analysed by Laser.

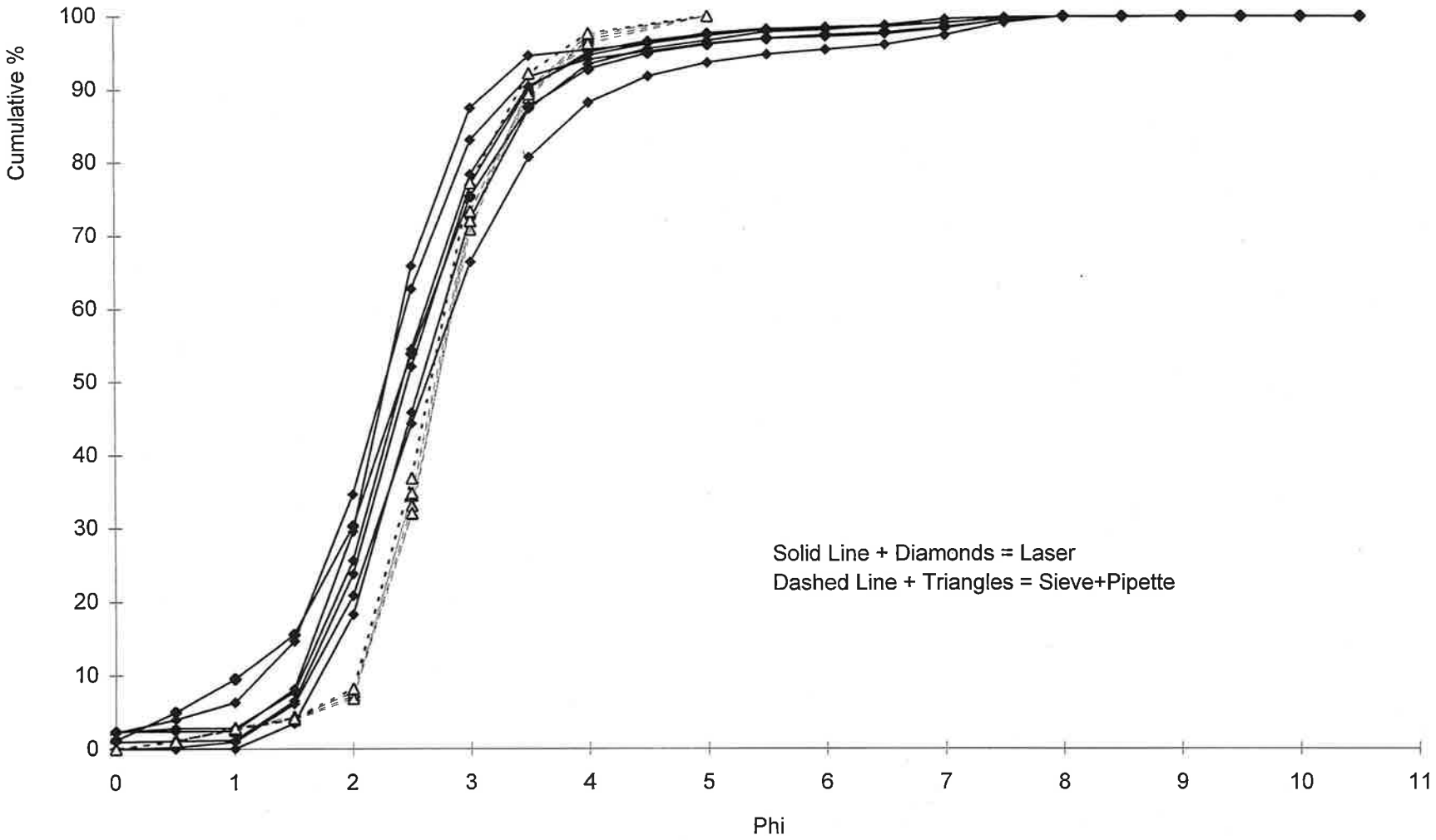


Figure 3. Particle size distribution curves resulting from analysis of sediment sample PS08 by the participating laboratories. Analytical method is indicated.

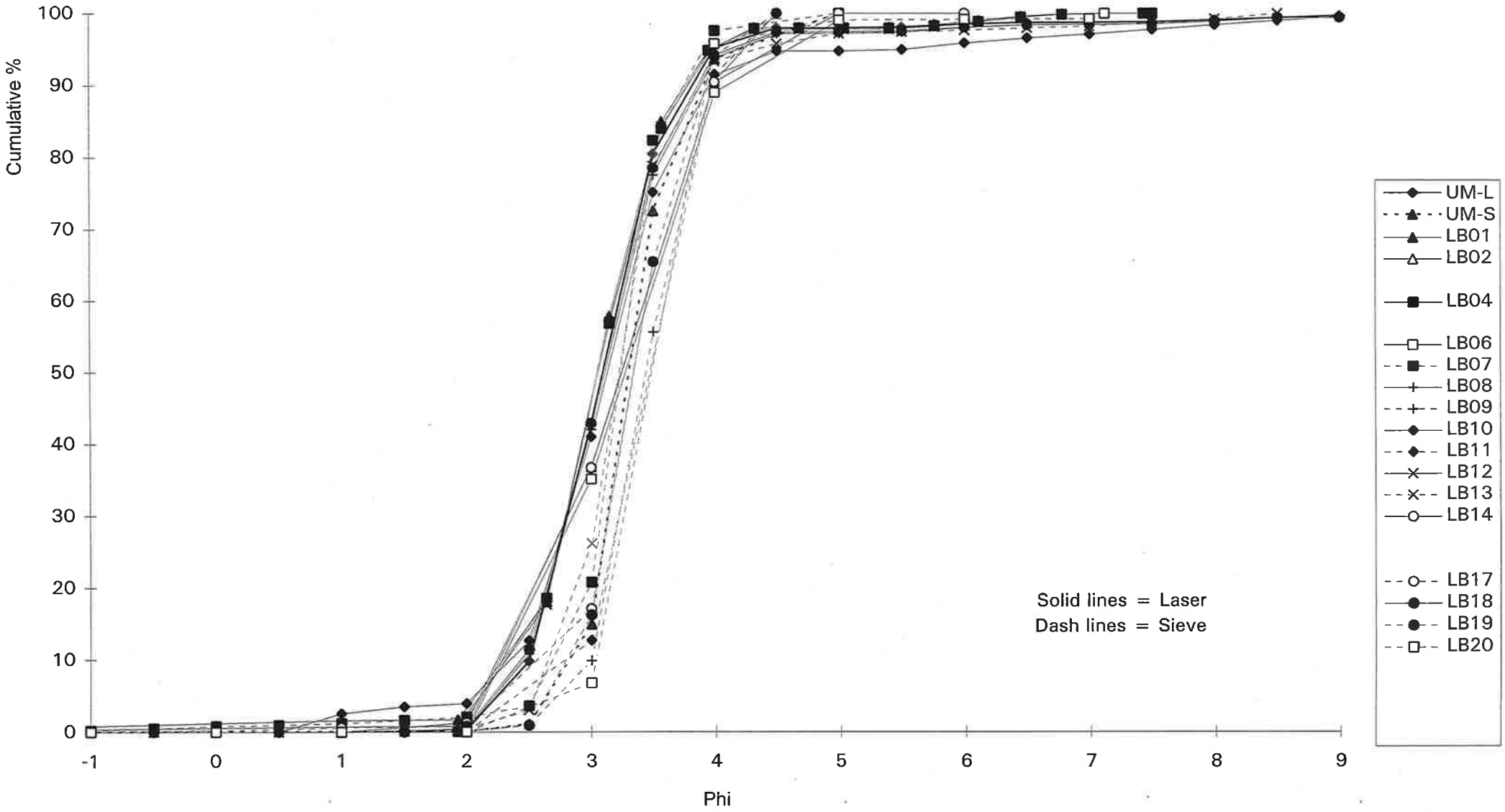


Figure 4. Particle size distribution curves resulting from analysis of sediment sample PS09 by the participating laboratories.

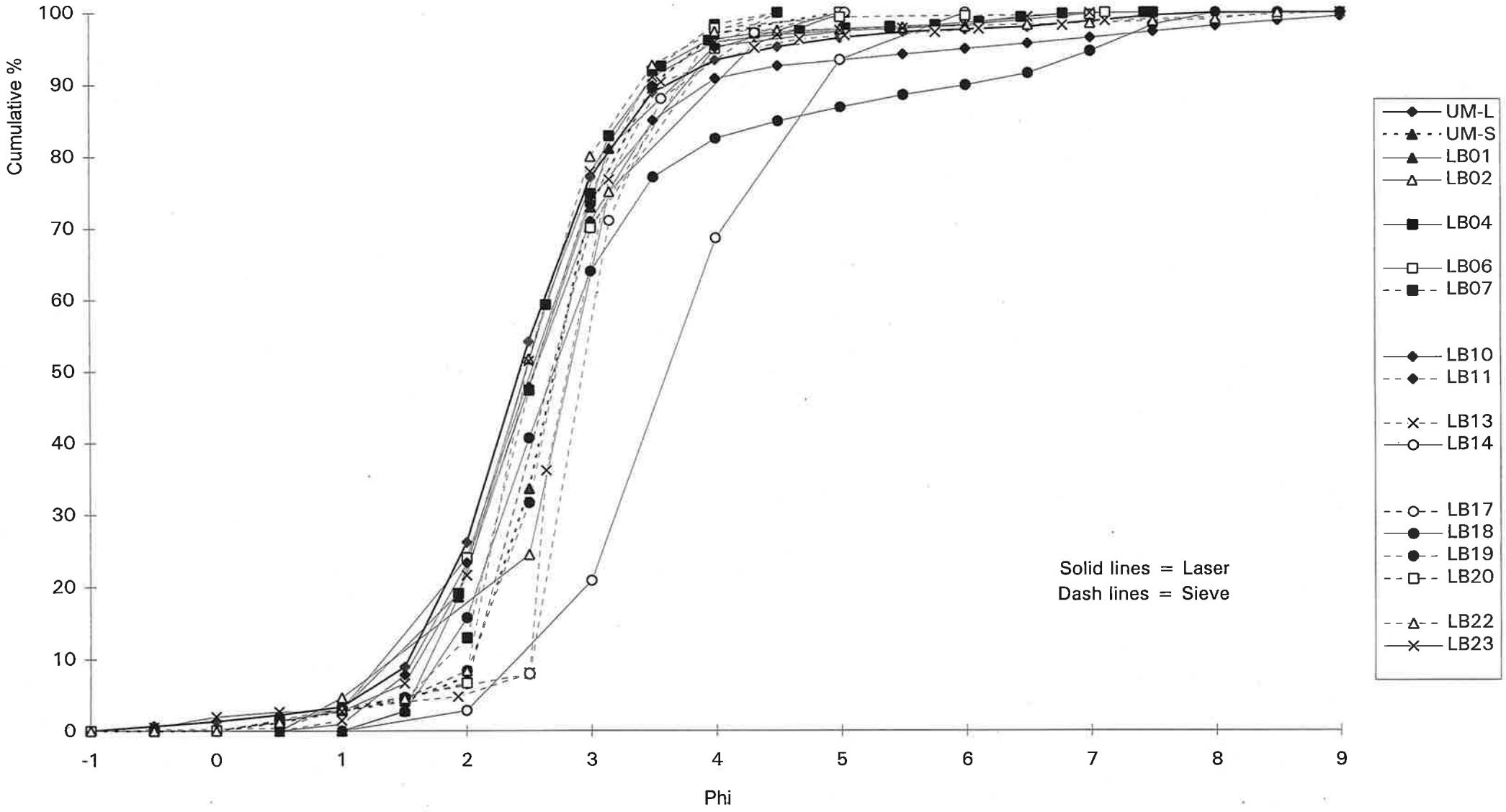
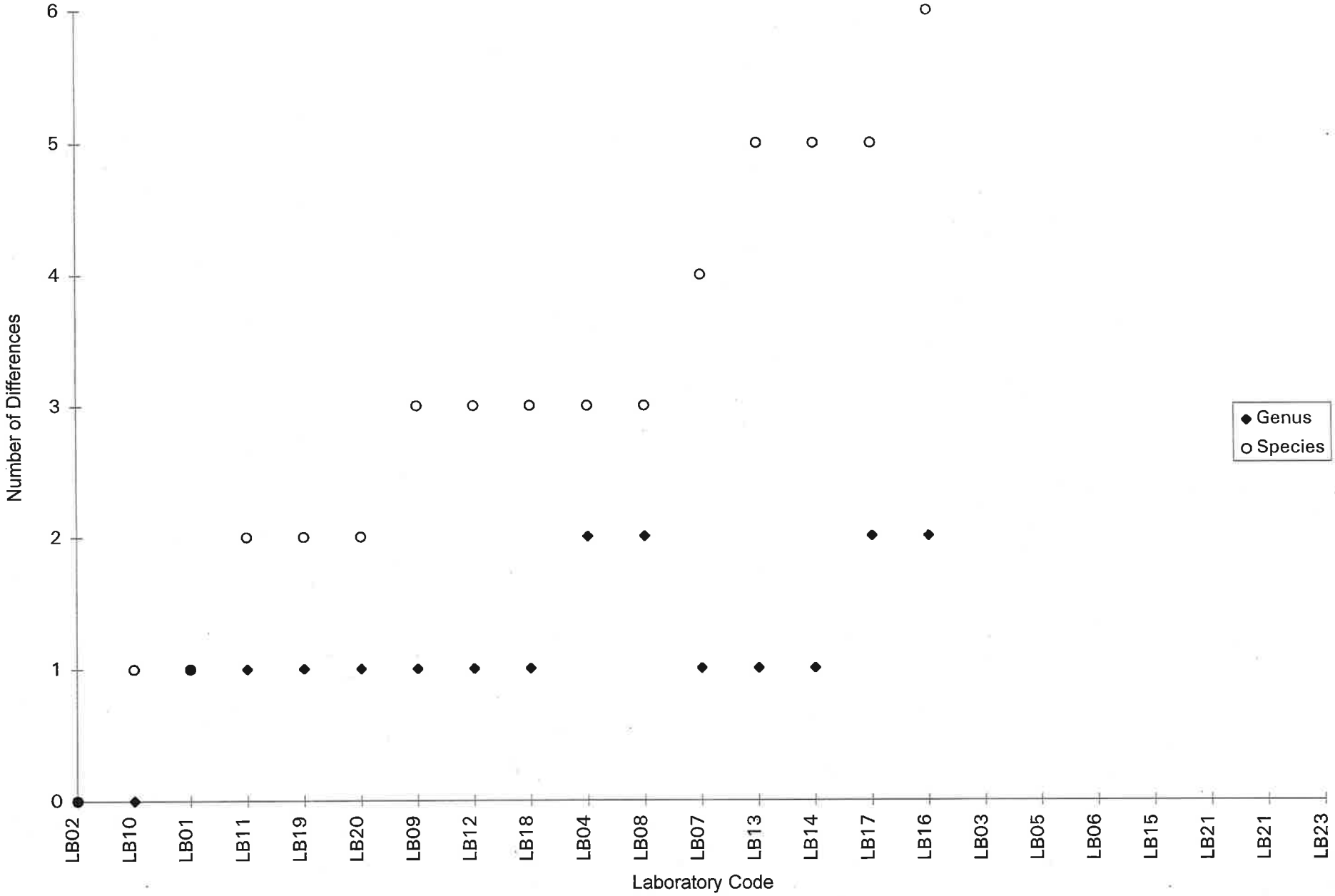


Figure 5. The number of differences at the level of genus and species recorded for each of the participating laboratories for RT08. Laboratories arranged in order of increasing number of differences at the level of species.



Appendices

Appendix 1. List of groups from which specimens should be selected for the Laboratory Reference exercise.

	Major Group	Group	Note
1	Oligochaeta	Tubificidae	
2	Polychaeta	Ampharetidae	
3	Polychaeta	Cirratulidae	
4	Polychaeta	Nephtyidae	
5	Polychaeta	Nereididae	
6	Polychaeta	Phyllodocidae	
7	Polychaeta	Sigalionidae or Polynoidae	Choose one
8	Polychaeta	Spionidae	
9	Polychaeta	Spionidae	
10	Polychaeta	Syllidae	
11	Polychaeta	Terebellidae	
12	Polychaeta	Hesionidae, Glyceridae, Goniadidae, Opheliidae Sphaerodoridae, Eunicida, Paraonidae, Maldanidae	Choose one from the list
13	Crustacea	Ampeliscidae	
14	Crustacea	Oedicerotidae	
15	Crustacea	Another gammaridean amphipod family	Choose another family
16	Crustacea	Decapoda	
17	Crustacea	Cumacea	
18	Crustacea	Isopoda	
19	Mollusca	Gastropoda - Opisthobranchia	
20	Mollusca	Gastropoda - non Opisthobranchia	
21	Mollusca	Pelecypoda	
22	Mollusca	Pelecypoda	
23	Mollusca	Caudofoveata, Solenogastres or Polyplacophora	One specimen from one class
24	Echinodermata	Echinoidea, Holothurioidea or Ophiuroidea	One specimen from one class
25	Other	Sipuncula, Pycnogonida, Bryozoa, Cnidaria	

End of Contractor's Report

4. ISSUES ARISING

4.1. The composition and aims of the scheme

The scheme has developed from a combination of committee suggestion/discussion, feedback from participants and needs of the National Monitoring Programme. It is apparent that the different components are not given equal status by the participants and equally not all components are suited to developing standards of achievement.

Ring tests are generally accepted as a method of improving learning skills relating to taxonomy. Laboratories generally achieved good results. Areas of difficulty emerged with particular faunal groups which were tackled by targeted RT and the taxonomic workshop. The standard ring test formed part of the core programme. It is recognised that the contractor supplied ring tests do not necessarily reflect the skills of individual laboratories and for this reason RT's have not been used to set a pass/fail standard for NMP labs. They can however be used to reflect overall lab performance and improve skills.

The **Lab ref RT** was perceived as a parallel to OS returns ie this component test would apply quality control to 'own specimens'. It has transpired however that while some laboratories are only beginning to set up a marine voucher collection, others have used the lab ref test to acquire a free second opinion on their 'difficult specimens' from a consultant who would otherwise charge a fee, rather than as a check on a range of their 'standard' fauna. Should this component acquire a pass fail standard, labs may well choose to send specimens they are confident in to achieve a high score! In the mean time labs are urged to consider this component in a more 'random' fashion selecting a range of beasts from across a spectrum of taxa, substrates and salinities if possible.

The **MB sample**, though sourced from a geographical location unfamiliar to many participants, was designed to examine sample processing skills in addition to taxonomic skills. It became apparent that a few labs had some serious problems in overlooking a number of taxa in addition to many others overlooking some specimens. While overlooking a few individuals might be deemed to be insignificant, should these individuals comprise several taxa in a sparse community, interpretation could be compromised.

Determining **biomass** is a new skill for many laboratories that do not complete this analysis routinely.

Three **Own samples** from 24 labs , was agreed a s a reasonable number to be taken on by the contractor. Additional OS 's to be reprocessed were sought by some labs but currently this requires to part of an agreement between that lab and the contractor and not as part of the NMBAQC Scheme. Pass /Fail Standards for the NMP data base have been applied only to OS samples for enumeration and taxon extraction as representing the true reflection of local lab skills. Biomass determination is a requirement of NMP labs but no standard has been assigned by the AQC Committee, until skills and protocols have been agreed and tackled.

Particle size determinations are accepted as a routine biological descriptor and can be carried out by a variety of techniques each of which appears to be fairly consistent in its reproducibility. As a routine and NMP determinand, this analysis has been assigned a pass/fail standard and must be completed by NMP labs. Most labs in the scheme carried out the analysis by one of the two preferred techniques in common use.

4.2 Participation

The 24 participants in 1996/97 comprised private contractors, university labs and Government labs in Scotland Ireland and England. 16 laboratories sample for the NMP and submit data to the NMP data base. A number of the participants subcontract to a second or third party. While it is in the interest of all laboratories to participate in all components of the scheme in order to gauge their performance, clearly private contractors and non NMP labs, may favour completing certain components over others which will be compatible with their commercial interests or their budgets. This is their choice provided no contractual agreement is broken. For these labs, participation in selected components eg only RTs is acceptable. **However, labs submitting data to the NMP should complete the whole programme whether pass / fail standards have been devised or not for individual components.**

4.3 Targets and standards

The standards to be achieved in 1996/97 were described in 1995/96 report and in section 3 above. Some difficulty in applying the proposed standards was experienced and it was agreed that **the separate components of the Own Samples and PS only would be scored against the targets.** Due to disparate problems with biomass determinations, this component has been excluded for 1996/97. Thus for those labs returning data, 9 separate components can be assigned as pass or fail. The committee agreed it would be reasonable that in order to achieve an overall pass, the standards should be achieved or exceeded on >=6/9 components.

While individually very few labs had consistent problems, applying the agreed level of pass, 8 out of 16 NMP labs failed, no OS data were returned for a further 5 (these would be deemed to have failed) and a further 3 failed but had made the effort to return data .

Standards of achievement for PS test was much higher.

It would appear that the reduced standards of achievement of one or two labs may well be addressed through the development of standard protocols for subsampling techniques, the subject of a workshop held in 1997/98.

The data submitted to NMP and currently held on the data base have been reported in the draft Holistic Report due to be published early in 1998. These data stand but the standards now developed and reported here will be applied to future data submissions.

Further development of standards to include at least biomass is proposed.

4.4 Reporting and submission of returns

During the year, late or non return of data to the contractor has led to reporting problems and some criticism about feedback . The time scales allowed for sample treatment and issue have been thought to be reasonable hoping to avoid busy biological 'seasons' and allowing the contractor sufficient time to feedback on each circulation. However, late or non return of data has made this increasingly difficult and interim comparisons virtually impossible. Labs now require to accept only partial feedback with its concomitant confidentiality problems ie a risk of 'letting the cat out of the bag' or wait till the annual report is issued, if data are not returned to schedule. In an effort to prevent delay in production of future annual reports, in 1997/98, a final reporting date will be issued and labs not returning data by then could forfeit their inclusion in the report.

It is worth noting that in 1996/97, ten NMP labs failed to make returns for some components of the AQC programme during the year. Three of these failed to return any data at all and a further one lab completed only the lab ref RT. A total of five NMP labs failed to supply OS data against which standards could be assigned.

Such a poor response has serious implications not only for cost effectiveness measures made by managers and but also will have grave implications for the NMP database as such labs would be deemed to have failed to achieve the required standards and their data would be flagged as a failure or excluded from the data base in future.

The issue of resolution of individual lab problems and feedback of information will be considered in 1997/98.

4.5 Confidentiality

The scheme depends on each lab having a code assigned to it. Each lab knows its own code and the contractor knows all the codes. The interim results of each circulation are notified to the participating labs as fully as possible. However due to late return of results by some participants, partial reporting has been necessary which inevitably reveals the 'answers' before some labs have completed their returns. It is advised that it would not be in the spirit of the scheme for these interim reports to be communicated to other labs even though the component may not carry an NMP standard/target.

Further, to preserve confidentiality, during the year it became necessary to change the codes to protect the lab results from overt exposure to commercial interests. If necessary, codes could be changed annually or biennially to continue to preserve the commitment to lab confidentiality. It is recognised however that such a procedure would lead to extraordinary reporting difficulty for the contractor in maintaining continuity.

4.6 Standardising protocols

Achieving good quality control and reliable reproducibility of benthic biological/community data is fundamental to spatial or temporal monitoring. Field techniques ie sampling, good and accurate position fixing and survey design require considerable scrutiny as well as laboratory techniques eg Temporal community data could be invalidated by poor position fixing. Additionally, among the reasons for disparity in benthic biological results is a variation in protocols of sample processing, analytical techniques eg biomass, subsampling on dense populations, differing efficiencies of sampling equipment and a host of other variables. It is the intention of the scheme to address some of these eg biomass and subsampling protocols to reduce some of the variability. The workshop on field methods may allow some degree of standardisation though changes would carry greater resource implications for some laboratories. There will inevitably be some resistance to any recommended change so it is essential for laboratories to remain flexible in their approach to keep standards as high as possible.

5. SCHEME PROPOSAL FOR 1997/98

The core programme for the scheme in the coming year 1997/98 will contain the following components:

1. Own samples;
2. Ring Tests including a targeted ring test
3. Bucket sample.
4. PSA samples.

6. CO-ORDINATING COMMITTEE ACTIVITIES

As well as the projects assigned to the contractor committee members undertook specific tasks on behalf of the scheme.

6.1 Committee Projects

a) Workshop on taxonomic problems in some invertebrate groups;
b) Workshop on field methods
c) NODC Codes
d) MCS Species Directory.

a. Workshop on taxonomic problems in some invertebrate groups

This workshop held at the University Marine Biological Station, Millport was organised jointly by the NMBAQC Co-ordinating Committee and Estuarine and Coastal Sciences Association (ECSA) with participating members attendance subsidised by the scheme. The central aim of the workshop was to concentrate on a small number of so called "problem taxa" and by using new keys and the advice of appropriate specialists try and clarify areas of known taxonomic difficulty. During the course of this workshop a short

session was held allowing scheme participants to feed back to the Co-ordinating committee any concerns regarding the scheme or to make suggestions regarding improvements.

b. Workshop on Field Methods

A workshop on field methods designed to improve the intercomparabilty at the sampling level and to field test different sampling equipment was organised jointly by the Environment Agency, NMBAQC Scheme and ECSA during March 1997. As follow up from this workshop, samples collected by different operators will be analysed by a single laboratory to assess variability occurring at the sampling stage.

6.2 NODC Codes

The problem of merging the new edition of the MCS Species Directory with the NODC coding system has been undertaken by Mr Moore, SOAEFD. This task is at last showing some signs of progress. The NODC in the United States have now provided a complete list of NODC codes matched to the most recent MCS species listing. This together with impending publication of the new MCS species directory (supported by the NMBAQC scheme) should prove valuable in facilitating the manipulation of benthic species data and improve data intercomparibilty.

6.3 NMP

The National Monitoring Plan is now coming towards the completion of its first phase which will see the production of the overall "holistic" UK report and already regional reports from N Ireland, England and Wales and Scotland are well advanced and will be published early in 1998. . During 1996 a UK database for NMP data was established at the EA TAPS centre at Peterborough. However, the initial versions of this were not particularly suited to the entering of benthic data sets and in March 1997 a meeting between the NMBAQC and a representative from TAPS was held to discuss a more suitable approach and an appropriate solution agreed.

It was agreed in 1996 that the NMABAQC co-ordinating committee will liaise with working group and the TAPS centre and advise on the analysis and interpretation of the benthic data and preliminary discussions have begun on this. It is clear also that the committee needs to address the problems of modification/transformation of the data for interpretative purposes. This would include issues surrounding the treatment of juveniles, singletons and qualitative taxa.

6.4 Setting Standards and Reporting Performance

The method where standards could be set for benthic data was laid out in the 2nd annual report of the NMBAQC scheme and full results from this will be reported to the Autumn meeting of MPMMG. See Section 4d above. Further refinements and additional standards may be developed.

6.5. Accreditation /certification

During the November workshop a session was set aside to allow feedback from the participants. There was generally expressed view that the NMBAQC scheme be used to provided some form of accreditation or certification to laboratories. This matter has been further discussed by the Co-ordinating Committee and number of options appear possible;

a) the Co-ordinating Committee issue certification;
b) the scheme manager issues certification;

c) the United Kingdom Accreditation Service be approached with a view to the scheme being adopted under the umbrella of UKAS.

d) an organisation such as the Institute of Biology be approached to issue accreditation/certification based on contracted participation in the Scheme.

The Co-ordinating committee recognised that each of these options contains problems and requested that the Chairman seek the guidance of MPMMG.

7. National Marine Biological AQC Scheme

Financial Report 1996/1997

The third year of the scheme has been completed successfully.

Twenty-three laboratories continued to participate from year two and during the year two new laboratories entered the scheme from Southern Science and the Institute of Estuarine and Coastal Sciences bringing the total to twenty-five.

Confirmation of participation in 1997/98 was received from EA National Laboratory Service, Llanelli and University College, Cork.

Fees in 1996/97 remained the same as in year two although it was decided to offer split fees next year where appropriate (ie non NMP labs) according to discipline. Laboratories participating in two workshops held during the year were subsidised through the scheme to encourage and develop taxonomic and sampling skills.

It was decided to award the contract for this year's core programme to Unicomarine on the basis of their experience, good management and reasonable cost.

The contract continued to be managed by the Scottish Environment Protection Agency (SEPA) West Region (formerly Clyde River Purification Board) under direction from the AQC committee.

Financial Summary 1996/1997

	INCOME	**EXPENDITURE**
Participant Fees	34800.00	
Consultant fees		34721.00
Management fee		3000.00
CD ROM code		67.73
Hospitality		85.00
MCS Directory		4000.00
Workshop fees carried over into 97/98		
TOTALS	**34800.00**	**41873.73**
BALANCE B/F £ 29 267.37		
Working Balance 31st March 1997 £ 22193.64		
All above figures exclude VAT and fees received before year end for participation in year four.		

APPENDIX 1

NATIONAL MARINE BIOLOGICAL AQC CO-ORDINATING COMMITTEE

Membership:

Dr. M. Service(Department of Agriculture, Northern Ireland) Chairman)

Ms. I. Jack (SEPA East) (Secretary)

Mrs. A. Henderson (SEPA West) (Contract Manager)

Dr. M. Elliott (University of Hull)

Mr. D. Moore (SOAEFD)

Dr. H. Rees (CEFAS)

Mr. R. Proudfoot (EA)

Mr. J. Breen (IRTU/Industrial Science Centre)

APPENDIX 2

ROLE OF THE NATIONAL MARINE BIOLOGICAL ANALYTICAL QUALITY CONTROL COMMITTEE (NMBAQCC)

The functions and role of the committee for the marine biological AQC scheme are as follows:

1. Define what services are required with particular reference to the NMP.
2. Interact with Scottish Environmental Protection Agency (SEPA) as managers of the contract.
3. Review other organisations/laboratories that should be approached to join the scheme.
4. Agree and set an annual budget and itemise contributions from individual participants.
5. Agree the funding requirements of SEPA to service the scheme and the committee.
6. Develop all necessary definitions.
7. Develop and document an overall plan for the scheme.
8. Receive and review reports from participating laboratories on any problems arising from internal and external AQC exercises.
9. Receive and review reports from SEPA on the management of the scheme.
10. Establish the frequency and location of committee meetings.

11. Receive and review reports from the tendering organisation on AQC exercises.
12. As necessary, establish ad-hoc groups to address problems as they arise and provide members to chair each sub-group.
13. Produce an annual report which will be presented to MPMMG for information.
14. Establish links and stimulate collaboration with international intercomparison exercises.
15. Encourage accreditation and co-ordinate in-house AQC policy.
16. Make recommendations and receive reports from participating laboratories on in-house AQC.
17. Establish a timetable and dates for reports.

APPENDIX 3

NATIONAL MARINE BIOLOGICAL ANALYTICAL QUALITY CONTROL SCHEME

ROLE OF THE CONTRACT MANAGER

(Scottish Environmental Protection Agency)

Objectives

1. To establish a managed national marine biological quality control scheme.
2. To recommend quality materials where appropriate.
3. To manage the scheme's finances.

Schedule of Work

1. Provide operational support for the National Co-ordinating Committee.
2. Implement the plan for the national AQC scheme.
3. Receive and manage funds donated by participating members of the AQC consortium.
4. Co-ordinate with the Committee the contents of the tender document, issue to relevant laboratories, evaluate tenders, provide a report with recommendations to the Committee and agree the contract.

APPENDIX 4

PARTICIPATING ORGANISATIONS IN NMBAQC 1996/97

CEFAS (MAFF), DANI , FRS (SOAEFD), IRTU/Industrial Science Centre, Northern Ireland , Scottish Environmental Protection Agency , Environment Agency, SEAS Ltd, ENTEC (Europe Ltd), Environmental Resources and Technology Ltd, Zeneca, Southern Science, IECS, Hull.