National Marine Biological AQC

1999/00

ANNUAL REPORT
(Year 6)

November 2000
National Marine Biological AQC Coordinating Committee
Unicomarine Ltd

NATIONAL MARINE BIOLOGICAL ANALYTICAL QUALITY CONTROL SCHEME

Annual Report 1999/2000

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1. OVERALL SUMMARY

- The National Marine Biological AQC Scheme (NMBAQC Scheme) has completed its sixth year in 1999/2000. The background to the scheme is described in previous annual reports.

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

- The aims of the scheme include improving laboratory skills, improving the consistency and quality of marine biological benthic data and screening data for the UK NMMP programme.

- Participation in the scheme remained high with a total of twenty six laboratories participating. Sixteen of these laboratories submitted data for NMMP, seven were consultants or private contractors and the remainder non NMMP government labs. Interest had been expressed by some non NMMP labs in 'selective' participation where particular components of the scheme could be excluded/included for them. NMMP labs were required to participate in ALL relevant components. Overall the scheme was well supported.

- Several laboratories contract out analysis of their own samples and for the NMBAQC Scheme samples. Others supply a central laboratory service with relevant material. 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.

- There was considerable variation in the way different participating laboratories approached the scheme components. There were long time delays and some non returns of essential data to the contractor, presenting feedback reporting and 'flagging' difficulties.

- Detailed results of the circulations are presented in the contractors report (Section 7) where individual laboratory performance is described and standards of achievement against the targets tabulated.

- Problems with biomass analysis were again evident with a great deal of variation amongst labs. The Scheme needs to address the issue of biomass determination. Trials are required to derive the best method for the "blotted technique". Consideration needs to be given to the preparation of a standardised protocol and reporting format.

- Serious problems still exist in sorting accuracy. Laboratories should target taxa commonly being overlooked and provide additional training. A review of existing extraction techniques and quality control measures may be required.

- There was a slight improvement in extraction efficiency for the MB sample compared to last year.

- Overall participating laboratories performed quite well in the OS exercise. Faunal extraction needs to be improved as major extraction differences were reported between the participating laboratory and the contractor.

- Random selection of the OS choice needs to be improved to prevent additional effort being used on samples AFTER they have been selected by the contractor.

- Particle size exercises again highlighted the variation in results depending on the technique employed. These differences are further emphasised by certain sediment characteristics.

- Efforts to achieve better data feedback to participants were hindered by late returns and non returns of data. Even when deadlines were extended delays were experienced. **Laboratories who miss data or sample return deadlines will be deemed to have failed.** The use of e-mail to facilitate rapid data transfer is strongly recommended where practicable.

- Laboratories should use feedback to decide if additional training or procedural changes are required to improve their performance.

- To improve the training aspect of the RT component of the scheme laboratories will be allowed to retain RT specimens until the results have been distributed. This will allow participants to check specimens and assess where errors arose. This will commence in scheme year 7 (2000/2001). Laboratories should endeavour to return RT specimens to the contractor after checking their results and not retain them indefinitely.

- NMMP Laboratories achieved a 69% overall pass rate. This is similar to last year but is again partly due to non returns of OS data.

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

- A Scheme Statement of Performance will be issued to participants.

- The Co-ordinating Committee commissioned an independent review of standards in 1999. The final report is expected by December 2000.

- The JNCC are organising a ring test for epibiota, using photographic material. This pilot scheme will be held in late 2000/early 2001 on a voluntary basis.

- Co-ordinating Committee has instigated steps to commission an independent audit of the scheme with expected completion of the documentation audit by spring 2001.

- Proceedings from the 1997 Humber Benthic Field Methods Workshop are expected to be published in early 2001.

- Unicomarine Ltd. continue to operate the scheme successfully.

- Overall co-ordination of the scheme was undertaken by the National Co-ordinating Committee (Appendix 1) reporting to NMMP Working Group at UK level.

2. SCOPE OF THE SCHEME

The sixth year of the scheme was designed to build on the data from previous years and highlighting the standards achieved, while continuing the emphasis on participant supplied samples. In total thirteen participant supplied samples, have now been judged against the standards derived in 1996/97. To this end the format of the scheme in 1999/2000 followed last year's formula.

Scheduled circulations:

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

b) Two Ring Tests (RT) as follows;
i. one normal ring test of twenty five species to be supplied by the contractor;
ii. one ring test targeted at "problem taxa" highlighted throughout the scheme;

c) One participant supplied set of twenty five laboratory reference (LR) species to be sent to the contractor for validation;

d) One contractor supplied macrobenthic sample (MB);

e) Two contractor supplied sediment samples for particle size analysis (PS).

The samples were sent out to participants at staggered intervals during the year with set time scales for sample or data returns to Unicomarine Ltd.

A detailed breakdown of the results from the year, are contained in the contractors report in Section 7.

3. ISSUES ARISING

3.1 The composition and aims of the scheme

The statements made in last year's report hold true for 1999/2000

- **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 the targeted RT and individual feedback. 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 NMMP labs. They can however be used to reflect overall lab performance and improve skills. Particularly important will be the comparison by each lab of their own results against the issued specimens. Only in this way will errors be improved upon.

- The **Laboratory Reference** was perceived as a parallel to OS returns i.e. 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 LR exercise to acquire a second opinion on their 'difficult specimens' from a consultant, 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 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. The derivation of a standardised effective protocol requires addressing by the committee. Biomass determination is a requirement of NMMP labs but no standard has been assigned by the AQC Committee, until skills and protocols have been agreed and tackled.

- **Own samples**. Pass / Fail Standards for the NMMP data base have been applied only to OS samples for the enumeration and taxon extraction as representing the true reflection of local laboratory skills. There is no doubt that participants give a lot of weight to these samples and to this end may be selecting samples with specimens of which they are confident in order to gain a pass. A technique to avoid this selectivity will be developed.

- **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 NMMP determinand, this analysis has been assigned a pass / fail standard and must be completed by NMMP labs. Most laboratories in this scheme carried out the analysis by one of the two preferred techniques in common use.

3.2 Participation

The twenty six participants in 1999/2000 comprised private contractors, university labs and Government labs in Scotland, Northern Ireland, England and Wales. Sixteen laboratories provide data or analytical services for NMMP components and submit data to the NMMP 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, some laboratories may favour completing certain components over others which will be compatible with their commercial interests, budgets or time constraints. This is their choice provided no contractual agreement is broken. **However, all laboratories submitting data to the NMMP should complete the whole programme whether pass / fail standards have been devised or not for individual components.**

3.3 Submission of data

Despite long time periods allowed for data returns, there are still problems with late or non returns and use of incorrect formats. As last year, **only four NMMP laboratories supplied all the data from all the relevant components.** One supplied no data at all while the rest failed to supply at least one component. Of these, three omitted to supply data for the LR exercise having completed all the other aspects of the scheme. Recognising the value of flags, laboratories tended to favour the supply of OS and PS data at the expense of the rest of the scheme. **The MB component is considered by many labs to be irrelevant or too time consuming and returns were not forthcoming even from NMMP labs.** This serious failure on the part of some laboratories will require to be addressed as well as its significance for the NMMP programme.

3.4 Data feedback

As in previous years considerable problems were encountered feeding back data due to late or non returns and incorrect data formats. **Laboratories who miss data or sample return deadlines will be deemed to have failed.**

Laboratories have been issued with their individual results for circulations to allow review of their own performance. The introduction of ring test bulletins (RTB) has improved feedback and emphasised the learning aspect of this component.

3.5 Targets and Standards

As in 1998/99, it was agreed that the separate components of the Own Samples and PS only would be scored against the targets. Thus for those labs returning data, 9 separate components can be assigned as pass or fail. These components are a pass or fail for estimation of taxa, estimation of abundance and the similarity index for each of the three OS samples. 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. Overall flags for the OS exercise can only be applied to those laboratories which submit all three Own Samples.

While individually very few laboratories had consistent problems, applying the agreed level of pass, five out of the nineteen participating labs failed overall. **Of the five labs which failed overall, two supplied no OS data** (these are deemed to have failed).

Achievement of the biological standards appears to be posing a challenge for a number of laboratories. An independent review of standards has been undertaken during 1999/2000. The final report should be available by December 2000.

Particle size analysis poses less of a challenge to laboratories although a number of laboratories failed to return data and thus do not achieve a pass.

4. SCHEME PROPOSAL FOR 2000/2001

The core programme for the scheme in the coming year 2000/2001 will contain the following components.

1. Own samples;
2. Ring Tests including a targeted ring test;
3. Laboratory reference specimens (reverse Ring Test);
4. Macrobenthic 'Bucket' sample;
5. PSA samples.

The Co-ordinating Committee has instigated steps to commission an independent audit of the scheme. It is likely that this will be conducted in two parts, with an audit of documentation expected to take place during winter 2000/2001.

A pilot ring test of epibiota will be circulated in early 2001. It has been organised by the JNCC and will consist of photographic material. Participation will be voluntary although it is hoped that Scheme laboratories will recognise the importance of AQC in relation to the EC Habitats Directive.

The Committee is progressing plans for a future workshop to deal with certain problematic taxonomic groups, possibly to be held in autumn 2001.

5. CO-ORDINATING COMMITTEE ACTIVITIES AND PROJECTS

From its conception in 1993 the primary function of the NMABAQC scheme was to meet the benthic quality control needs of the UK National (Marine) Monitoring Plan. With this in mind the membership of the co-ordinating committee was drawn principally from those Government bodies and statutory agencies providing data to the NMMP. However, from the onset it was clear the scheme would draw participants from wider benthic biology community including many commercial bodies with this in mind one committee member (Dr. M Elliot) represents these wider interests.

During the period covered by this report the co-ordinating committee met four times with the principal purpose of discussing management aspects of the scheme and ensuring that any problems reported to the schemes contractors or the scheme manager were dealt with. However, during the year the committee devoted time to a number of special activities.

5.1 NMMP Developments

The Co-ordinating Committee has continued to play a role in the development of the NMMP, particularly those parts of the "Green Book" relevant to benthic biology. As data from the temporal trends phase of the NMMP begins to be generated the co-ordinating committee will require to strengthen its links to the central database in order to apply efficiently the pass/fail flags to the data. A review of these standards by an independent UK benthic biologist confirming their utility will be published by December 2000. It has been acknowledged that a failing in the original UK NM(M)P was a lack of co-ordination between the benthic biology, biological effects and chemical components of the plan. The co-ordinating committee will play a leading role in managing this aspect of the temporal survey. Central to this will be the SNIFFER project on predictive benthic models currently being undertaken by Dr. Elliott at the University of Hull.

5.2 Workshops

In past years the NMBAQC Committee has organised and supported workshops in conjunction with ECSA. In May 1999 a workshop on sampling strategies was held at the University Marine Biological Station, Millport. No other workshops were held in the UK between April 1999 and March 2000 although Mrs. Hamilton attended a workshop on crustacean taxonomy in Hamburg, Germany organised by the European BeQUALM initiative.

Proceedings from the 1997 Humber Benthic Field Methods Workshop are expected to be published in early 2001.

5.3 Epibenthos

As the EC Habitats Directive has begun to be implemented and the monitoring of Marine SAC's begin the UK lead organisation in this area (JNCC) has recognised the need for appropriate AQC measures and accordingly has joined the NMBAQC scheme and is now represented on the Co-ordinating Committee. A sub-group has now been tasked to consider AQC measures for epibenthic (flora) surveys and biotope mapping. A ring test for epibiota using photographic material organised by the JNCC will be held in the last quarter of 2000/2001.

5.4 Scheme Audit

Although most aspects of the scheme have been generally well received and any problems arising dealt with by the committee, several participants have raised questions regarding the scope and management of the scheme. Particularly where contracting bodies have stipulated that membership of the scheme is a necessary qualification for obtaining contracts. Mindful of this, the Co-ordinating Committee has begun steps to commission an independent audit of the scheme. It is likely that this will be conducted in two parts, commencing with an audit of the documentation procedures and management criteria taking place in winter 2000/2001.

Scheme members have made contact with colleagues in Europe and the United States and although as yet no formal links have developed a number European countries have expressed interest in the structures adopted by the UK Scheme.

6. FINANCIAL SUMMARY 1999/2000

The sixth year of the scheme has been completed..

Fees charged in 1999/00 remained the same as 1998/1999. Non NMMP laboratories were eligible to take advantage of the 'split fee' according to the components required although many elected to participate fully. Support was given in the year to encourage NMMP awareness during a workshop in Germany and a meeting in Copenhagen.

Income in 1999 dropped due to a smaller number of participants than last year. In addition, the rising fees and expenses incurred during the year have reduced the balance considerably.

The contract continued to be administered by Unicomarine on the basis of their experience, good management and reasonable cost having won the contract in a competitive tendering exercise at the end of 1997/98. The contract is due to be relet for the next 3 – 5 year period beginning in April 2001.

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

Financial Summary 1999/2000

	INCOME	***EXPENDITURE***
Participant Fees	*36 850.00*	
Interest	*2 306.63*	
Expenditure *Core project/Additional projects* *Travel/Admin etc*		*60 723.40* *2 808.61*
Management fee		*3 000.00*
Bank Balance carried forward from 98/99	*44 551.17*	
Balance at year end £ 17 175.79		

Report from contractor

7. REPORT FROM THE CONTRACTOR

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Appendices

Summary of performance

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

The Scheme consisted of five components:

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

The analytical procedures of the various components of the Scheme were the same as for the fifth year of the Scheme. The results for each of the Scheme components are presented and discussed. Comments are provided on the performance for each of the participating laboratories in each of the components.

Analysis of the **Macrobenthic sample (MB)** 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, irrespective of sorting, was better than 90% in 60% of comparisons and better than 95% in 50% 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 73% and 96% and was better than 80% in 80% of comparisons and better than 90% in 50% of comparisons.

The results for the **Own samples (OS)** were broadly similar to those from the Macrobenthic sample. Agreement between the laboratories and Unicomarine Ltd. was generally good. Extraction efficiency, irrespective of sorting, was better than 90% in 78% of comparisons and better than 95% in 76% of all comparisons. The Bray-Curtis similarity index was greater than 95% in 63% of comparisons and in most cases (73%) the value of the index was greater than 90%.

The influence of analytical technique on the results returned for the **Particle Size exercises (PS)** was marked. As has been previously reported, in most cases there was good agreement between laboratories using the same technique.

Two **Ring Tests (RT)** of twenty-five animal specimens were distributed. One set contained general fauna and the other set consisted of twenty-five specimens of Mollusca. For the general set of fauna (RT14) there was fairly good agreement between the identifications made by the participating laboratories and those made by Unicomarine Ltd. The 'targeted' set (RT15) posed, as expected, far more problems with a 76% increase in the number of differences recorded at the generic level and 84% more at species level.

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. However there were differences in the approach to this **Laboratory Reference (LR)** exercise by the individual laboratories. For example, some laboratories used this as a test for confirming voucher specimens whilst others sought a means of having 'unknowns' identified.

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 Marine Monitoring Plan is presented.

1. Introduction

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

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

The sixth year of the Scheme (1999/00) followed the format of the fifth year. A series of exercises involved the distribution of test materials to participating laboratories and the centralised examination of returned data and samples. During the course of the year up to twenty-eight laboratories participated in the Scheme.

As in previous years, some laboratories elected to be involved in limited aspects of the Scheme. Others chose not to submit samples for the Own Sample component. NMMP laboratories were required to participate in all components and standards were applied to agreed components.

In this report performance targets have been applied for the OS and PS components only (See Appendix 2: Description of the Scheme standards for each component). These targets have been applied to the results from laboratories (See Section 5: Application of NMBAQC Scheme standards) and "Pass" or "Fail" flags assigned accordingly. As these data have been deemed the basis for quality target assessment, where laboratories failed to fulfil these components through not returning the data, a "Fail" flag has been assigned. The two flags are indicated in the Tables presenting the comparison of laboratory results with the standards (Tables 15 and 16).

2. Description of the Scheme Components

There are five components; Macrobenthic sample analysis (MB), Ring Test identification (RT), Particle Size analysis (PS), Laboratory Reference (LR) and Own Sample (OS) reanalysis.

Each of the scheme components is 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 previously have been maintained and details may be found in the reports for 1994/95 and 1995/96. For some laboratories email has become the preferred mechanism of communication. It is considered to be a very useful mechanism but must remain an option until email facilities are available to all participating laboratories.

2.1.2 Data returns

Return of data to Unicomarine Ltd. followed the same process as in previous years. Pre-formatted discs with spreadsheet based forms (tailored to the receiving laboratory) were distributed with each circulation in addition to hard copies. A range of file formats were required to cover all applications in use by participating laboratories. All returned data have been converted to Excel 97 format 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 new four-digit Laboratory Code was introduced in April 1999. These new codes are prefixed with the scheme year to reduce the possibility of obsolete codes being used inadvertently by laboratories, as has occurred in the past. For example, Laboratory 4 in scheme year six will be recorded as LB0604.
In the present report all references to Laboratory Codes are the post-April 1999 codes.

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 plus 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 MB07 was collected from Falmouth Bay; in an area of dead maerl sediment. A set of forty samples was collected using a 0.1m² Day Grab. Sampling was carried out while at anchor and samples for distribution were collected within a five hour period. All grabs taken were equal in size. Sieving was carried out on-board using a mesh of 0.5mm, 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 macrobenthic fauna contained in the sample. Precise protocols were not provided, other than the use of a 1mm sieve mesh; 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. 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.

Thirty-five weeks were allowed for completion of the sample analysis (following a deadline extension). 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 sample and residue were 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 'home' area. Each laboratory was requested to send a list of samples from which three samples were identified. The selection was in turn notified to the laboratories. NMMP laboratories were advised to use NMMP 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 - e.g. 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. **Thirty-five weeks** were allowed for preparation of the Own Samples selected for reanalysis (following a deadline extension).

2.4 Particle Size Analysis (PS)

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. Two samples of sediment, one coarse the other much finer, were distributed in 1999/00. Both samples were derived from natural sediments and prepared as described below. 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. 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 14) 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 1999/00. The first of the year's RT circulations (RT14) 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 (RT 15) 'targeted' specimens of Mollusca. This faunal group had been identified from earlier RT circulations and MB exercises as causing laboratories significant problems with identification.

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 (RT14) and the 'targeted' RT (RT15), all specimens were taken from replicate grabs within a single survey and in most cases they were replicates from a single sampling station.

2.5.2 Analysis required

The participating laboratories were required to identify each of the RT specimens to species and provide the Species Directory 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)

A repeat of the laboratory reference exercise completed last year was included in 1999/00 (LR04). This component aims 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 were not a valid test of laboratory skills, The participants were required to submit a reference collection, following certain guidelines, of twenty-five specimens for re-examination by Unicomarine Ltd.

2.6.1 Selection of fauna

The different geographical distributions of species meant that a contractor request for a uniform 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 family *Spionidae,* 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 1999/00 were undertaken by approximately twenty-eight 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, even though these had been extended for some exercises this year due to variations in seasonal workload between laboratories. 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, or the returns were not in the format requested; this is indicated in the tables by a dash (-). The reasons for the dashes are various. In some case samples were not returned by laboratories, in others the data, although returned, were not suitable for the analysis. In some instances, laboratories had elected not to participate in a particular component of the Scheme.

To avoid unnecessary detail in the Tables described below the reason for the dashes is explained in each case under the appropriate heading in Section 6: Comments on individual laboratories.

3.1 Macrobenthic Samples (MB)

3.1.1 General comments

The distributed sediment (MB07) was from a coastal maerl substratum taken from a depth of approximately 17m. The samples were very diverse with an average of thirty-five species and one

hundred and eighty-seven individuals, covering a variety of phyla. The composite list from all samples was approximately one hundred and thirty-nine species. A number of samples returned had been stained with Rose Bengal. Overall, of the eleven laboratories participating in this exercise, ten laboratories returned samples and data; one did not.

3.1.2 *Efficiency of sample sorting*

Table 1 presents for sample MB07, 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 a percentage in Table 1. Table 2 shows the composition of missed fauna by each participating laboratory.

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 four taxa (and 10% of the total taxa in the sample) were either not extracted or not recognised within the picked material. On average Unicomarine Ltd. recorded two more taxa than the participating laboratories.

The values presented for the number of taxa not extracted (column 10) represent taxa not recorded or extracted (even if misidentified) elsewhere in the results *i.e.* these were taxa completely missed by the laboratory. Four laboratories extracted representatives of all the species present in their samples and in the worst instance three completely new taxa were missed during the picking stage of this exercise.

3.1.2.2 *Number of Individuals*

Re-sorting of the sample residue following analysis by the participating laboratories retrieved small numbers of individuals from nine out of the ten samples. These data are presented in columns 10 to 12 of Table 1. 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 (*i.e.* column 12 = column 11 / column 7 %). The proportion of missed individuals represented in half of the samples was less than 5% of the true total number in the sample, though 20.5% (27 individuals) were not enumerated in the worst instance. A breakdown of the missed individuals by taxonomic group is presented in Table 2. The average number of missed individuals found upon re-sorting the residue was eleven.

3.1.2.3 *Uniformity of identification*

Most of the species in the distributed sample were identified correctly by the participating laboratories. In the worst instance thirteen taxonomic differences were recorded (Table 1, column 15). On average five taxonomic differences were encountered per sample.

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 73% to 96%, with an average value of 88%. The index for the majority of laboratories (8 of 10) was in excess of 80%. Half of the participating laboratories achieved a Bray-Curtis similarity index above 90%. The variation and relatively low average Bray-Curtis similarity indices can be attributed to several factors. In some cases, new taxa (*i.e.* taxa not already recorded by the participating laboratory) were found in the residue by Unicomarine Ltd. Additional individuals of taxa already recorded by participating laboratories were also often found in the residue. There were also identification differences involving large numbers of individuals. An indication of particular reasons 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: Comments on individual laboratories.

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 MB07 circulation is presented in Table 3. Three laboratories did not supply biomass data. The average difference between the two values was –1.67%, with the measurement made by Unicomarine Ltd. typically being greater (*i.e. heavier*) than that made by the participating laboratory. In contrast to last year, the range was –9.22% (measurements by laboratory were lighter than those made by Unicomarine Ltd.) to +9.26% (measurements by laboratory were greater than those made by Unicomarine Ltd.).

3.1.5 *Uniformity of samples*

The faunal content of the samples distributed as MB07 is shown in Table 4. Data received from LB0601, LB0604 and LB0619 are clearly richer than those of the other participating laboratories. 'Floating' of specimens onto a smaller sieve mesh than specified and less thorough sieving of coarser sediments are believed to be the reasons for these differences.

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, fifty-one samples were received from seventeen laboratories, together with descriptions of their origin and the collection and analysis procedures employed. Samples were identified as OS11, OS12 and OS13 on receipt. Five laboratories did not participate in this component although notification of non-participation was only received from three. 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 5l of residue. The associated fauna of the samples was also very varied; the number of taxa recorded ranged from 2 to 74, and the number of individuals from 3 to 3729. All NMMP labs were required to participate in this exercise. Overall, of the twenty-one laboratories participating in this exercise, seventeen laboratories returned all three Own Samples. One laboratory failed to supply Unicomarine Ltd. with a list of samples from which to select their samples, one did not submit the requested samples, and two laboratories decided not to take part in this component for this scheme year.

3.2.2 *Efficiency of sample sorting*

Table 5 displays a summary of the data obtained from the analysis of the Own Sample exercise. All taxa identified and enumerated by the participating laboratory were included in the analysis. In twenty-six cases (51% of the comparisons) the number of taxa recorded by the participating laboratories was identical to that obtained by Unicomarine Ltd. (column 4). In the twenty-five exceptions, the difference was at most eight taxa and the average difference was one taxon.

The data for the numbers of individuals recorded (columns 6 & 7) shows a range of differences from the value obtained from re-analysis of between 0% and 65%. The average difference is 7.5% (only twelve samples exceeded this average). Seventeen of the samples received showed 100% extraction of fauna from residue (column 12), and in eight samples various numbers of individuals (but no new taxa) were missed during sorting (column 11). The remaining twenty-six samples contained taxa in the residue which were not previously extracted, the worst example being nine new taxa found in the residue (column 10). In the worst instance residue was found to contain four hundred and sixty-nine individuals. A breakdown of the missed individuals by taxonomic group is presented in Table 6. The average number of missed individuals found upon re-sorting the residue was twenty-eight, and the average number of missed taxa was one.

3.2.3 *Uniformity of identification*

Taxonomic differences between participating laboratory and Unicomarine Ltd. results were found in twenty-six of the fifty-one samples received. An average of one and a half taxonomic differences per laboratory were recorded; in the worst instance nine 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 5, column 14) ranged from 50% to 100%, with an average of 91%. This indicates that, with the exception of six samples, there was a fairly high degree of similarity between the data-sets produced separately from the same sample by the participating laboratories and Unicomarine Ltd. Five samples gave similarity figures of 100%. The best overall results were achieved by LB0611, whose results consisted of 100%, 98.04% and 98.31% similarity scores. 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; five laboratories did not supply biomass data, in others it was in a different format from that requested (the three laboratories that supplied data to three decimal places have been excluded from the summary figures below). Table 7 shows the comparison of the participating laboratory and Unicomarine Ltd. biomass figures by major taxonomic groups. Twenty-seven of the fifty-one samples received could be used in this comparative exercise. The total biomass values obtained by the participating laboratories varied greatly with those obtained by Unicomarine Ltd. The average was a –1.1% difference between the two sets of results, the range was from –122.2% to +40.7%. The reason for these large differences is unknown but is presumably a combination of variations in apparatus (*e.g.* calibration) and operator technique (*e.g.* period of, and effort applied to, drying). Further analysis of biomass results by major taxonomic groups indicated an average difference of -2% for polychaetes, -79% for crustaceans and -115% for molluscs. These figures are markedly different to those produced by this same exercise in the last three years , this emphasises the variability caused by not only duration and method of drying but also the consistency of results within each major taxonomic group. This year the Unicomarine biomass data was achieved using a non-pressure drying procedure as specified in the Green Book.

3.3 Particle Size Analysis (PS)

3.3.1 *General comments*

Most participating laboratories now provide data in the requested format, though some variations remain. As previously reported, it should be remembered that the results presented are for a more limited number of analytical laboratories than is immediately apparent since this component of the Scheme is often sub-contracted by participants to one of a limited number of specialist laboratories. For PS14, nineteen out of the twenty-one participating laboratories returned data (including labs with grouped results); two did not. For PS15, sixteen out of the twenty-one participating laboratories returned data and five did not.

3.3.2 *Analysis of sample replicates*

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 were analysed using the Malvern laser and half by the sieve and pipette technique.

There was very good agreement between the *replicate* samples from PS14; the shape of the distribution curves was similar for the two analytical techniques and they were closely grouped. This sample had a very low percentage of sediment in the fine fraction (average of 0.5% <63µm). Results for the individual replicates are provided in Table 8 and are displayed in Figure 1.

Sample PS15 was of a much finer sediment (average of 88.6% <63µm) although there was still very good agreement between the two techniques. The difference between the two techniques was clear. Results for the individual replicates are provided in Table 9 and are displayed in Figure 2.

3.3.3 *Results from participating laboratories*

Summary statistics for the two PS circulations are presented in Tables 10 and 11. After resolution of the differences in data 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 for the replicate samples as obtained by Unicomarine Ltd.

It should be noted that five laboratories which normally sub-contract particle size analysis to the same independent laboratory (also participating), elected to utilise the results from this laboratory. These laboratories are indicated in Tables 10 and 11 by an asterisk against their LabCode. Accordingly the results from this laboratory have been used in the Figures and Tables as appropriate though a few points should be noted. In Figures 3 and 4, which present the size distribution curves for PS14 and PS15 respectively, only a single line is shown though it applies to six laboratories (the sub-contractor and the five laboratories utilising their results. In Tables 10 and 11, which present the summary statistics for PS14 and PS15 respectively, although the results are displayed for all six laboratories, the value supplied (by the sub-contractor) has been included only once in the calculation of mean values for the exercise. Performance flags (as discussed in Section 5: Application of NMBAQC Scheme standards) have been assigned in the same manner as for other laboratories.

3.3.3.1 PS14

There was good agreement for PS14 between the results from the analysis of replicates and those from the majority of participating laboratories. The results for a single laboratory (LB0602) were clearly different; it is believed that this resulted from the incorrect application of analytical software. The difference between the analytical techniques was apparent though less marked than has been seen for other PS circulations (see Figure 3).

3.3.3.2 PS15

There was more spread in the results for this sample (which had a much higher proportion of sediment in the silt-clay fraction) and the difference between the techniques was less marked (see Figure 4).

3.4 Ring Test Circulations (RT)

3.4.1 General comments

The implementation of this part of the Scheme was the same as previous years. A number of labs use this part of the scheme as a training exercise and have selected it preferentially over other components. NMMP labs are required to participate in this component though it is not used when assigning pass or fail flags. Two circulations of twenty-five specimens were made. For RT14 the species were from a variety of Phyla (as for previous years) while for RT15 twenty-five Mollusca specimens were 'targeted' for circulation. Other aspects of the two circulations, in particular the method of scoring results, were the same as for previous circulations. Overall twenty-three laboratories were distributed with RT14 and RT15 specimens. For RT14, sixteen laboratories returned samples and data (one of which was used as replicate data for two further laboratories); five did not (one submitted data several months after the deadline – this was inadmissible). For RT15, sixteen laboratories returned samples and data (one of which was used as replicate data for two further laboratories); five did not.

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 pointer to all those instances where (for whatever reason) the names differed. Each of these instances was examined to determine the reason for the difference.

As previously found, the main cause of an identification being different from the AQC identification was through differences in spelling of what was clearly intended to be the same species. There were several reasons for these differences, for example:

- Use of a different synonym for a species, e.g. *Phyllodoce mucosa* for *Anaitides mucosa*.
- Simple mis-spelling of a name, e.g. *Sipiola* for *Sepiola*.

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 12 and 13, respectively, present the identifications made by each of the participating laboratories for each of the twenty-five specimens in RT circulations RT14 and RT15. 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 *i.e.* for each instance where text other than a dash or a bracketed name appears in the appropriate column in Tables 12 and 13. 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 mirrored that of 1998/99 as there was only a single 'standard' exercise (RT14). RT15 was targeted on Mollusca. The circulation was designed as more of a learning exercise to discover where particular difficulties lie within these individuals. Results were forwarded to the participating laboratories as soon as practicable. Each participant also received a ring test bulletin (RTB14 and RTB15), which outlined the reasons for individual laboratories identification discrepancies.

3.4.3.1 Fourteenth distribution – RT14

Table 12 presents the results for the RT14. 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.

Two specimens (*Chaetozone gibber*, and *Paramphinome jeffreysii*) accounted for 26% of the differences at the level of genus. Three specimens (*Limapontia depressa*, *Paramphinome jeffreysii* and *Onoba aculeus*) accounted for 35% of the differences at the level of species. Six of the twenty-five circulated specimens were correctly identified by all participating laboratories. Further details and analysis of results can be found in the relevant Ring Test Bulletin (RTB14) which was circulated to each laboratory from which results were received.

3.4.3.2 Fifteenth distribution – RT15

RT15 contained twenty-five Mollusca specimens. The results from the circulation are presented in Table 13 in the same manner as for the other circulations. For the majority of the distributed taxa there was an reasonable 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.

The agreement at the generic level relatively poor, sixty-five errors were recorded. Two specimens (*Potamopyrgus antipodarum* and *Obtusella intersecta*) accounted for 40% of the differences recorded at the generic level. At the species level five specimens accounted for 56% of the differences recorded (*Potamopyrgus antipodarum, Obtusella intersecta, Thyasira sarsi, Retusa umbilicata* and *Odostomia turrita*). Five of the twenty-five circulated specimens were correctly identified by all participating laboratories. Further details and analysis of results can be found in the relevant Ring Test Bulletin (RTB15) which was circulated to each laboratory from which results were received.

3.4.4 *Differences between participating laboratories*

Figures 5 and 6 present the number of differences recorded at the level of genus and species for each of the participating laboratories, for RT circulations RT14 and RT15 respectively. The laboratories are ordered by increasing number of differences at the level of species. The division of laboratories into three bands (Low, Medium and High) on the basis of the number of differences at the level of species is also shown. These bands are discussed further in Section 6: Comments on individual laboratories.

3.4.5 *Differences by taxonomic group*

Most of the differences of identification in RT14 were of polychaetes, with approximately 62% of the total number of generic differences and 45% of specific differences being attributable to Polychaeta. Only four Mollusca specimens were circulated, however these were responsible for 24% of the total number of generic differences and 34% of specific differences.

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. Of the twenty-one laboratories participating in this exercise, nine laboratories returned samples and data; twelve did not.

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 for this component are presented in Table 14. There was generally very 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 Section 6: Comments on individual laboratories.

4.1 Macrobenthic Analyses

The sample distributed as MB07 posed different problems for participating laboratories compared to some of the samples of previous circulations. The extraction of fauna from the sediment was time consuming due to the volume of coarse material retained after sieving. This coarse post-sieving fraction often contained several small molluscs. Only one participating laboratory extracted all the countable material from the residue. Identification also caused isolated problems, especially in the following groups; *Polygordius*, *Polydora* and Veneridae. As a consequence, five out of the ten returning laboratories attained a Bray-Curtis similarity index less than 90%. The average Bray-Curtis figure of 88% is comparable with those recorded for MB06 (91%), MB05 (85%) and MB04 (82%).

Table 4 shows the variation, by major Phyla, between those samples circulated for the macrobenthic exercise (MB07). The data from three laboratories (LB0601, LB0604 and LB0619) differs from the majority of returns. These laboratories have recorded individuals that should not have been retained on a 1mm sieve, e.g. juvenile amphipods and small polychaete worms and *Caecum glabrum*. All laboratories concerned have reiterated that they employed a 1.0mm sieve mesh, as specified. Two of these laboratories (LB0601 and LB0619) have recorded the small prosobranch, *Caecum glabrum*, which suggests that the sediment was not correctly sieved. Both these laboratories are advised to review their sieving procedures. The remaining anomalous laboratory (LB0604) has not recorded such 'non-floating' small taxa, but have recorded several small polychaete worms and juvenile amphipods. Correspondence with the laboratory suggested that the separation of the lighter suspension fraction of the fauna / sediment may have been conducted using a 0.5mm sieve mesh rather than 1.0mm.

The 'blot-drying' procedure employed by Unicomarine Ltd. for the determination of biomass was as specified in the Green Book, *i.e.* avoiding excessive pressure when blotting specimens dry. However, there remains a 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 less than those made by Unicomarine Ltd., up to a maximum of –9.22% lighter (LB0601 and LB0619). In one instance (Laboratory 8) the measurement was 9.26% heavier. Overall the average difference between the values determined by the participating laboratories Unicomarine Ltd. was 1.67% (i.e. laboratory measurements were slightly lighter than those made by Unicomarine Ltd.).

It seems likely that the main reasons for the observed differences between the measurements are more thorough, or less consistent, drying by participating laboratories prior to weighing. A similar observation was made in previous years of the Scheme. The average percentage difference between Unicomarine Ltd. and participating laboratories biomass figures for MB07 was –1.67%, while for MB06 it was +26%, MB05 it was +32% and for MB04 it was +20%. There are likely to be several reasons for the differences between years, though the nature of the fauna in the distributed samples is likely to of particular importance.

Clearly, determination of biomass remains a problem area warranting further examination. Although each laboratory is following the same protocol it is apparent that different interpretations are being made of the degree of drying required. When single specimens of small species are being weighed (*e.g.* amphipods) very small differences in the effectiveness of drying will make large percentage differences in the overall weight recorded. It must be noted that the techniques specified are derived from the conversion factors used, *i.e.* which technique best reflects the methods specified by the conversion factors to be subsequently used. A series of trials should be commissioned to ascertain the best methods for accurate and consistent 'blotted' dry weight figures which can in turn be reliably applied to existing or new conversion factors.

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 similarly in the OS exercises and the MB07 exercise. The average value of the index was 91% for the OS, compared with 88% for MB07. The average values of the other individual measures of processing performance (% of taxa extracted and identified, % individuals extracted) were similar for the MB07 exercise. The most apparent difference between these exercises was the far better identification of the fauna in the OS samples, the average number of taxonomic differences for the MB07 exercise was more than five compared with the figure of one and a half for the OS returns. This was to be expected considering that in most cases participating laboratories would be much more familiar with the fauna of their 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. In summary although the average Bray-Curtis figures between these two exercises are similar, the OS returns had fewer taxonomic differences and contained more missed individuals in their residues compared with the MB07 returns.

There was an increase in the number of samples returned for this component compared with the previous years exercises. This was facilitated by an extended deadline for returns. Fifty-one samples were received, producing an average Bray-Curtis similarity index of 91.4%. Approximately 73% of samples received exceeded the 90% Bray-Curtis pass mark. In the 1998/99 year (OS 08, 09 and 10) the average Bray-Curtis figure was 89.3%, and 71% (of the forty-two samples received) achieved more than 90%. In the 1997/98 year (OS 05, 06 and 07) the average Bray-Curtis figure was 93.6%, and 83% (of the forty samples received) achieved more than 90%.

Since the beginning of the OS component one hundred and eighty-four samples have been received (OS01 – 13). The average Bray-Curtis similarity figure is 92%. Forty-four samples have fallen below the 90% pass mark (24%). Twenty-six samples have achieved a similarity figure of 100% (14% of all returns). Whether laboratories are giving special attention to the samples that they submit for the OS component remains to be seen. However it must be noted that the extraction of fauna is an area in which several participating laboratories could review their efficiency. All countable fauna must be extracted to record a truly representative sample, although this is rarely the case due to time restraints or inefficient methods used. A sample that has been poorly picked stands high possibility of being unrepresentative regardless of the quality of subsequent faunal identifications, and should the sorted

residue be disposed of this cannot be rectified. Laboratories should study their detailed OS and MB reports and target the particular taxon or groups of taxa that are being commonly overlooked during the picking stages of sample analysis. It must be resolved whether the individuals are either not recognised as countable or not scanned using the extraction methods employed. If it is the former, then training is appropriate. If the latter is the case then a review of current extraction methods should be conducted. An assortment of approaches would be appropriate in accordance to sediment type and faunal composition.

4.3 Particle Size Analyses

The difference between the two main techniques employed for analysis of the samples (laser and sieve) was again apparent in the results from the analysis of the replicates samples and from those from the participating laboratories, though perhaps not quite as marked as in some circulations. The sample distributed as PS14 appeared from an analysis of replicates (Figure 1) to be very uniform and, with one exception, the results from participating laboratories (Figure 3) were closely grouped.

There was more scatter in the results for PS15 from participating laboratories and a much less clear division between the two analytical methods. This may reflect variations in the use of sieves to pre-process samples analysed by laser (and therefore flagged as being analysed by laser).

It is essential that the analytical method is stated when attempting to compare results. The situation is complicated further by the fact that the difference between the techniques also varies with the nature of the sediment sample. In Figures 3 and 4 the technique employed is indicated (as far as could be determined from the returns made by the laboratory). In most cases either sieve or laser analysis was used though in a few cases a mixed technique was employed.

4.4 Ring Test distributions

The results were in general comparable with those from the first five 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. The ring test bulletins (RTB) have further emphasised the learning aspect of this component. **From RT16 onwards laboratories are requested to retain the specimens until they have their results to facilitate the vital 'second look'.**

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. For the laboratories returning a collection, the average number of differences at the level of genus was 1, and in most cases (7 of 9) laboratories had no differences or only a single difference. The situation was similar for identification at the level of species where the majority of laboratories achieved at most a single difference in identification (4 of 9 laboratories). The average number of specific differences was 1.9. In the majority of instances identifications made by the participating laboratories were in agreement with those made by Unicomarine Ltd. In view of the range of species submitted it was not possible to identify a single taxon causing the majority of problems.

The results for this exercise should be viewed bearing in mind the different approach of different laboratories. Some clearly are sending well known species while others elect to obtain a 'second opinion' on more difficult species. Thus the scores are not comparable. The results presented in Table 14 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 Marine Monitoring Plan. With this aim a target standard has been defined for certain of the Scheme components. These standards are unchanged and have been applied to the results for the present year; each is described in detail in Appendix 2. 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, as in previous years, only the OS and PS exercise have been used in 'flagging' for the purposes of assessing data for the National Marine 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. This follows the same approach as used when reporting the results for the year 1996/97.

As mentioned in the Introduction, non-return of samples or results for the PS and OS components resulted in the assignment of a "Fail" flag to the laboratory (see also Sections 3: Results). The only exception to this approach has been in those instances where laboratories had elected not to participate in a particular component of the Scheme.

5.1 Laboratory Performance

The target values for each component and the corresponding laboratory results are presented in Table 15 (OS) and Table 16 (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. The tables should be should be read in conjunction with the comments on individual laboratories' results made in Section 6: Comments on individual laboratories.

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. Where no returns were made for the exercise this is indicated with a "-".

It can be seen from Table 15 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 80% of the comparisons were considered to have passed the enumeration of taxa standard; 69% exceeded the enumeration of individuals standard and 73% passed the Bray-Curtis comparison standard. Of the twenty-one laboratories participating in this component seventeen supplied samples for reanalysis; two decided not to submit samples this scheme year; fourteen achieved an overall pass flag; three failed; two laboratories which failed to supply samples or indicate their intentions have been flagged as 'Fail'.

Performance with respect to the biomass standard was much poorer however with only half of the participating laboratories meeting the required standard. It should be noted that there were three laboratories for which the results from the biomass exercise were considered unsuitable for comparison with the standard (expressed as three decimal places instead of four). If these laboratories are removed from the analysis then the percentage of participating laboratories achieving the NMBAQCS biomass standard is increased to 59%. This figure is an improvement upon those of previous years.

Application of the standards to the results for the PS component is shown in Table 16. It may be seen that two laboratories failed to meet the standard in PS14 due to non-return of data. A single laboratory received a Fail flag as their results fell outside of the required range for the exercise. Six laboratories failed to meet the standard in PS15 (a single Fail and five 'Deemed fails' due to non-return of data).

5.2 Statement of Performance

Each participating laboratory will received a 'Statement of Performance', which includes a summary of results for each of the schemes components and details the resulting flags where appropriate. These statements were first circulated in with the 1998/1999 annual report, for the purpose of providing proof of scheme participation and for ease of analysing year on year progress.

5.3 Comparison with results from previous year

A comparison of the overall results for recent years is presented in Table 17. The Table shows the number of laboratories assigned "Deemed Fail"(non-return), "Fail" and "Pass" flags for the OS and PS exercises over the last four years. For the OS component, there has been an increase in the percentage of laboratories achieving a Pass flag. This marked increase is the result of more laboratories providing the requested samples this year and therefore not being awarded 'deemed fail' flags. Table 18 shows the

trend of OS flags for participating laboratories over the past four years. There appears to be a fairly high level of consistency within each laboratory. Monitoring the situation over a longer period is required before a firm statement about changes in laboratory standards could be made.

6. Comments on individual laboratories

Brief comments on the results for individual laboratories are provided below. These are not intended to be detailed discussions of all aspects of the results but provide an indication of the main issues arising for each of the exercises. Clearly different laboratories have encountered different analytical problems. Broadly, these fell into the following areas:

- Incomplete sorting and extraction of individuals from whole samples.
- Particular taxonomic problems in RT's and whole samples
- Accuracy in biomass measurement

Where possible these are noted for each laboratory listed below.

Also in the comments below, the results for RT14 and RT15 are expressed in terms of their position relative to the results from all laboratories. The overall range of differences at the level of genus and species was used to define three categories according to the number of differences: **Low**, **Mid** and **High** (based on the number of differences with the Unicomarine identifications). Each laboratory has been placed into a group for information only, on this basis.

This year five laboratories which normally use a centralised sediment analysis centre for the PS exercises, have decided to pool their data from just one laboratories analysis of PS samples. Their data is indicated accordingly in all figures and tables. In the comments below they are termed 'Data from centralised analysis'.

Laboratory – LB0601

Macrobenthos

MB07 - Six taxonomic differences. Four vials contained mixtures of species, including three additional taxa. No individuals found during resorting of residue. Count variance of nine individuals. Bray-Curtis similarity index of 90.6%. Biomass on average 9.22% lighter than Unicomarine Ltd.

Own Sample

OS11 – Three individuals not picked from residue, including three previously unpicked taxa. Count variance of one individual. Bray-Curtis similarity index of 98.3%. Biomass on average 17% lighter than Unicomarine Ltd.
OS12 – Four individuals not picked from residue, including three previously unpicked taxa. Count variance of one individual. Bray-Curtis similarity index of 97.7%. Biomass on average 2% heavier than Unicomarine Ltd.
OS13 – Five individuals not picked from residue, including four previously unpicked taxa. Count variance of one individual. Bray-Curtis similarity index of 96.3%. Biomass on average 20% lighter than Unicomarine Ltd.

Particle size

PS14 – No major differences in size distribution curve.
PS15 – No major differences in size distribution curve.

Ring Test

RT14 – Two generic and three specific differences. Number of AQC identifications in Mid group.
RT15 – Four generic and six specific differences. Number of AQC identifications in Mid group.

Laboratory Reference

No specimens received.

Laboratory – LB0602

Macrobenthos

MB07 - Three taxonomic differences. Two individuals not picked from residue. Count variance of two individuals. Bray-Curtis similarity index of 94.2%. Biomass data not supplied.

Own Sample

OS11 – Eight taxonomic differences. Four vials contained mixtures of species, including one additional taxon. Two hundred and thirty-six individuals not picked from residue, including nine previously unpicked taxa. Count variance of eighteen individuals. Bray-Curtis similarity index of 74.2%. No biomass data supplied.
OS12 – Seven taxonomic differences. Twenty-nine individuals not picked from residue, including seven previously unpicked taxa. Bray-Curtis similarity index of 76.6%. No biomass data supplied.
OS13 – Eight taxonomic differences. Three vials contained mixtures of species, including one additional taxon. One hundred and eleven individuals not picked from residue, including six previously unpicked taxa. Count variance of two individuals. Bray-Curtis similarity index of 71.0%. No biomass data supplied.

Particle size

PS14 – Data received after the deadline. Curve markedly depressed compared to other laboratories.
PS15 – No data received.

Ring Test

RT14 – Two generic and three specific differences. Number of AQC identifications in Mid group.
RT15 – Three generic and four specific differences. Number of AQC identifications in Low group.

Laboratory Reference

No specimens received.

Laboratory – LB0603

Macrobenthos

MB07 - Not participating in the scheme this year.

Own Sample

OS11 – Not participating in the scheme this year.
OS12 – Not participating in the scheme this year.
OS13 – Not participating in the scheme this year.

Particle size

PS14 – Not participating in the scheme this year.
PS15 – Not participating in the scheme this year.

Ring Test

RT14 – Not participating in the scheme this year.
RT15 – Not participating in the scheme this year.

Laboratory Reference

Not participating in the scheme this year.

Laboratory – LB0604

Macrobenthos

MB07 - Eight taxonomic differences. Three vials contained mixtures of species, including two additional taxa. Twelve individuals not picked from residue including one previously unpicked taxon (*Verruca stroemia*). Count variance of eight individuals. Bray-Curtis similarity index of 88.1%. Biomass on average 6.12% heavier than Unicomarine Ltd.

Own Sample

OS11 – One taxonomic difference. All individuals were extracted from the residue. Bray-Curtis similarity index of 89.3%. Biomass on average 41% heavier than Unicomarine Ltd. Biomass expressed to five decimal places.
OS12 – One taxonomic difference. All individuals were extracted from the residue. Bray-Curtis similarity index of 95.7%. Biomass on average 33% heavier than Unicomarine Ltd. Biomass expressed to five decimal places.
OS13 – Two taxonomic differences. Two individual not picked from residue, including one previously unpicked taxon. Two vials contained mixtures of species, including one additional taxon. Count variance of two individuals. Bray-Curtis similarity index of 94.5%. Biomass on average 20% heavier than Unicomarine Ltd. Biomass expressed to five decimal places.

Particle size

PS14 – No major differences in size distribution curve.
PS15 – No major differences in size distribution curve. Estimate of percentage of sediment in silt-clay fraction outside target range.

Ring Test

RT14 – Two generic and four specific differences. Number of AQC identifications in Mid group.
RT15 – Four generic and nine specific differences. Number of AQC identifications in High group.

Laboratory Reference

One specific difference.

Laboratory – LB0605

Macrobenthos

MB07 - Ten taxonomic differences. One vial contained mixtures of two species, this was an additional taxon. Thirteen individuals not picked from residue including three previously unpicked taxa (*Caecum imperforatum*, *Vermiliopsis striaticeps* and *Gari tellinella*). Count variance of six individuals. Bray-Curtis similarity index of 73.1%. Biomass on average 7.36% lighter than Unicomarine Ltd.

Own Sample

OS11 – Two taxonomic differences. All individuals extracted from the residue. Count variance of one individual. Bray-Curtis similarity index of 95.8%. No biomass data supplied.
OS12 – Four taxonomic differences. Two vials contained mixtures of species, including two additional taxa. Two hundred and eleven individuals not picked from residue, including six previously unpicked taxa. Bray-Curtis similarity index of 49.6%. No biomass data supplied.
OS13 – Nine taxonomic differences. Four vials contained mixtures of species, including four additional taxa. All individuals extracted from the residue. Count variance of one individual. Bray-Curtis similarity index of 67.3%. No biomass data supplied.

Particle size

PS14 – No major differences in size distribution curve.
PS15 – No major differences in size distribution curve.

Ring Test

RT14 – Seven generic and ten specific differences. Number of AQC identifications in High group.
RT15 – Four generic and seven specific differences. Number of AQC identifications in Mid group.

Laboratory Reference

Specimens received after the deadline. Four generic and seven specific differences.

Laboratory – LB0606

Macrobenthos

MB07 - One taxonomic difference. Twenty-seven individuals not picked from residue including two previously unpicked taxa (*Verruca stroemia* and *Vermiliopsis striaticeps*). Count variance of five individuals. Bray-Curtis similarity index of 90.1%. Biomass on average 1.93% heavier than Unicomarine Ltd.

Own Sample

OS11 – Three taxonomic differences. One vial contained a mixture of species, including one additional taxon. Count variance of five individuals. Four hundred and sixty-nine individuals not picked from residue, including two previously unpicked taxa. Bray-Curtis similarity index of 73.0%. Biomass on average 33% heavier than Unicomarine Ltd.
OS12 – Two individuals not picked from residue. Bray-Curtis similarity index of 99.5%. Biomass on average 8% heavier than Unicomarine Ltd.
OS13 – Two taxonomic differences. One vial contained a mixture of species, including one additional taxon. Sixteen individuals not picked from residue, including five previously unpicked taxa. Count variance of one individual. Bray-Curtis similarity index of 90.5%. Biomass on average 7% heavier than Unicomarine Ltd.

Particle size

PS14 – No major differences in size distribution curve.
PS15 – Data received after the deadline. No major differences in size distribution curve.

Ring Test

RT14 – One specific difference. Number of AQC identifications in the Low group.
RT15 – Data received after the deadline. Two generic and four specific differences. Number of AQC identifications in Low group.

Laboratory Reference

Specimens received after the deadline. All specimens identified correctly.

Laboratory – LB0607

Macrobenthos

MB07 - Not participating in this component.

Own Sample

OS11 – Five taxonomic differences. Two vials contained mixtures of species, including two additional taxa. Thirty-six individuals not picked from residue, including three previously unpicked taxa. Count variance of one individual. Bray-Curtis similarity index of 87.1%. Biomass on average 6% heavier than Unicomarine Ltd.
OS12 – Four vials contained mixtures of species, including two additional taxa. Eight individuals not picked from residue, including one previously unpicked taxon. Count variance of one individual. Bray-Curtis similarity index of 98.6%. Biomass on average 32% heavier than Unicomarine Ltd.

OS13 – One taxonomic difference. Five vials contained mixtures of species, including one additional taxon. Three individuals not picked from residue. Count variance of seven individuals. Bray-Curtis similarity index of 98.2%. Biomass on average 22% heavier than Unicomarine Ltd.

Particle size

PS14 – Data from centralised analysis; No major differences in size distribution curve.
PS15 – Data from centralised analysis; No major differences in size distribution curve; somewhat elevated below 6 phi.

Ring Test

RT14 – Data received after the deadline. One generic and two specific differences. Number of AQC identifications in Low group.
RT15 – Three generic and three specific differences. Number of AQC identifications in Low group.

Laboratory Reference

Two generic and two specific differences. One spelling error.

Laboratory – LB0608

Macrobenthos

MB07 - No data received.

Own Sample

OS11 – No response to initial sample selection form. No response to reminder letter.
OS12 – No response to initial sample selection form. No response to reminder letter.
OS13 – No response to initial sample selection form. No response to reminder letter.

Particle size

PS14 – Not participating in this component.
PS15 – Not participating in this component.

Ring Test

RT14 – No results received.
RT15 – No results received.

Laboratory Reference

No specimens received.

Laboratory – LB0609

Macrobenthos

MB07 - One taxonomic difference. Count variance of one individual. Twenty-two individuals not picked from residue including two previously unpicked taxa (*Verruca stroemia* and *Caecum imperforatum*). Bray-Curtis similarity index of 90.7%. Biomass data not supplied.

Own Sample

OS11 – Not participating in this component this year.
OS12 – Not participating in this component this year.
OS13 – Not participating in this component this year.

Particle size

PS14 – No major differences in size distribution curve.
PS15 – No major differences in size distribution curve.

Ring Test

RT14 – Two specific differences. Number of AQC identifications in the Low group.
RT15 – Five generic and eight specific differences. Number of AQC identifications in Mid group.

Laboratory Reference

No specimens received.

Laboratory – LB0610

Macrobenthos

MB07 - Not participating in this component.

Own Sample

OS11 – One taxonomic difference. Count variance of twenty-seven individuals. Four vials contained mixtures of species. Thirteen individuals not picked from residue. Bray-Curtis similarity index of 99.2%. Biomass on average 55% heavier than Unicomarine Ltd. Biomass expressed to only three decimal places.
OS12 – Three taxonomic differences. Count variance of one individual. One vial contained a mixture of species. Eight individuals not picked from residue, including one previously unpicked taxon. Bray-Curtis similarity index of 90.4%. Biomass on average 23% heavier than Unicomarine Ltd. Biomass expressed to only three decimal places.
OS13 – Two taxonomic differences. Three vials contained mixtures of species, including one additional taxon. Two individuals not picked from residue. Count variance of forty-one individuals. Bray-Curtis similarity index of 98.1%. Biomass on average 62% heavier than Unicomarine Ltd. Biomass expressed to only three decimal places.

Particle size

PS14 – No major differences in size distribution curve.
PS15 – No data received.

Ring Test

RT14 – Grouped data. Data received after the deadline. One generic and three specific differences. Number of AQC identifications in Mid group.
RT15 – Grouped data. Data received after the deadline. Two generic and three specific differences. Number of AQC identifications in Low group.

Laboratory Reference

No specimens received.

Laboratory – LB0611

Macrobenthos

MB07 - Not participating in this component.

Own Sample

OS11 – Bray-Curtis similarity index of 100%. Biomass on average 11% heavier than Unicomarine Ltd. Biomass expressed to only three decimal places.
OS12 – One taxonomic difference. All individuals extracted from residue. Bray-Curtis similarity index of 98.0%. Biomass on average 17% heavier than Unicomarine Ltd. Biomass expressed to only three decimal places.
OS13 – One individual not picked from residue. Bray-Curtis similarity index of 98.3%. Biomass on average 15% heavier than Unicomarine Ltd. Biomass expressed to only three decimal places.

Particle size

PS14 – No data received.
PS15 – No data received.

Ring Test

RT14 – Grouped data. Data received after the deadline. One generic and three specific differences. Number of AQC identifications in Mid group.
RT15 – Grouped data. Data received after the deadline. Two generic and three specific differences. Number of AQC identifications in Low group.

Laboratory Reference

No specimens received.

Laboratory – LB0612

Macrobenthos

MB07 - Not participating in this component.

Own Sample

OS11 – Count variance of five individuals. One individuals not picked from the residue. Bray-Curtis similarity index of 99.2%. Biomass on average 8% lighter than Unicomarine Ltd.
OS12 – Count variance of two individuals. Twenty-five individuals not picked from the residue. Bray-Curtis similarity index of 97.9%. Biomass on average 1% lighter than Unicomarine Ltd.
OS13 – One taxonomic difference. Count variance of two individuals. One vial contained a mixture of species, including one additional taxon. All individuals extracted from residue. Bray-Curtis similarity index of 95.9%. Biomass on average 18% lighter than Unicomarine Ltd.

Particle size

PS14 – Data from centralised analysis; No major differences in size distribution curve.
PS15 – Data from centralised analysis; No major differences in size distribution curve; somewhat elevated below 6 phi.

Ring Test

RT14 – Data received after the deadline. Two specific differences. Number of AQC identifications in Low group.
RT15 – No results received.

Laboratory Reference

Specimens received after the deadline. One generic and two specific differences. One spelling error.

Laboratory – LB0613

Macrobenthos

MB07 - Not participating in this component this year.

Own Sample

OS11 – Bray-Curtis similarity index of 100%. Biomass on average 26% lighter than Unicomarine Ltd.
OS12 – One taxonomic difference. Bray-Curtis similarity index of 70.0%. Biomass on average 23% lighter than Unicomarine Ltd.
OS13 – Eleven individuals not picked from the residue, including one previously unpicked taxon. Bray-Curtis similarity index of 75.6%. Biomass on average 45% lighter than Unicomarine Ltd.

Particle size

PS14 – Data received after the deadline. No major differences in size distribution curve.
PS15 – No major differences in size distribution curve.

Ring Test

RT14 – Data received after the deadline. Two generic and two specific differences. Number of AQC identifications in Low group.
RT15 – Three generic and five specific differences. Number of AQC identifications in Mid group.

Laboratory Reference

One generic and two specific differences. One name change. One spelling error.

Laboratory – LB0614

Macrobenthos

MB07 - Four taxonomic differences. Count variance of four individuals. One vial contained a mixture of two species, one of which was an additional taxon. Fourteen individuals not picked from residue including two previously unpicked taxa (*Vermiliopsis striaticeps* and *Parvicardium ovale*). Bray-Curtis similarity index of 84.4%. Biomass on average 5.25% lighter than Unicomarine Ltd.

Own Sample

OS11 – Bray-Curtis similarity index of 100%. Biomass on average 6% lighter than Unicomarine Ltd.
OS12 – Count variance of one individual. Bray-Curtis similarity index of 98.3%. Biomass on average 16% lighter than Unicomarine Ltd.
OS13 – Eighteen individuals not picked from the residue. One vial contained a mixture of species. Bray-Curtis similarity index of 92.4%. Biomass on average 16% lighter than Unicomarine Ltd.

Particle size

PS14 – No major differences in size distribution curve.
PS15 – Data received after the deadline. No major differences in size distribution curve.

Ring Test

RT14 – Two generic and four specific differences. Number of AQC identifications in Mid group.
RT15 – Data received after the deadline. Two generic and seven specific differences. Number of AQC identifications in Mid group.

Laboratory Reference

No specimens received.

Laboratory – LB0615

Macrobenthos

MB07 - Not participating in this component.

Own Sample

OS11 – Data received after the deadline. Two taxonomic differences. Count variance of four individuals. One individual not picked from residue. Bray-Curtis similarity index of 98.1%. Biomass on average 16% heavier than Unicomarine Ltd.
OS12 – Data received after the deadline. Two taxonomic differences. Count variance of one individual. All individuals extracted from residue. Bray-Curtis similarity index of 66.3%. Biomass on average 22% heavier than Unicomarine Ltd.

OS13 – Data received after the deadline. Two taxonomic differences. Count variance of six individuals. All individuals extracted from residue. Bray-Curtis similarity index of 88.8%. Biomass on average 13% heavier than Unicomarine Ltd.

Particle size

PS14 – Data from centralised analysis; No major differences in size distribution curve.
PS15 – Data from centralised analysis; No major differences in size distribution curve; somewhat elevated below 6 phi.

Ring Test

RT14 – No results received.
RT15 – No results received.

Laboratory Reference

Specimens received after the deadline. All specimens identified correctly. One name change. Five spelling errors. One vial contained a mixture of species.

Laboratory – LB0616

Macrobenthos

MB07 - Not participating in the scheme.

Own Sample

OS11 – Not participating in the scheme.
OS12 – Not participating in the scheme.
OS13 – Not participating in the scheme.

Particle size

PS14 – Not participating in the scheme.
PS15 – Not participating in the scheme.

Ring Test

RT14 – Not participating in the scheme.
RT15 – Not participating in the scheme.

Laboratory Reference

Not participating in the scheme.

Laboratory – LB0617

Macrobenthos

MB07 - Not participating in this component.

Own Sample

OS11 – Two vials contained mixtures of species, including one additional taxon. Three individuals not picked from residue, including one previously unpicked taxon. Count variance of eighty-two individuals. Bray-Curtis similarity index of 97.3%. Biomass on average 25% heavier than Unicomarine Ltd.
OS12 – One vial contained a mixture of species. All individuals extracted from residue. Count variance of six individuals. Bray-Curtis similarity index of 98.7%. Biomass on average 11% heavier than Unicomarine Ltd.
OS13 – All individuals extracted from residue. Count variance of one individual. Bray-Curtis similarity index of 97.6%. Biomass on average 122% lighter than Unicomarine Ltd.

Particle size

PS14 – Data from centralised analysis; No major differences in size distribution curve.

PS15 – Data from centralised analysis; No major differences in size distribution curve; somewhat elevated below 6 phi.

Ring Test

RT14 – No results received.
RT15 – No results received.

Laboratory Reference

No specimens received.

Laboratory – LB0618

Macrobenthos

MB07 - One taxonomic difference. Count variance of three individuals. Two vials contained mixtures of species. One individual not picked from residue (*Macrochaeta clavicornis*). Bray-Curtis similarity index of 96.5%. Biomass on average 7.14% lighter than Unicomarine Ltd.

Own Sample

OS11 – Not participating in this component this year.
OS12 – Not participating in this component this year.
OS13 – Not participating in this component this year.

Particle size

PS14 – Data received after the deadline. No major differences in size distribution curve.
PS15 – Data received after the deadline. distribution curve slightly depressed compared with other laboratories.

Ring Test

RT14 – Data received after the deadline. Two generic and two specific differences. Number of AQC identifications in Low group.
RT15 – Data received after the deadline. Six generic and eight specific differences. Number of AQC identifications in Mid group.

Laboratory Reference

Specimens received after the deadline. One generic and two specific differences.

Laboratory – LB0619

Macrobenthos

MB07 - Thirteen taxonomic differences. Count variance of seven individuals. Six vials contained a mixture of species, including four additional taxa. One individual not picked from residue (*Vermiliopsis striaticeps*). Bray-Curtis similarity index of 79.3%. Biomass data not supplied.

Own Sample

OS11 – Three taxonomic differences. Count variance of one individual. Seventeen individuals not picked from residue, including one previously unpicked taxon. Bray-Curtis similarity index of 97.8%. No biomass data supplied.
OS12 – Count variance of six individuals. Two vials contained mixtures of species. One hundred and twenty-three individuals not picked from residue including four previously unpicked taxa. Bray-Curtis similarity index of 92.9%. No biomass data supplied.
OS13 – Three taxonomic differences. Count variance of three individuals. One vial contained a mixture of species. Four individuals not picked from residue. Bray-Curtis similarity index of 97.8%. No biomass data supplied.

Particle size

PS14 – Not participating in this component.
PS15 – Not participating in this component.

Ring Test

RT14 – Eight generic and ten specific differences. Number of AQC identifications in High group.
RT15 – Data received after the deadline. Ten generic and fourteen specific difference. Number of AQC identifications in High group.

Laboratory Reference

Specimens received after the deadline. One specific difference. One spelling error.

Laboratory – LB0620

Macrobenthos

MB07 - Not participating in this component.

Own Sample

OS11 – Not participating in this component.
OS12 – Not participating in this component.
OS13 – Not participating in this component.

Particle size

PS14 – Not participating in this component.
PS15 – Not participating in this component.

Ring Test

RT14 – Results received several months after the deadline – data inadmissible.
RT15 – Five generic and nine specific differences. Number of AQC identifications in High group.

Laboratory Reference

Not participating in this component.

Laboratory – LB0621

Macrobenthos

MB07 - Not participating in this component.

Own Sample

OS11 – Not participating in this component.
OS12 – Not participating in this component.
OS13 – Not participating in this component.

Particle size

PS14 – Not participating in this component.
PS15 – Not participating in this component.

Ring Test

RT14 – Six generic and seven specific differences. Number of AQC identifications in High group.
RT15 – Four generic and eight specific differences. Number of AQC identifications in Mid group.

Laboratory Reference

Not participating in this component.

Laboratory – LB0622

Macrobenthos

MB07 - Not participating in the scheme this year.

Own Sample

OS11 – Not participating in the scheme this year.
OS12 – Not participating in the scheme this year.
OS13 – Not participating in the scheme this year.

Particle size

PS14 – Not participating in the scheme this year.
PS15 – Not participating in the scheme this year.

Ring Test

RT14 – Not participating in the scheme this year.
RT15 – Not participating in the scheme this year.

Laboratory Reference

Not participating in the scheme this year.

Laboratory – LB0623

Macrobenthos

MB07 - Not participating in this component.

Own Sample

OS11 – Bray-Curtis similarity index of 100%. Biomass on average 54% heavier than Unicomarine Ltd. Biomass expressed to only three decimal places.
OS12 – One taxonomic difference. All individuals extracted from residue. Bray-Curtis similarity index of 99.0%. Biomass on average 44% heavier than Unicomarine Ltd. Biomass expressed to only three decimal places.
OS13 – All individuals extracted from residue. Count variance of four individuals. Bray-Curtis similarity index of 85.7%. Biomass on average 61% heavier than Unicomarine Ltd. Biomass expressed to only three decimal places.

Particle size

PS14 – No data received.
PS15 – No data received.

Ring Test

RT14 – Grouped data. Data received after the deadline. One generic and three specific differences. Number of AQC identifications in Mid group.
RT15 – Grouped data. Data received after the deadline. Two generic and three specific differences. Number of AQC identifications in Low group.

Laboratory Reference

No specimens received.

Laboratory – LB0624

Macrobenthos

MB07 - Not participating in this component.

Own Sample

OS11 – No sample received.
OS12 – No sample received.
OS13 – No sample received.

Particle size

PS14 – Data from centralised analysis; No major differences in size distribution curve.
PS15 – Data from centralised analysis; No major differences in size distribution curve; somewhat elevated below 6 phi.

Ring Test

RT14 – No results received.
RT15 – No results received.

Laboratory Reference

No specimens received.

Laboratory – LB0625

Macrobenthos

MB07 - Not participating in this component.

Own Sample

OS11 – One vial contained a mixture of species, including one additional taxon. One individual not picked from residue. Count variance of eighty-six individuals. Bray-Curtis similarity index of 98.2%. No biomass data supplied.
OS12 – Two individuals not picked from residue. Count variance of thirty-four individuals. Bray-Curtis similarity index of 97.8%. No biomass data supplied.
OS13 – Bray-Curtis similarity index of 100%. No biomass data supplied.

Particle size

PS14 – Data received after the deadline. No major differences in size distribution curve.
PS15 – No major differences in size distribution curve.

Ring Test

RT14 – One generic and six specific differences. Number of AQC identifications in High group.
RT15 – Data received after the deadline. Three generic and eight specific differences. Number of AQC identifications in Mid group.

Laboratory Reference

No specimens received.

Laboratory – LB0626

Macrobenthos

MB07 - Not participating in this component.

Own Sample

OS11 – Not participating in this component.
OS12 – Not participating in this component.
OS13 – Not participating in this component.

Particle size

PS14 – Data from centralised analysis; No major differences in size distribution curve.
PS15 – Data from centralised analysis; No major differences in size distribution curve; somewhat elevated below 6 phi.

Ring Test

RT14 – Not participating in this component.
RT15 – Not participating in this component.

Laboratory Reference

Not participating in this component.

Laboratory – LB0627

Macrobenthos

MB07 - Not participating in this component.

Own Sample

OS11 – Not participating in this component.
OS12 – Not participating in this component.
OS13 – Not participating in this component.

Particle size

PS14 – No major differences in size distribution curve.
PS15 – No major differences in size distribution curve.

Ring Test

RT14 – Not participating in this component.
RT15 – Not participating in this component.

Laboratory Reference

Not participating in this component.

Laboratory – LB0628

Macrobenthos

MB07 - Four taxonomic differences. Count variance of one individual. Nineteen individuals not picked from residue including three previously unpicked taxa (*Vermiliopsis striaticeps, Caecum imperforatum* and *Goodallia triangularis*). No molluscs were extracted from the residue by the participating laboratory. Bray-Curtis similarity index of 88.7%. Biomass on average 9.26% heavier than Unicomarine Ltd.

Own Sample

OS11 – One taxonomic difference. Two vials contained mixtures of species. Fifteen individuals not picked from residue, including one previously unpicked taxon. Count variance of three individuals. Bray-Curtis similarity index of 97.9%. No biomass data supplied.
OS12 – Four individuals not picked from residue, including three previously unpicked taxa. Bray-Curtis similarity index of 84.9%. No biomass data supplied.

OS13 – Three vials contained mixtures of species. Twenty individuals not picked from residue, including two previously unpicked taxa. Count variance of two individuals. Bray-Curtis similarity index of 97.3%. No biomass data supplied.

Particle size

PS14 – No major differences in size distribution curve.
PS15 – No data received.

Ring Test

RT14 – One generic and four specific differences. Number of AQC identifications in Mid group.
RT15 – One generic and five specific differences. Number of AQC identifications in Mid group.

Laboratory Reference

No specimens received.

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. Only three participating laboratories do not have e-mail capabilities. E-mail as an option for correspondence facilitates data transfer and its use is strongly recommended where practicable.
2. Laboratories involved in NMMP 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 performance "flags". Non-return of data will result in assignment of a "Fail" flag. This deemed "Fail" for no data submission is to be perceived as far worse then a participatory "Fail" flag.
3. There were continued problems associated with the measurement of biomass for individual species. Further consideration needs to be given to the preparation of a standardised protocol and reporting format. Various methods should be subjected to laboratory trials to ascertain a precise and consistent working protocol for NMMP biomass data. Biomass procedures should not render the specimens indistinguishable, therefore the trials should derive the best protocol for blotted weighing technique.
4. Clear differences in the results obtained by different analytical methods make it essential that the technique employed (*e.g.* Laser, sieve) is stated for each PS submission. PS data indicates that the variance between laser and sieve results is further emphasised by certain sediments characteristics. The overall range of these variances needs to be determined. It is essential that particle size data should be presented with a clear description of the method of analysis used.
5. 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.
6. Some of the problems with identification, which arose throughout the various components of the scheme, included certain Mollusca, these were the subject of a targeted RT. This is an area which requires further study to improve laboratory understanding. The use of a growth series and comparative reference specimens / images is imperative when identifying certain molluscs. Molluscs will once again be circulated as primary ring test specimens to clarify the major problem areas.
7. There are still some serious problems of individuals and taxa missed at the sorting stage. The figures for these sorting errors remain as high as in previous years exercises. In the MB exercise up to 3 taxa (10% of the actual total taxa in the sample) were not extracted. . On average 1.3 taxa were not extracted from the residue. Only one laboratory extracted all countable individuals. In the worst instance 27 individuals (20.5% of total individuals in the sample) were not extracted. The situation

was worse for some of the OS samples where a maximum of 9 taxa and up to 23% of the taxa were not extracted. In the worst instance 469 individuals were not picked from the residue and up to 65% of the total individuals remained in the residue. On average for the OS exercise, 1.25 taxa were not extracted compared with 1.48, 0.45 and 1.39 taxa from last three years data, respectively. Enumeration of sorted individuals is generally good. However, where taxa and individuals are missed during the extraction of fauna from the sediment, laboratories should determine why certain taxa are not extracted. This could be due to the taxon not being recognised as countable or due to problems with the effect of stains upon the specimens. There may also be a problem within certain taxonomic groups (*e.g.* crustaceans floating within sample or molluscs settled within the coarser sediment fractions). Additional training may be required and a review of existing extraction techniques and quality control measures may be beneficial.

8. 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 misinterpreting a low index in terms of quality of service.
9. Protocols are to be developed to standardise the approach towards headless and partial specimens. This also has implications for comparing biomass estimations, certain laboratories pick headless portions of specimens from residues and assign them to the relevant taxa for combined biomass measurements.
10. Implementation of an improved learning structure to the scheme through detailed individual exercise reports has been successfully implemented. For the LR, OS and MB exercises, detailed results to be forwarded to each laboratory as soon as practicable, such as is done for RT and PS exercises. After each RT exercise a bulletin is produced, reviewing the literature used and illustrating the correct identification of the more troublesome taxa will be set-up as a web page for the next scheme year.
11. The current OS 'Flagging' system can result in anomalies. The use of taxa, individual and Bray-Curtis scores combined with a 'six from nine' pass threshold (See Appendix 2: Description of the Scheme standards for each component) could theoretically pass a laboratory which picks and counts all the individuals perfectly but identifies all the species incorrectly. The flagging should reflect the importance of achieving potentially truly representative data (i.e. completely picked residues) and also accurately identified taxa. Laboratories should not be further penalised for not identifying taxa that have failed to be picked out. A balance must be struck; there is little point having an excellently identified sample which was poorly picked and is consequently unrepresentative of the true sample.

8. References

Howson, C.M. & Picton, B.E. (eds), 1997. The species directory of the marine fauna and flora of the British Isles and surrounding seas. A coded checklist. Ulster Museum / Marine Conservation Society.

Tables

Table 1. Results from the analysis of Macrobenthic sample MB07 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
LB0601	32	35	-3	8.6	286	277	9	3.1	0	0	0.0	9	90.59	6
LB0602	24	24	0	0.0	103	103	0	0.0	0	2	1.9	2	94.18	3
LB0604	56	59	-3	5.1	301	305	-4	1.3	1	12	3.9	8	88.12	8
LB0605	27	30	-3	10.0	82	89	-7	7.9	3	13	14.6	6	73.14	10
LB0606	24	26	-2	7.7	110	132	-22	16.7	2	27	20.5	5	90.08	1
LB0608	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LB0609	23	25	-2	8.0	123	146	-23	15.8	2	22	15.1	-1	90.71	1
LB0614	28	31	-3	9.7	226	236	-10	4.2	2	14	5.9	4	84.42	4
LB0618	40	38	2	5.0	172	170	2	1.2	0	1	0.6	3	96.49	1
LB0619	48	52	-4	7.7	297	291	6	2.0	0	1	0.3	7	79.32	13
LB0628	29	32	-3	9.4	105	125	-20	16.0	3	19	15.2	-1	88.70	4

Key: PL - participating laboratory
UM - Unicomarine Ltd.
"-" - No data. See Report, Section 6, for details.

Table 2. Comparison of the efficiency of extraction of fauna by the participating laboratories for the major taxonomic groups present in sample MB07.

LabCode		Nemertea	Polychaeta	Oligochaeta	Pycnogonida	Crustacea	Echinodermata	Mollusca	Other	Overall
LB0601	UM count	-	100	-	-	41	5	121	10	277
	PL missed	-	0	-	-	0	0	0	0	0
	%missed	-	0.0	-	-	0.0	0.0	0.0	0.0	0.0
LB0602	UM count	-	58	1	-	9	1	32	2	103
	PL missed	-	0	0	-	0	0	2	0	2
	%missed	-	0.0	0.0	-	0.0	0.0	6.3	0.0	1.9
LB0604	UM count	2	125	1		40	9	90	38	305
	PL missed	0	1	0	-	1	0	9	1	12
	%missed	0.0	0.8	0.0	-	2.5	0.0	10.0	2.6	3.9
LB0605	UM count	2	44	7	-	9	4	11	12	89
	PL missed	0	2	1	-	0	2	7	1	13
	%missed	0.0	4.5	14.3	-	0.0	50.0	63.6	8.3	14.6
LB0606	UM count	-	55	5	-	10	-	44	18	132
	PL missed	-	2	0	-	6	-	19	0	27
	%missed	-	3.6	0.0	-	60.0	-	43.2	0.0	20.5
LB0608	UM count	-	-	-	-	-	-	-	-	0
	PL missed	-	-	-	-	-	-	-	-	0
	%missed	-	-	-	-	-	-	-	-	-
LB0609	UM count	-	75	2	-	12	1	42	14	146
	PL missed	-	0	0	-	2	0	19	1	22
	%missed	-	0.0	0.0	-	16.7	0.0	45.2	7.1	15.1
LB0614	UM count	-	84	-	-	45	7	37	63	236
	PL missed	-	1	-	-	0	0	13	0	14
	%missed	-	1.2	-	-	0.0	0.0	35.1	0.0	5.9
LB0618	UM count	-	52	3	-	20	1	83	11	170
	PL missed	-	1	0	-	0	0	0	0	1
	%missed	-	1.9	0.0	-	0.0	0.0	0.0	0.0	0.6
LB0619	UM count	-	104	2	-	57	8	95	26	292
	PL missed	-	1	0	-	0	0	0	0	1
	%missed	-	1.0	0.0	-	0.0	0.0	0.0	0.0	0.3
LB0628	UM count	-	83	1	-	12	2	14	13	125
	PL missed	-	1	0	-	0	0	14	4	19
	%missed	-	1.2	0.0	-	0.0	0.0	100.0	30.8	15.2

Key:
PL - participating laboratory
UM - Unicomarine Ltd.
"-" - No data. See Report, Section 6, for details.
n/a - no residue supplied

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 MB07. Values are in grams (g).

LabCode		Nemertea	Polychaeta	Oligochaeta	Pycnogonida	Crustacea	Echinodermata	Mollusca	Other	Overall
LB0601	PL	-	0.0146	-	-	0.0016	0.0111	4.9172	0.0090	4.9535
	UM	-	0.4537	-	-	0.0034	0.0114	4.9292	0.0123	5.4100
	%diff.	-	-3007.5	-	-	-112.5	-2.7	-0.2	-36.7	-9.2
LB0602	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB0604	PL	0.00355	0.06721	-	-	0.00597	0.00123	8.43172	0.01267	8.52235
	UM	0.00330	0.05220	-	-	0.00400	0.00120	7.93130	0.00920	8.00120
	%diff.	7.0	22.3	-	-	33.0	2.4	5.9	27.4	6.1
LB0605	PL	0.00427	0.02238	0.00052	-	0.00461	0.01767	10.88492	0.00806	10.94243
	UM	0.00330	0.01340	0.00020	-	0.00290	0.01670	11.70580	0.00560	11.74790
	%diff.	22.7	40.1	61.5	-	37.1	5.5	-7.5	30.5	-7.4
LB0606	PL	-	0.0258	0.0016	-	0.0055	-	18.6917	0.0019	18.7265
	UM	-	0.0195	0.0012	-	0.0030	-	18.3399	0.0023	18.3659
	%diff.	-	24.4	25.0	-	45.5	-	1.9	-21.1	1.9
LB0608	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB0609	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB0614	PL	-	0.0158	-	-	0.0102	0.1079	18.2661	0.0026	18.4026
	UM	-	0.0176	-	-	0.0076	0.1469	19.1945	0.0017	19.3683
	%diff.	-	-11.4	-	-	25.5	-36.1	-5.1	34.6	-5.2
LB0618	PL	-	0.0283	0.0000	-	0.0243	0.0000	0.3153	0.0004	0.3683
	UM	-	0.0202	0.0001	-	0.0235	0.0001	0.3504	0.0003	0.3946
	%diff.	-	-	-	-	-	-	-11.1	25.0	-7.1
LB0619	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB0628	PL	-	0.0435	0.0001	-	0.0044	0.0001	-	0.0016	0.0497
	UM	-	0.0390	0.0001	-	0.0036	0.0001	-	0.0023	0.0451
	%diff.	-	10.3	0.0	-	18.2	0.0	-	-43.8	9.3

Key: PL - participating laboratory
UM - Unicomarine Ltd.
"-" - No data. See Report, Section 6, for details.

Table 4. Variation in the faunal content of samples distributed as MB07.

Taxa

LabCode	Nemertea	Polychaeta	Oligochaeta	Crustacea	Echinodermata	Mollusca	Other	Total taxa
LB0601	-	13	-	7	2	12	1	35
LB0602	-	15	1	3	1	3	1	24
LB0604	2	27	1	14	3	10	2	59
LB0605	1	10	2	6	2	6	3	30
LB0606	-	15	1	2	-	5	3	26
LB0609	-	13	2	4	1	4	1	25
LB0614	-	12	-	9	2	6	2	31
LB0618	-	19	1	7	1	8	2	38
LB0619	-	28	1	8	1	11	3	52
LB0628	-	19	1	7	1	2	2	32
Mean	2	17	1	7	2	7	2	35
Max	2	28	2	14	3	12	3	59
Min	1	10	1	2	1	2	1	24

Individuals

LabCode	Nemertea	Polychaeta	Oligochaeta	Crustacea	Echinodermata	Mollusca	Other	Total Ind.
LB0601	-	100	-	41	5	121	10	277
LB0602	-	58	1	9	1	32	2	103
LB0604	2	125	1	40	9	90	38	305
LB0605	2	44	7	9	4	11	14	91
LB0606	-	55	5	10	-	44	18	132
LB0609	-	75	2	12	1	42	14	146
LB0614	-	84	-	45	7	37	63	236
LB0618	-	52	3	20	1	83	11	170
LB0619	-	104	2	57	8	95	26	292
LB0628	-	83	1	12	2	14	13	125
Mean	2	78	3	26	4	57	21	188
Max	2	125	7	57	9	121	63	305
Min	2	44	1	9	1	11	2	91

Table 5. Results from the analysis of Own Samples (OS11-OS13) supplied by participating laboratories and re-analysis by Unicomarine Ltd.

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	Errors	Note
LB0601	OS11	17	20	-3	15.0	118	120	-2	1.7	3	3	2.5	1	98.32	0	
LB0601	OS12	19	21	-2	9.5	105	108	-3	2.8	3	4	3.7	1	97.65	0	
LB0601	OS13	17	21	-4	19.0	78	84	-6	7.1	4	5	6.0	-1	96.30	0	
LB0602	OS11	68	74	-6	8.1	770	988	-218	22.1	9	236	23.9	18	74.21	8	samples had leaked in transport
LB0602	OS12	31	37	-6	16.2	102	131	-29	22.1	7	29	22.1	0	76.60	7	
LB0602	OS13	52	58	-6	10.3	633	742	-109	14.7	6	111	15.0	2	70.98	8	
LB0604	OS11	8	8	0	0.0	28	28	0	0.0	0	0	0.0	0	89.29	1	
LB0604	OS12	10	10	0	0.0	23	23	0	0.0	0	0	0.0	0	95.65	1	
LB0604	OS13	50	52	-2	3.8	179	183	-4	2.2	1	2	1.1	-2	94.48	2	
LB0605	OS11	13	14	-1	7.1	59	60	-1	1.7	0	0	0.0	-1	95.80	2	
LB0605	OS12	30	38	-8	21.1	116	327	-211	64.5	6	211	64.5	0	49.56	4	
LB0605	OS13	27	32	-5	15.6	109	108	1	0.9	0	0	0.0	1	67.28	9	
LB0606	OS11	24	27	-3	11.1	676	1140	-464	40.7	2	469	41.1	5	73.02	3	
LB0606	OS12	22	22	0	0.0	198	200	-2	1.0	0	2	1.0	0	99.50	0	
LB0606	OS13	36	41	-5	12.2	102	119	-17	14.3	5	16	13.4	-1	90.50	2	
LB0607	OS11	36	40	-4	10.0	212	247	-35	14.2	3	36	14.6	1	87.15	5	1.0 & 0.5mm sieve data combined
LB0607	OS12	10	13	-3	23.1	518	525	-7	1.3	1	8	1.5	1	98.56	0	1.0 & 0.5mm sieve data combined
LB0607	OS13	20	21	-1	4.8	2665	2661	4	0.2	0	3	0.1	7	98.24	1	1.0 & 0.5mm sieve data combined
LB0608	OS11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No response - no list of OS
LB0608	OS12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No response - no list of OS
LB0608	OS13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No response - no list of OS
LB0609	OS11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Not participating this year
LB0609	OS12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Not participating this year
LB0609	OS13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Not participating this year
LB0610	OS11	12	12	0	0.0	2341	2327	14	0.6	0	13	0.6	27	99.23	1	
LB0610	OS12	35	35	0	0.0	168	175	-7	4.0	1	8	4.6	1	90.38	3	
LB0610	OS13	29	29	0	0.0	1542	1503	39	2.5	0	2	0.1	41	98.13	2	
LB0611	OS11	7	7	0	0.0	20	20	0	0.0	0	0	0.0	0	100.00	0	
LB0611	OS12	12	12	0	0.0	51	51	0	0.0	0	0	0.0	0	98.04	1	
LB0611	OS13	14	14	0	0.0	29	30	-1	3.3	0	1	3.3	0	98.31	0	
LB0612	OS11	11	11	0	0.0	359	355	4	1.1	0	1	0.3	5	99.16	0	1.0 & 0.5mm sieve data combined
LB0612	OS12	13	13	0	0.0	541	564	-23	4.1	0	25	4.4	2	97.92	0	1.0 & 0.5mm sieve data combined
LB0612	OS13	3	4	-1	25.0	122	120	2	1.6	0	0	0.0	2	95.87	1	1.0 & 0.5mm sieve data combined
LB0613	OS11	9	9	0	0.0	16	16	0	0.0	0	0	0.0	0	100.00	0	
LB0613	OS12	7	7	0	0.0	30	30	0	0.0	0	0	0.0	0	70.00	1	
LB0613	OS13	8	9	-1	11.1	17	28	-11	39.3	1	11	39.3	0	75.56	0	

Table 5. Results from the analysis of Own Samples (OS11-OS13) supplied by participating laboratories and re-analysis by Unicomarine Ltd.

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	Errors	Note
LB0614	OS11	11	11	0	0.0	37	37	0	0.0	0	0	0.0	0	100.00	0	
LB0614	OS12	9	9	0	0.0	30	29	1	3.3	0	0	0.0	1	98.31	0	
LB0614	OS13	12	12	0	0.0	123	141	-18	12.8	0	18	12.8	0	92.42	0	
LB0615	OS11	21	21	0	0.0	136	133	3	2.2	0	1	0.8	4	98.14	2	
LB0615	OS12	9	9	0	0.0	81	82	-1	1.2	0	0	0.0	-1	66.26	2	
LB0615	OS13	13	13	0	0.0	199	193	6	3.0	0	0	0.0	6	88.78	2	
LB0617	OS11	8	10	-2	20.0	2026	2111	-85	4.0	1	3	0.1	-82	97.27	0	
LB0617	OS12	7	7	0	0.0	465	459	6	1.3	0	0	0.0	6	98.70	0	
LB0617	OS13	6	5	1	16.7	21	20	1	4.8	0	0	0.0	1	97.56	0	
LB0618	OS11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Not participating this year
LB0618	OS12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Not participating this year
LB0618	OS13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Not participating this year
LB0619	OS11	52	53	-1	1.9	995	1011	-16	1.6	1	17	1.7	1	97.81	3	
LB0619	OS12	39	43	-4	9.3	835	952	-117	12.3	4	123	12.9	6	92.89	0	
LB0619	OS13	25	25	0	0.0	383	390	-7	1.8	0	4	1.0	-3	97.80	3	
LB0623	OS11	2	2	0	0.0	3	3	0	0.0	0	0	0.0	0	100.00	0	
LB0623	OS12	14	14	0	0.0	96	96	0	0.0	0	0	0.0	0	98.96	1	
LB0623	OS13	5	5	0	0.0	16	12	4	25.0	0	0	0.0	4	85.71	0	
LB0624	OS11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Samples not received
LB0624	OS12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Samples not received
LB0624	OS13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Samples not received
LB0625	OS11	20	21	-1	4.8	3814	3729	85	2.2	0	1	0.0	86	98.21	0	1.0 & 0.5mm sieve data combined
LB0625	OS12	21	21	0	0.0	796	832	-36	4.3	0	2	0.2	-34	97.79	0	1.0 & 0.5mm sieve data combined
LB0625	OS13	3	3	0	0.0	8	8	0	0.0	0	0	0.0	0	100.00	0	1.0 & 0.5mm sieve data combined
LB0628	OS11	19	20	-1	5.0	462	480	-18	3.8	1	15	3.1	-3	97.92	1	
LB0628	OS12	10	13	-3	23.1	11	15	-4	26.7	3	4	26.7	0	84.85	0	
LB0628	OS13	19	21	-2	9.5	446	468	-22	4.7	2	20	4.3	-2	97.29	0	

Table 6. Comparison of the efficiency of extraction of fauna by the participating laboratories for the major taxonomic groups present in Own Samples (OS11-OS13).

LabCode		Nemertea	Polychaeta	Oligochaeta	Pycnogonida	Crustacea	Echinodermata	Mollusca	Other	Overall
LB01	UM count	-	62	-	-	46	6	4	2	120
OS11	PL missed	-	1	-	-	0	0	2	0	3
	%missed	-	1.6	-	-	0.0	0.0	50.0	0.0	2.5
LB01	UM count	-	43	-	-	17	12	29	7	108
OS12	PL missed	-	1	-		0	0	2	1	4
	%missed	-	2.3	-	-	0.0	0.0	6.9	14.3	3.7
LB01	UM count	-	41	-	-	17	-	25	1	84
OS13	PL missed	-	3	-	-	0	-	2	0	5
	%missed	-	7.3	-	-	0.0	-	8.0	0.0	6.0
LB02	UM count	-	115	1	1	324	35	483	25	984
OS11	PL missed	-	13	0	1	3	13	189	13	232
	%missed	-	11.3	0.0	100.0	0.9	37.1	39.1	52.0	23.6
LB02	UM count	-	68	-	-	12	9	26	16	131
OS12	PL missed	-	2	-	-	0	6	19	2	29
	%missed	-	2.9	-	-	0.0	66.7	73.1	12.5	22.1
LB02	UM count	3	532	3	1	38	10	153	2	742
OS13	PL missed	0	47	3	1	8	1	51	0	111
	%missed	0.0	8.8	100.0	100.0	21.1	10.0	33.3	0.0	15.0
LB04	UM count	2	23	-	-	-	-	3	-	28
OS11	PL missed	0	0	-	-	-	-	0	-	0
	%missed	0.0	0.0	-	-	-	-	0.0	-	0.0
LB04	UM count	-	14	-	-	-	-	-	9	23
OS12	PL missed	-	0	-	-	-	-	-	0	0
	%missed	-	0.0	-	-	-	-	-	0.0	0.0
LB04	UM count	3	115	-	-	4	5	23	33	183
OS13	PL missed	0	1	-	-	0	0	1	0	2
	%missed	0.0	0.9	-	-	0.0	0.0	4.3	0.0	1.1
LB05	UM count	-	6	-	-	2	42	3	7	60
OS11	PL missed	-	0	-	-	0	0	0	0	0
	%missed	-	0.0	-	-	0.0	0.0	0.0	0.0	0.0
LB05	UM count	-	59	-	-	32	2	234	-	327
OS12	PL missed	-	3	-	-	1	2	205	-	211
	%missed	-	5.1	-	-	3.1	100.0	87.6	-	64.5
LB05	UM count	5	69	-	-	15	1	18	-	108
OS13	PL missed	0	0	-	-	0	0	0	-	0
	%missed	0.0	0.0	-	-	0.0	0.0	0.0	-	0.0
LB06	UM count	6	62	12	-	18	-	1042	-	1140
OS11	PL missed	0	2	3	-	6	-	458	-	469
	%missed	0.0	3.2	25.0	-	33.3	-	44.0	-	41.1
LB06	UM count	3	39	-	-	-	-	158	-	200
OS12	PL missed	0	0	-	-	-	-	2	-	2
	%missed	0.0	0.0	-	-	-	-	1.3	-	1.0
LB06	UM count	1	68	-	-	8	15	21	6	119
OS13	PL missed	0	3	-	-	2	2	8	1	16
	%missed	0.0	4.4	-	-	25.0	13.3	38.1	16.7	13.4
LB07	UM count	-	158	35	2	3	-	42	7	247
OS11	PL missed	-	19	10	1	0	-	1	5	36
	%missed	-	12.0	28.6	50.0	0.0	-	2.4	71.4	14.6
LB07	UM count	-	29	467	-	17	-	12	-	525
OS12	PL missed	-	0	1	-	5	-	2	-	8
	%missed	-	0.0	0.2	-	29.4	-	16.7	-	1.5

Table 6. Comparison of the efficiency of extraction of fauna by the participating laboratories for the major taxonomic groups present in Own Samples (OS11-OS13).

LabCode		Nemertea	Polychaeta	Oligochaeta	Pycnogonida	Crustacea	Echinodermata	Mollusca	Other	Overall
LB07	UM count	-	1668	947	-	41	-	3	2	2661
OS13	PL missed	-	1	2	-	0	-	0	0	3
	%missed	-	0.1	0.2	-	0.0	-	0.0	0.0	0.1
LB08	UM count	-	-	-	-	-	-	-	-	0
OS11	PL missed	-	-	-	-	-	-	-	-	0
	%missed	-	-	-	-	-	-	-	-	-
LB08	UM count	-	-	-	-	-	-	-	-	0
OS12	PL missed	-	-	-	-	-	-	-	-	0
	%missed	-	-	-	-	-	-	-	-	-
LB08	UM count	-	-	-	-	-	-	-	-	0
OS13	PL missed	-	-	-	-	-	-	-	-	0
	%missed	-	-	-	-	-	-	-	-	-
LB09	UM count	-	-	-	-	-	-	-	-	0
OS11	PL missed	-	-	-	-	-	-	-	-	0
	%missed	-	-	-	-	-	-	-	-	-
LB09	UM count	-	-	-	-	-	-	-	-	0
OS12	PL missed	-	-	-	-	-	-	-	-	0
	%missed	-	-	-	-	-	-	-	-	-
LB09	UM count	-	-	-	-	-	-	-	-	0
OS13	PL missed	-	-	-	-	-	-	-	-	0
	%missed	-	-	-	-	-	-	-	-	-
LB10	UM count	-	837	1440	-	-	-	50	-	2327
OS11	PL missed	-	0	4	-	-	-	9	-	13
	%missed	-	0.0	0.3	-	-	-	18.0	-	0.6
LB10	UM count	-	81	2	-	8	30	53	1	175
OS12	PL missed	-	0	0	-	0	1	7	0	8
	%missed	-	0.0	0.0	-	0.0	3.3	13.2	0.0	4.6
LB10	UM count	3	656	685	-	2	-	157	-	1503
OS13	PL missed	0	1	0	-	0	-	1	-	2
	%missed	0.0	0.2	0.0	-	0.0	-	0.6	-	0.1
LB11	UM count	-	8	-	-	3	5	-	4	20
OS11	PL missed	-	0	-	-	0	0	-	0	0
	%missed	-	0.0	-	-	0.0	0.0	-	0.0	0.0
LB11	UM count	-	15	1	-	10	7	1	17	51
OS12	PL missed	-	0	0	-	0	0	0	0	0
	%missed	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
LB11	UM count	-	11	1	-	9	5	1	3	30
OS13	PL missed	-	0	0	-	1	0	0	0	1
	%missed	-	0.0	0.0	-	11.1	0.0	0.0	0.0	3.3
LB12	UM count	-	31	1	-	319	-	3	1	355
OS11	PL missed	-	1	0	-	0	-	0	0	1
	%missed	-	3.2	0.0	-	0.0	-	0.0	0.0	0.3
LB12	UM count	-	123	2	-	19	-	416	4	564
OS12	PL missed	-	1	0	-	0	-	23	1	25
	%missed	-	0.8	0.0	-	0.0	-	5.5	25.0	4.4
LB12	UM count	-	9	111	-	-	-	-	-	120
OS13	PL missed	-	0	0	-	-	-	-	-	0
	%missed	-	0.0	0.0	-	-	-	-	-	0.0
LB13	UM count	-	14	-	-	1	-	-	1	16
OS11	PL missed	-	0	-	-	0	-	-	0	0
	%missed	-	0.0	-	-	0.0	-	-	0.0	0.0

Table 6. Comparison of the efficiency of extraction of fauna by the participating laboratories for the major taxonomic groups present in Own Samples (OS11-OS13).

LabCode		Nemertea	Polychaeta	Oligochaeta	Pycnogonida	Crustacea	Echinodermata	Mollusca	Other	Overall
LB13	UM count	-	14	10	-	-	-	6	-	30
OS12	PL missed	-	0	0	-	-	-	0	-	0
	%missed	-	0.0	0.0	-	-	-	0.0	-	0.0
LB13	UM count	-	6	7	-	-	-	1	14	28
OS13	PL missed	-	1	1	-	-	-	1	8	11
	%missed	-	16.7	14.3	-	-	-	100.0	57.1	39.3
LB14	UM count	-	29	1	-	1	-	6	-	37
OS11	PL missed	-	0	0	-	0	-	0	-	0
	%missed	-	0.0	0.0	-	0.0	-	0.0	-	0.0
LB14	UM count	-	19	-	-	1	-	8	1	29
OS12	PL missed	-	0	-	-	0	-	0	0	0
	%missed	-	0.0	-	-	0.0	-	0.0	0.0	0.0
LB14	UM count	-	61	3	-	5	-	71	1	141
OS13	PL missed	-	2	0	-	0	-	16	0	18
	%missed	-	3.3	0.0	-	0.0	-	22.5	0.0	12.8
LB15	UM count	-	21	83	-	19	-	6	4	133
OS11	PL missed	-	0	1	-	0	-	0	0	1
	%missed	-	0.0	1.2	-	0.0	-	0.0	0.0	0.8
LB15	UM count	-	27	44	-	2	-	9	-	82
OS12	PL missed	-	0	0	-	0	-	0	-	0
	%missed	-	0.0	0.0	-	0.0	-	0.0	-	0.0
LB15	UM count	-	46	128	-	1	-	11	7	193
OS13	PL missed	-	0	0	-	0	-	0	0	0
	%missed	-	0.0	0.0	-	0.0	-	0.0	0.0	0.0
LB17	UM count	-	1812	288	-	-	-	9	2	2111
OS11	PL missed	-	2	0	-	-	-	1	0	3
	%missed	-	0.1	0.0	-	-	-	11.1	0.0	0.1
LB17	UM count	-	413	30	-	-	-	16	-	459
OS12	PL missed	-	0	0	-	-	-	0	-	0
	%missed	-	0.0	0.0	-	-	-	0.0	-	0.0
LB17	UM count	-	3	12	-	3	-	2	-	20
OS13	PL missed	-	0	0	-	0	-	0	-	0
	%missed	-	0.0	0.0	-	0.0	-	0.0	-	0.0
LB18	UM count	-	-	-	-	-	-	-	-	0
OS11	PL missed	-	-	-	-	-	-	-	-	0
	%missed	-	-	-	-	-	-	-	-	-
LB18	UM count	-	-	-	-	-	-	-	-	0
OS12	PL missed	-	-	-	-	-	-	-	-	0
	%missed	-	-	-	-	-	-	-	-	-
LB18	UM count	-	-	-	-	-	-	-	-	0
OS13	PL missed	-	-	-	-	-	-	-	-	0
	%missed	-	-	-	-	-	-	-	-	-
LB19	UM count	10	272	-	-	1	24	689	15	1011
OS11	PL missed	0	14	-	-	0	0	3	0	17
	%missed	0.0	5.1	-	-	0.0	0.0	0.4	0.0	1.7
LB19	UM count	6	388	-	-	-	7	529	22	952
OS12	PL missed	0	17	-	-	-	1	97	8	123
	%missed	0.0	4.4	-	-	-	14.3	18.3	36.4	12.9
LB19	UM count	6	339	-	-	1	-	23	21	390
OS13	PL missed	0	1	-	-	0	-	1	2	4
	%missed	0.0	0.3	-	-	0.0	-	4.3	9.5	1.0

Table 6. Comparison of the efficiency of extraction of fauna by the participating laboratories for the major taxonomic groups present in Own Samples (OS11-OS13).

LabCode		Nemertea	Polychaeta	Oligochaeta	Pycnogonida	Crustacea	Echinodermata	Mollusca	Other	Overall
LB23	UM count	-	1	-	-	2	-	-	-	3
OS11	PL missed	-	0	-	-	0	-	-	-	0
	%missed	-	0.0	-	-	0.0	-	-	-	0.0
LB23	UM count	-	12	-	-	80	-	4	-	96
OS12	PL missed	-	0	-	-	0	-	0	-	0
	%missed	-	0.0	-	-	0.0	-	0.0	-	0.0
LB23	UM count	-	-	3	-	1	-	6	2	12
OS13	PL missed	-	-	0	-	0	-	0	0	0
	%missed	-	-	0.0	-	0.0	-	0.0	0.0	0.0
LB24	UM count	-	-	-	-	-	-	-	-	0
OS11	PL missed	-	-	-	-	-	-	-	-	0
	%missed	-	-	-	-	-	-	-	-	-
LB24	UM count	-	-	-	-	-	-	-	-	0
OS12	PL missed	-	-	-	-	-	-	-	-	0
	%missed	-	-	-	-	-	-	-	-	-
LB24	UM count	-	-	-	-	-	-	-	-	0
OS13	PL missed	-	-	-	-	-	-	-	-	0
	%missed	-	-	-	-	-	-	-	-	-
LB25	UM count	-	3502	214	-	1	-	11	1	3729
OS11	PL missed	-	1	0	-	0	-	0	0	1
	%missed	-	0.0	0.0	-	0.0	-	0.0	0.0	0.0
LB25	UM count	-	352	476	-	3	-	1	-	832
OS12	PL missed	-	1	1	-	0	-	0	-	2
	%missed	-	0.3	0.2	-	0.0	-	0.0	-	0.2
LB25	UM count	-	6	-	-	2	-	-	-	8
OS13	PL missed	-	0	-	-	0	-	-	-	0
	%missed	-	0.0	-	-	0.0	-	-	-	0.0
LB28	UM count	-	195	-	-	-	-	282	3	480
OS11	PL missed	-	10	-	-	-	-	5	0	15
	%missed	-	5.1	-	-	-	-	1.8	0.0	3.1
LB28	UM count	-	9	-	-	1	-	5	-	15
OS12	PL missed	-	0	-	-	1	-	3	-	4
	%missed	-	0.0	-	-	100.0	-	60.0	-	26.7
LB28	UM count	-	322	-	-	2	1	143	-	468
OS13	PL missed	-	3	-	-	0	0	17	-	20
	%missed	-	0.9	-	-	0.0	0.0	11.9	-	4.3

Key: PL - participating laboratory
UM - Unicomarine Ltd.
"-" - No data. See Report, Section 6, for details.

Table 7. 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 OS11-OS13.

Sample OS11

LabCode		Nemertea	Polychaeta	Oligochaeta	Pycnogonida	Crustacea	Echinodermata	Mollusca	Other	Overall
LB0601	PL	-	0.2178	-	-	0.0162	0.3969	0.0040	0.0002	0.6351
	UM	-	0.1605	-	-	0.0191	0.5599	0.0039	0.0003	0.7437
	%diff.	-	26.3	-	-	-17.9	-41.1	2.5	-50.0	-17.1
LB0602	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB0604	PL	0.00532	0.20241	-	-	-	-	0.00136	-	0.20909
	UM	0.0038	0.1189	-	-	-	-	0.0013	-	0.1240
	%diff.	28.6	41.3	-	-	-	-	4.4	-	40.7
LB0605	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB0606	PL	0.0061	0.1316	0.0045	-	0.0223	-	0.3017	-	0.4662
	UM	0.0042	0.0827	0.0031	-	0.0093	-	0.2147	-	0.3140
	%diff.	31.1	37.2	31.1	-	58.3	-	28.8	-	32.6
LB0607	PL	-	2.3367	0.0012	0.0002	0.0005	-	105.7092	0.0001	108.0479
	UM	-	1.5843	0.0007	0.0001	0.0007	-	100.1331	0.0001	101.7190
	%diff.	-	32.2	41.7	50.0	-40.0	-	5.3	0.0	5.9
LB0608	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB0609	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB0610	PL	-	0.7160	2.2160	-	-	-	0.0390	-	2.9710
	UM	-	0.2770	1.0511	-	-	-	0.0144	-	1.3425
	%diff.	-	61.3	52.6	-	-	-	63.1	-	54.8
LB0611	PL	-	0.0070	-	-	0.0050	1.5320	-	0.0060	1.5500
	UM	-	0.0034	-	-	0.0012	1.3684	-	0.0031	1.3761
	%diff.	-	51.4	-	-	76.0	10.7	-	48.3	11.2
LB0612	PL	-	0.0028	0.0001	-	0.2179	-	0.0910	0.0001	0.3119
	UM	-	0.0057	0.0001	-	0.2492	-	0.0830	0.0001	0.3381
	%diff.	-	-103.6	0.0	-	-14.4	-	8.8	0.0	-8.4
LB0613	PL	-	0.4440	-	-	-	-	-	-	0.4440
	UM	-	0.5611	-	-	-	-	-	-	0.5611
	%diff.	-	-26.4	-	-	-	-	-	-	-26.4
LB0614	PL	-	0.0529	0.0001	-	0.0004	-	6.6233	-	6.6767
	UM	-	0.0541	0.0001	-	0.0004	-	6.9892	-	7.0438
	%diff.	-	-2.3	0.0	-	0.0	-	-5.5	-	-5.5
LB0615	PL	-	1.1485	0.0071	-	0.0191	-	0.0828	0.2111	1.4686
	UM	-	0.9361	0.0060	-	0.0162	-	0.0803	0.1940	1.2326
	%diff.	-	18.5	15.5	-	15.2	-	3.0	8.1	16.1

Table 7. 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 OS11-OS13.

Sample OS11

LabCode		Nemertea	Polychaeta	Oligochaeta	Pycnogonida	Crustacea	Echinodermata	Mollusca	Other	Overall
LB0617	PL	-	0.6611	0.0240	-	-	-	0.0002	0.0001	0.6854
	UM	-	0.4866	0.0282	-	-	-	0.0013	0.0001	0.5162
	%diff.	-	26.4	-17.5	-	-	-	-550.0	0.0	24.7
LB0618	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB0619	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB0623	PL	-	0.0280	-	-	0.0050	-	-	-	0.0330
	UM	-	0.0125	-	-	0.0026	-	-	-	0.0151
	%diff.	-	55.4	-	-	48.0	-	-	-	54.2
LB0624	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB0625	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-		-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB0628	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-

Table 7. 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 OS11-OS13.

Sample OS12

LabCode		Nemertea	Polychaeta	Oligochaeta	Pycnogonida	Crustacea	Echinodermata	Mollusca	Other	Overall
LB0601	PL	-	0.4490	-	-	0.0881	0.0023	3.2544	0.0019	3.7957
	UM	-	0.6225	-	-	0.1245	0.0027	2.9690	0.0025	3.7212
	%diff.	-	-38.6	-	-	-41.3	-17.4	8.8	-31.6	2.0
LB0602	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB0604	PL	-	0.00411	-	-	-	-	-	0.00096	0.00507
	UM	-	0.0030	-	-	-	-	-	0.0004	0.0034
	%diff.	-	27.0	-	-	-	-	-	58.3	32.9
LB0605	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB0606	PL	0.0012	0.8909	-	-	-	-	14.2555	-	15.1476
	UM	0.0017	0.7609	-	-	-	-	13.1160	-	13.8786
	%diff.	-41.7	14.6	-	-	-	-	8.0	-	8.4
LB0607	PL	-	0.5417	0.1418	-	0.0171	-	0.0267	-	0.7273
	UM	-	0.3537	0.1106	-	0.0094	-	0.0240	-	0.4977
	%diff.	-	34.7	22.0	-	45.0	-	10.1	-	31.6
LB0608	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB0609	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB0610	PL	-	1.1940	0.0010	-	0.0750	3.3510	0.4350	0.0010	5.0570
	UM	-	0.6989	0.0006	-	0.0352	2.7516	0.3918	0.0005	3.8786
	%diff.	-	41.5	40.0	-	53.1	17.9	9.9	50.0	23.3
LB0611	PL	-	0.0120	0.0010	-	1.0250	3.1730	0.0390	0.0200	4.2700
	UM	-	0.0077	0.0008	-	0.7279	2.7566	0.0232	0.0274	3.5436
	%diff.	-	35.8	20.0	-	29.0	13.1	40.5	-37.0	17.0
LB0612	PL	-	0.0152	0.0002	-	0.0310	-	1.8459	0.0001	1.8924
	UM	-	0.0203	0.0002	-	0.0384	-	1.8561	0.0001	1.9151
	%diff.	-	-33.6	0.0	-	-23.9	-	-0.6	0.0	-1.2
LB0613	PL	-	0.0908	-	-	-	-	0.0374	-	0.1282
	UM	-	0.1286	-	-	-	-	0.0293	-	0.1579
	%diff.	-	-41.6	-	-	-	-	21.7	-	-23.2
LB0614	PL	-	0.0261	-	-	0.0001	-	0.4790	0.0001	0.5053
	UM	-	0.0373	-	-	0.0001	-	0.5490	0.0001	0.5865
	%diff.	-	-42.9	-	-	0.0	-	-14.6	0.0	-16.1
LB0615	PL	-	0.5883	0.0074	-	0.0016	-	0.0256	-	0.6229
	UM	-	0.4549	0.0080	-	0.0008	-	0.0254	-	0.4891
	%diff.	-	22.7	-8.1	-	50.0	-	0.8	-	21.5

Table 7. 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 OS11-OS13.

Sample OS12

LabCode		Nemertea	Polychaeta	Oligochaeta	Pycnogonida	Crustacea	Echinodermata	Mollusca	Other	Overall
LB0617	PL	-	0.4240	0.0101	-	-	-	0.0930	-	0.5271
	UM	-	0.3920	0.0120	-	-	-	0.0657	-	0.4697
	%diff.	-	7.5	-18.8	-	-	-	29.4	-	10.9
LB0618	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB0619	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB0623	PL	-	0.0720	-	-	0.0080	-	0.0040	-	0.0840
	UM	-	0.0375	-	-	0.0088	-	0.0004	-	0.0467
	%diff.	-	47.9	-	-	-10.0	-	90.0	-	44.4
LB0624	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB0625	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-		-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB0628	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-

Table 7. 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 OS11-OS13.

Sample OS13

LabCode		Nemertea	Polychaeta	Oligochaeta	Pycnogonida	Crustacea	Echinodermata	Mollusca	Other	Overall
LB0601	PL	-	0.3786	-	-	0.0542	-	0.0740	-	0.5068
	UM	-	0.4708	-	-	0.0502	-	0.0874	-	0.6084
	%diff.	-	-24.4	-	-	7.4	-	-18.1	-	-20.0
LB0602	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB0604	PL	0.19243	1.99386	-	-	0.06877	0.29389	6.08583	0.28447	8.91925
	UM	0.1369	1.1123	-	-	0.0390	0.2244	5.4385	0.2009	7.1520
	%diff.	28.9	44.2	-	-	43.3	23.6	10.6	29.4	19.8
LB0605	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB0606	PL	0.0752	0.2342	-	-	0.0083	0.2691	0.1133	0.0011	0.7012
	UM	0.0731	0.2192	-	-	0.0046	0.2810	0.0769	0.0007	0.6555
	%diff.	2.8	6.4	-	-	44.6	-4.4	32.1	36.4	6.5
LB0607	PL	-	0.6034	0.1763	-	0.0619	-	0.0047	0.0001	0.8464
	UM	-	0.4557	0.1683	-	0.0281	-	0.0057	0.0001	0.6579
	%diff.	-	24.5	4.5	-	54.6	-	-21.3	0.0	22.3
LB0608	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB0609	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB0610	PL	0.0030	1.2460	0.3160	-	0.0020	-	0.0860	-	1.6530
	UM	0.0007	0.3969	0.1741	-	0.0004	-	0.0463	-	0.6184
	%diff.	76.7	68.1	44.9	-	80.0	-	46.2	-	62.6
LB0611	PL	-	0.0200	0.0010	-	0.2220	2.6160	0.0010	0.0050	2.8650
	UM	-	0.0084	0.0001	-	0.1602	2.2421	0.0004	0.0138	2.4250
	%diff.	-	58.0	90.0	-	27.8	14.3	60.0	-176.0	15.4
LB0612	PL	-	0.0066	0.0078	-	-	-	-	-	0.0144
	UM	-	0.0078	0.0092	-	-	-	-	-	0.0170
	%diff.	-	-18.2	-17.9	-	-	-	-	-	-18.1
LB0613	PL	-	0.0038	-	-	-	-	-	-	0.0038
	UM	-	0.0055	-	-	-	-	-	-	0.0055
	%diff.	-	-44.7	-	-	-	-	-	-	-44.7
LB0614	PL	-	0.0383	0.0005	-	0.0321	-	1.0558	0.0001	1.1268
	UM	-	0.0395	0.0003	-	0.0481	-	1.2167	0.0001	1.3047
	%diff.	-	-3.1	40.0	-	-49.8	-	-15.2	0.0	-15.8
LB0615	PL	-	0.0650	0.0189	-	0.0005	-	3.0112	0.0001	3.0957
	UM	-	0.0536	0.0151	-	0.0005	-	2.6281	0.0001	2.6974
	%diff.	-	17.5	20.1	-	0.0	-	12.7	0.0	12.9

Table 7. 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 OS11-OS13.

		Sample OS13								
LabCode		Nemertea	Polychaeta	Oligochaeta	Pycnogonida	Crustacea	Echinodermata	Mollusca	Other	Overall
LB0617	PL	-	0.0030	0.0030	-	0.0002	-	0.0001	-	0.0063
	UM	-	0.0044	0.0040	-	0.0033	-	0.0023	-	0.0140
	%diff.	-	-46.7	-33.3	-	-1550.0	-	-2200.0	-	-122.2
LB0618	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB0619	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB0623	PL	-	-	0.0020	-	0.0030	-	0.0070	0.0030	0.0150
	UM	-	-	0.0021	-	0.0008	-	0.0020	0.0010	0.0059
	%diff.	-	-	-5.0	-	73.3	-	71.4	66.7	60.7
LB0624	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB0625	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-
LB0628	PL	-	-	-	-	-	-	-	-	0.0000
	UM	-	-	-	-	-	-	-	-	0.0000
	%diff.	-	-	-	-	-	-	-	-	-

Table 8. Summary of the results of particle size analysis of the replicate samples from sediment circulation PS14.

PS14	% Clay & Silt	Median (phi)	Mean (phi)	Sorting	Skew
PS14 - 50 - laser	1.37	1.16	1.04	0.67	0.035
PS14 - 51 - laser	0.84	1.15	1.07	0.62	0.078
PS14 - 52 - laser	0.00	1.04	0.93	0.66	0.059
PS14 - 53 - laser	1.12	1.20	1.08	0.66	0.059
PS14 - 54 - laser	1.49	1.40	1.29	0.62	0.006
PS14 - 55 - laser	0.37	1.14	1.02	0.62	0.017
PS14 - 56 - laser	1.45	1.26	1.17	0.60	0.059
PS14 - 57 - sieve	0.09	1.49	1.44	0.64	-0.09
PS14 - 58 - sieve	0.06	1.44	1.44	0.65	-0.01
PS14 - 59 - sieve	0.10	1.51	1.44	0.64	-0.11
PS14 - 60 - sieve	0.07	1.44	1.44	0.65	0.00
PS14 - 61 - sieve	0.06	1.46	1.45	0.65	-0.02
PS14 - 62 - sieve	0.06	1.46	1.45	0.65	-0.02
PS14 - 63 - sieve	0.09	1.51	1.45	0.65	-0.10

Table 9. Summary of the results of particle size analysis of the replicate samples from sediment circulation PS15.

PS15	% Clay & Silt	Median (phi)	Mean (phi)	Sorting	Skew
PS15 - 29A - laser	83.58	5.99	5.01	2.33	0.210
PS15 - 30A - laser	81.91	5.89	4.41	2.44	0.230
PS15 - 31A - laser	84.28	6.01	4.83	2.32	0.207
PS15 - 32A - laser	82.48	5.97	4.78	2.31	0.171
PS15 - 33A - laser	96.43	6.33	5.62	2.02	0.229
PS15 - 34A - laser	83.97	6.06	4.92	2.25	0.153
PS15 - 35A - laser	82.17	6.02	4.62	2.33	0.149
PS15 - 36A - sieve	91.63	5.65	*	*	*
PS15 - 37A - sieve	92.15	5.64	*	*	*
PS15 - 38A - sieve	92.73	5.63	*	*	*
PS15 - 39A - sieve	92.01	5.57	*	*	*
PS15 - 40A - sieve	92.54	5.59	*	*	*
PS15 - 41A - sieve	92.73	5.61	*	*	*
PS15 - 42A - sieve	92.29	5.57	*	*	*

* statistic not calculated

Table 10. Summary of the particle size information received from participating laboratories for the fourteenth particle size distribution - PS14.

Lab	Method	%<63µm	Median	Mean	Sort	IGS (SKi)
LB0601	FD/DS	0.00	1.40	1.37	0.61	-0.12
LB0602	?	30.99	-	3.48	3.31	0.77
LB0604	L	0.00	1.47	1.47	0.66	-0.01
LB0605	WS/DS/L	1.43	1.15	1.30	0.95	0.32
LB0606	L	0.00	0.83	0.83	0.77	-0.010
LB0607*	L	1.33	0.95	0.68	0.85	-0.077
LB0609	S	0.79	1.45	1.43	0.69	0.56
LB0610	S	0.10	1.35	1.33	0.64	0.100
LB0611	-	-	-	-	-	-
LB0612*	L	1.33	0.95	0.68	0.85	-0.077
LB0613	S	0.20	1.38	1.36	0.64	0.040
LB0614	S	0.32	1.37	1.36	0.75	0.260
LB0615*	L	1.33	0.95	0.68	0.85	-0.077
LB0617*	L	1.33	0.95	0.68	0.85	-0.077
LB0618	DS	0.79	-	-	-	-
LB0623	-	-	-	-	-	-
LB0624*	L	1.33	0.95	0.68	0.85	-0.077
LB0625	L	0.00	1.01	0.64	0.91	-0.16
LB0626*	L	1.33	0.95	0.68	0.85	-0.08
LB0627	S/P	0.39	0.96	0.89	0.83	-
LB0628	S?	0.50	1.40	1.42	0.60	0.050

Key to methods:

L - Laser analysis DS - Dry sieve CC - Coulter counter
S - Sieve WS - Wet sieve FD - Freeze dried
P - Pipette n/c - not calculated
L* - data for this laboratory not included in calculations below (see text)
"-" - No data. See Report, Section 6, for details.

Summary	%<63µm	Median	Mean	Sort	IGS (SKi)
Number of values	14	12	13	13	12
Mean of laboratories	2.63	1.23	1.35	0.94	0.14
Mean of 7 replicates (laser)	0.95	1.19	1.09	0.64	0.04
Mean of 7 replicates (sieve)	0.08	1.47	1.44	0.65	-0.05
Laboratory minimum	0.00	0.83	0.64	0.60	-0.16
Laboratory maximum	30.99	1.47	3.48	3.31	0.77

Table 11. Summary of the particle size information received from participating laboratories for the fifteenth particle size distribution - PS15.

Lab	Method	%<63µm	Median	Mean	Sort	IGS (SKi)
LB0601	FD/L	72.30	5.00	5.57	1.80	0.43
LB0602	-	-	-	-	-	-
LB0604	L	95.95	6.23	6.00	1.71	-0.16
LB0605	WS/DS/L	76.20	4.90	5.35	1.88	0.37
LB0606	L	80.21	5.81	6.08	0.94	2.060
LB0607*	L	74.68	5.16	4.09	1.38	-0.154
LB0609	S	87.41	6.45	6.33	1.87	-0.06
LB0610	-	-	-	-	-	-
LB0611	-	-	-	-	-	-
LB0612*	L	74.68	5.16	4.09	1.38	-0.154
LB0613	L	85.13	5.96	5.09	2.10	0.164
LB0614	S	76.39	4.35	4.17	0.66	-2.210
LB0615*	L	74.68	5.16	4.09	1.38	-0.154
LB0617*	L	74.68	5.16	4.09	1.38	-0.154
LB0618	L	88.56	-	-	-	-
LB0623	-	-	-	-	-	-
LB0624*	L	74.68	5.16	4.09	1.38	-0.154
LB0625	L	72.21	4.96	4.29	2.08	0.32
LB0626*	L	74.68	5.16	4.09	1.38	-0.15
LB0627	S/P	89.20	5.50	5.44	1.51	-
LB0628	-	-	-	-	-	-

Key to methods:

L - Laser analysis DS - Dry sieve CC - Coulter counter
S - Sieve WS - Wet sieve FD - Freeze dried
P - Pipette n/c - not calculated
L* - data for this laboratory not included in calculations below (see text)
"-" - No data. See Report, Section 6, for details.

Summary	%<63µm	Median	Mean	Sort	IGS (SKi)
Number of values	11	10	10	10	9
Mean of laboratories	81.66	5.43	5.24	1.59	0.08
Mean of 7 replicates (laser)	84.97	6.04	4.88	2.29	0.19
Mean of 7 replicates (sieve)	92.30	5.61	n/c	n/c	n/c
Laboratory minimum	72.21	4.35	4.09	0.66	-2.21
Laboratory maximum	95.95	6.45	6.33	2.10	2.06

n/c - statistic not calculable

Table 12. The identifications of the fauna made by participating laboratories for RT14. Names are given only where different from the AQC identification.

RT14	Taxon	LB0601	LB0604	LB0606	LB0608	LB0610	LB0612	LB0614
RT1401	Sepiola atlantica	[Sipiola] -	--	--	0 0	--	--	Sepietta oweniana
RT1402	Cirriformia tentaculata	--	--	--	0 0	--	--	--
RT1403	Apseudes talpa	--	--	--	0 0	--	--	--
RT1404	Odontosyllis gibba	--	--	--	0 0	--	--	--
RT1405	Golfingia elongata	--	Nephasoma minutum	--	0 0	--	--	--
RT1406	Leptochiton asellus	--	--	- cancellatus	0 0	- scabridus	--	[Lepidochiton] -
RT1407	Scalibregma inflatum	--	--	--	0 0	--	--	--
RT1408	Cumella pygmaea	--	--	--	0 0	--	--	--
RT1409	Parapionosyllis minuta	--	--	--	0 0	--	--	--
RT1410	Polydora caulleryi	Pseudopolydora antonata	--	--	0 0	--	--	--
RT1411	Pygospio elegans	--	--	--	0 0	--	--	--
RT1412	Palaemon elegans	--	--	--	0 0	--	--	--
RT1413	Heterochaeta costata	[Heterochata] -	--	--	0 0	--	--	--
RT1414	Amaeana trilobata	Polycirrus medusa	--	--	0 0	--	--	--
RT1415	Nephtys incisa	--	--	--	0 0	--	--	--
RT1416	Anaitides mucosa	[Phyllodoce] -	--	--	0 0	[Phyllodoce] -	--	[Phyllodoce] -
RT1417	Limapontia depressa	- capitata	- capitata	--	0 0	Runcina coronata	- capitata	--
RT1418	Corophium lacustre	--	--	--	0 0	--	--	--
RT1419	Chaetozone gibber	--	Caulleriella zetlandica	--	0 0	--	--	--
RT1420	Pholoe synophthalmica	--	--	--	0 0	- inornata	--	--
RT1421	Ophiura albida	--	--	--	0 0	--	--	- robusta
RT1422	Paramphinome jeffreysii	- [jeffreysi]	--	--	0 0	--	--	Pseudeurythoe hemuli
RT1423	Nephtys cirrosa	--	- caeca	--	0 0	--	--	--
RT1424	Scolelepis squamata	--	--	--	0 0	--	--	--
RT1425	Onoba aculeus	--	--	--	0 0	--	- semicostata	- semicostata

RT14	Taxon	LB0602	LB0605	LB0607	LB0609	LB0611	LB0613	LB0615
RT1401	Sepiola atlantica	--	Sepietta neglecta	--	--	--	--	0 0
RT1402	Cirriformia tentaculata	--	Caulleriella zetlandica	--	--	--	--	0 0
RT1403	Apseudes talpa	--	--	[Aseudes] -	--	--	--	0 0
RT1404	Odontosyllis gibba	--	--	--	--	--	--	0 0
RT1405	Golfingia elongata	--	- rimicola	--	- margaritacea margaritacea	--	--	0 0
RT1406	Leptochiton asellus	--	--	--	--	- scabridus	--	0 0
RT1407	Scalibregma inflatum	--	--	--	--	--	--	0 0
RT1408	Cumella pygmaea	--	Campylaspis glabra	--	--	--	--	0 0
RT1409	Parapionosyllis minuta	--	Exogone naidina	--	--	--	--	0 0
RT1410	Polydora caulleryi	Pseudopolydora antennata	- caeca	--	--	--	--	0 0
RT1411	Pygospio elegans	--	--	--	--	--	--	0 0
RT1412	Palaemon elegans	--	--	--	--	--	--	0 0
RT1413	Heterochaeta costata	--	Tubificoides benedii	--	--	--	--	0 0
RT1414	Amaeana trilobata	Polycirrus medusa	[Amaena] -	[Amaea] -	[Ameana] -	--	--	0 0
RT1415	Nephtys incisa	--	--	--	--	--	--	0 0
RT1416	Anaitides mucosa	[Phyllodoce] -	[Phyllodoce] -	[Phyllodoce] -	--	[Phyllodoce] -	--	0 0
RT1417	Limapontia depressa	- capitata	--	--	- capitata	Runcina coronata	--	0 0
RT1418	Corophium lacustre	--	--	--	--	--	--	0 0
RT1419	Chaetozone gibber	--	Cirriformia tentaculata	--	--	--	--	0 0
RT1420	Pholoe synophthalmica	--	--	--	- [synopthalmica]	- inornata	--	0 0
RT1421	Ophiura albida	--	--	- ophiura	--	--	--	0 0
RT1422	Paramphinome jeffreysii	--	Scalibregma inflatum	Pseudeurythoe hemuli	--	--	Pseudeurythoe hemuli	0 0
RT1423	Nephtys cirrosa	--	- longosetosa	- [cirrhosa]	--	--	--	0 0
RT1424	Scolelepis squamata	[Scolelpis] -	[Scolelepsis] -	--	--	--	--	0 0
RT1425	Onoba aculeus	--	--	--	--	--	Ondina warreni	0 0

Table 12. The identifications of the fauna made by participating laboratories for RT14. Names are given only where different from the AQC identification.

RT14	Taxon	LB0617	LB0619	LB0621	LB0624	LB0628
RT1401	Sepiola atlantica	0 0	--	--	0 0	--
RT1402	Cirriformia tentaculata	0 0	--	Cirratulus sp. juv. (cirratus)	0 0	--
RT1403	Apseudes talpa	0 0	--	--	0 0	--
RT1404	Odontosyllis gibba	0 0	Syllidae 0	Kefersteinia cirrata	0 0	--
RT1405	Golfingia elongata	0 0	--	--	0 0	- vulgaris vulgaris
RT1406	Leptochiton asellus	0 0	Tonicella marmorea	Lepidochitona cinerea	0 0	--
RT1407	Scalibregma inflatum	0 0	--	--	0 0	--
RT1408	Cumella pygmaea	0 0	Campylapsis glabra	--	0 0	--
RT1409	Parapionosyllis minuta	0 0	Eusyllis lamelligera	Pionosyllis serrata	0 0	--
RT1410	Polydora caulleryi	0 0	--	--	0 0	--
RT1411	Pygospio elegans	0 0	--	--	0 0	--
RT1412	Palaemon elegans	0 0	--	--	0 0	--
RT1413	Heterochaeta costata	0 0	Tubificoides 0	--	0 0	--
RT1414	Amaeana trilobata	0 0	--	--	0 0	--
RT1415	Nephtys incisa	0 0	--	--	0 0	--
RT1416	Anaitides mucosa	0 0	[Anaitedes] -	--	0 0	--
RT1417	Limapontia depressa	0 0	Procerodes 0	Runcina coronata	0 0	- capitata
RT1418	Corophium lacustre	0 0	- acherusicum	--	0 0	--
RT1419	Chaetozone gibber	0 0	Caulleriella zetlandica	--	0 0	Caulleriella zetlandica
RT1420	Pholoe synophthalmica	0 0	--	--	0 0	--
RT1421	Ophiura albida	0 0	- ophiura	--	0 0	--
RT1422	Paramphinome jeffreysii	0 0	--	Pseudoeurythoe hemuli	0 0	--
RT1423	Nephtys cirrosa	0 0	--	--	0 0	--
RT1424	Scolelepis squamata	0 0	--	--	0 0	--
RT1425	Onoba aculeus	0 0	Ondina diaphana	- semicostata	0 0	- semicostata

RT14	Taxon	LB0618	LB0620	LB0623	LB0625
RT1401	Sepiola atlantica	--	0 0	--	--
RT1402	Cirriformia tentaculata	--	0 0	--	--
RT1403	Apseudes talpa	--	0 0	--	--
RT1404	Odontosyllis gibba	--	0 0	--	--
RT1405	Golfingia elongata	--	0 0	--	- vulgaris
RT1406	Leptochiton asellus	--	0 0	- scabridus	--
RT1407	Scalibregma inflatum	--	0 0	--	--
RT1408	Cumella pygmaea	--	0 0	--	--
RT1409	Parapionosyllis minuta	--	0 0	--	--
RT1410	Polydora caulleryi	Pseudopolydora antennata	0 0	--	--
RT1411	Pygospio elegans	--	0 0	--	--
RT1412	Palaemon elegans	--	0 0	--	--
RT1413	Heterochaeta costata	--	0 0	--	--
RT1414	Amaeana trilobata	Lysilla loveni	0 0	--	--
RT1415	Nephtys incisa	--	0 0	--	--
RT1416	Anaitides mucosa	--	0 0	[Phyllodoce] -	[Phyllodoce] maculata
RT1417	Limapontia depressa	--	0 0	Runcina coronata	- capitata
RT1418	Corophium lacustre	--	0 0	--	--
RT1419	Chaetozone gibber	--	0 0	--	--
RT1420	Pholoe synophthalmica	--	0 0	- inornata	--
RT1421	Ophiura albida	--	0 0	--	- affinis
RT1422	Paramphinome jeffreysii	--	0 0	--	Pseudeurythoe hemuli
RT1423	Nephtys cirrosa	--	0 0	--	--
RT1424	Scolelepis squamata	--	0 0	--	--
RT1425	Onoba aculeus	[Onuba] -	0 0	--	- semicostata

Table 13. The identifications of the fauna made by participating laboratories for RT15. Names are given only where different from the AQC identification.

RT15	Taxon	LB0601	LB0604	LB0606	LB0608	LB0610	LB0612	LB0614
RT1501	Littorina littorea	--	--	--	0 0	--	0 0	--
RT1502	Saxicavella jeffreysi	- [jefferysi]	--	--	0 0	--	0 0	--
RT1503	Abra alba	--	--	--	0 0	--	0 0	--
RT1504	Potamopyrgus antipodarum	Hydrobia ulvae	Hydrobia ulvae	Hydrobia ulvae	0 0	Hydrobia ulvae	0 0	Hydrobia ventrosa
RT1505	Obtusella intersecta	--	Paludinella litorina	Paludinella littorina	0 0	--	0 0	Littorina neglecta
RT1506	Skeneopsis planorbis	--	--	--	0 0	--	0 0	--
RT1507	Thyasira sarsi	- croulinensis	- flexuosa	- flexuosa	0 0	- flexuosa	0 0	- flexuosa
RT1508	Moerella pygmaea	--	[Tellina] -	--	0 0	--	0 0	--
RT1509	Acanthodoris pilosa	--	--	--	0 0	--	0 0	--
RT1510	Philine aperta	--	--	--	0 0	--	0 0	--
RT1511	Modiolarca tumida	--	Musculus costulatus	--	0 0	--	0 0	--
RT1512	Lacuna crassior	--	--	--	0 0	--	0 0	--
RT1513	Retusa umbilicata	Roxania uticulus	- obtusa	--	0 0	Cylichna cylindracea	0 0	- truncatula
RT1514	Goodallia triangularis	--	--	--	0 0	--	0 0	--
RT1515	Parvicardium ovale	Cerastoderma edule	- scabrum	--	0 0	--	0 0	--
RT1516	Crenella decussata	--	--	--	0 0	--	0 0	--
RT1517	Mysella bidentata	--	--	--	0 0	--	0 0	--
RT1518	Mytilus edulis	--	--	--	0 0	--	0 0	--
RT1519	Rissoa interrupta	Pusillina inconspicua	--	--	0 0	--	0 0	- parva
RT1520	Cingula cingillus	--	Barleeia unifasciata	--	0 0	--	0 0	- [trifasciata]
RT1521	Nucula nitidosa	--	--	--	0 0	--	0 0	--
RT1522	Bittium reticulatum	--	--	--	0 0	--	0 0	--
RT1523	Odostomia turrita	--	- unidentata	- unidentata	0 0	--	0 0	- conoidea
RT1524	Limatula subauriculata	- sulcata	- sulcata	--	0 0	--	0 0	- sulcata
RT1525	Phaxas pellucidus	--	--	--	0 0	--	0 0	--

RT15	Taxon	LB0602	LB0605	LB0607	LB0609	LB0611	LB0613	LB0615
RT1501	Littorina littorea	--	--	--	--	--	--	0 0
RT1502	Saxicavella jeffreysi	--	--	Solecurtis chamasolen	--	--	--	0 0
RT1503	Abra alba	--	--	--	--	--	--	0 0
RT1504	Potamopyrgus antipodarum	Hydrobia ulvae	Hydrobia ulvae	- [jenkinsi]	Hydrobia ulvae	Hydrobia ulvae	Hydrobia ulvae	0 0
RT1505	Obtusella intersecta	--	Paludinella litorina	--	Rissoella opalina	--	LOST 0	0 0
RT1506	Skeneopsis planorbis	--	--	--	--	--	--	0 0
RT1507	Thyasira sarsi	Lucinoma borealis	- furruginea	Gafrarium minimum	- flexuosa	- flexuosa	- flexuosa	0 0
RT1508	Moerella pygmaea	--	--	[Tellina] -	--	--	--	0 0
RT1509	Acanthodoris pilosa	--	--	--	--	--	--	0 0
RT1510	Philine aperta	--	--	--	--	--	--	0 0
RT1511	Modiolarca tumida	--	Musculus costulatus	--	Musculus discors	--	--	0 0
RT1512	Lacuna crassior	--	--	--	--	--	--	0 0
RT1513	Retusa umbilicata	--	- truncatula	--	Cylichna alba	Cylichna cylindracea	--	0 0
RT1514	Goodallia triangularis	--	--	[Astarte] -	--	--	--	0 0
RT1515	Parvicardium ovale	Cerastoderma edule	--	--	--	--	--	0 0
RT1516	Crenella decussata	--	--	--	--	--	--	0 0
RT1517	Mysella bidentata	--	--	Venerupis rhomboides	--	--	--	0 0
RT1518	Mytilus edulis	--	--	--	--	--	--	0 0
RT1519	Rissoa interrupta	--	- parva	--	- parva	--	--	0 0
RT1520	Cingula cingillus	- [trifasciata]	--	- [trifaciata]	Barleeia unifasciata	--	Barleeia unifasciata	0 0
RT1521	Nucula nitidosa	--	--	--	--	--	--	0 0
RT1522	Bittium reticulatum	--	--	--	--	--	--	0 0
RT1523	Odostomia turrita	--	Brachystomia carrozzai	--	- ?unidentata	--	- unidentata	0 0
RT1524	Limatula subauriculata	- sulcata	--	[Lima] -	--	--	--	0 0
RT1525	Phaxas pellucidus	--	--	--	--	--	--	0 0

Table 13. The identifications of the fauna made by participating laboratories for RT15. Names are given only where different from the AQC identification.

RT15	Taxon	LB0617	LB0619	LB0621	LB0624	LB0628
RT1501	Littorina littorea	0 0	Melarhaphe neritoides	--	0 0	--
RT1502	Saxicavella jeffreysi	0 0	Sphenia binghami	--	0 0	--
RT1503	Abra alba	0 0	--	--	0 0	- sp. juv.
RT1504	Potamopyrgus antipodarum	0 0	Ondina diaphana	Hydrobia ulvae	0 0	--
RT1505	Obtusella intersecta	0 0	Pusillina inconspicua	Rissoella opalina	0 0	--
RT1506	Skeneopsis planorbis	0 0	--	--	0 0	--
RT1507	Thyasira sarsi	0 0	- flexuosa	- flexuosa	0 0	- flexuosa
RT1508	Moerella pygmaea	0 0	Angulus tenuis	--	0 0	--
RT1509	Acanthodoris pilosa	0 0	--	--	0 0	--
RT1510	Philine aperta	0 0	--	--	0 0	--
RT1511	Modiolarca tumida	0 0	Musculus costulatus	Musculus discors	0 0	Musculus discors
RT1512	Lacuna crassior	0 0	Trichotropis borealis	--	0 0	--
RT1513	Retusa umbilicata	0 0	- truncatula	--	0 0	--
RT1514	Goodallia triangularis	0 0	--	--	0 0	--
RT1515	Parvicardium ovale	0 0	--	--	0 0	--
RT1516	Crenella decussata	0 0	--	--	0 0	--
RT1517	Mysella bidentata	0 0	--	Tellimya ferruginosa	0 0	--
RT1518	Mytilus edulis	0 0	--	--	0 0	--
RT1519	Rissoa interrupta	0 0	Alvania semistriata	- parva	0 0	- parva
RT1520	Cingula cingillus	0 0	Barleeia unifasciata	--	0 0	--
RT1521	Nucula nitidosa	0 0	- sulcata	- sulcata	0 0	--
RT1522	Bittium reticulatum	0 0	--	--	0 0	--
RT1523	Odostomia turrita	0 0	--	- unidentata	0 0	--
RT1524	Limatula subauriculata	0 0	- sulcata	--	0 0	- sulcata
RT1525	Phaxas pellucidus	0 0	Ensis siliqua	--	0 0	--

RT15	Taxon	LB0618	LB0620	LB0623	LB0625
RT1501	Littorina littorea	--	--	--	--
RT1502	Saxicavella jeffreysi	--	--	--	--
RT1503	Abra alba	--	--	--	- nitida
RT1504	Potamopyrgus antipodarum	Hydrobiidae sp. indet.	Hydrobia ulvae	Hydrobia ulvae	--
RT1505	Obtusella intersecta	Paludinella litorina	Paludinella litorina	--	Rissoella diaphana
RT1506	Skeneopsis planorbis	--	--	--	--
RT1507	Thyasira sarsi	- flexuosa	- equalis	- flexuosa	- flexuosa
RT1508	Moerella pygmaea	Indet. Bivalvia juv.	--	--	--
RT1509	Acanthodoris pilosa	--	--	--	--
RT1510	Philine aperta	--	--	--	--
RT1511	Modiolarca tumida	Musculus costulatus	Musculus discors	--	--
RT1512	Lacuna crassior	--	--	--	- [crassicor]
RT1513	Retusa umbilicata	--	- truncatula	Cylichna cylindracea	--
RT1514	Goodallia triangularis	--	--	--	--
RT1515	Parvicardium ovale	--	--	--	Acanthocardia tuberculata
RT1516	Crenella decussata	Glycymeris glycymeris	--	--	--
RT1517	Mysella bidentata	--	--	--	--
RT1518	Mytilus edulis	--	--	--	--
RT1519	Rissoa interrupta	--	--	--	- parva
RT1520	Cingula cingillus	- [cingulus]	--	--	--
RT1521	Nucula nitidosa	--	--	--	--
RT1522	Bittium reticulatum	--	Cerithiopsis tubercularis	--	Cerithiopsis tubercularis
RT1523	Odostomia turrita	- sp. indet.	- unidentata	--	- plicata
RT1524	Limatula subauriculata	--	- sulcata	--	- sulcata
RT1525	Phaxas pellucidus	Pharus legumen	Ensis arcuatus	--	--

Table 14. Summary of the results from the identification of specimens supplied by participating laboratories for Laboratory Reference exercise LR04.

	Differences		
LabCode	Generic	Specific	name changes
LB0601	-	-	-
LB0602	-	-	-
LB0604	0	1	0
LB0605	4	7	0
LB0606	0	0	0
LB0607	2	2	0
LB0608	-	-	-
LB0609	-	-	-
LB0610	-	-	-
LB0611	-	-	-
LB0612	1	2	0
LB0613	1	2	1
LB0614	-	-	-
LB0615	0	0	1
LB0617	-	-	-
LB0618	1	2	0
LB0619	0	1	0
LB0623	-	-	-
LB0624	-	-	-
LB0625	-	-	-
LB0628	-	-	-

"-" - No data. See Report, Section 6, for details.

Table 15. Summary of the performance of participating laboratories in the Own Sample (OS) exercises with respect to the NMBAQCS / NMMP standards.

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	NMMP Flag
LB0601	OS11	17	18.0 - 22.0	**Fail**	118	108.0 - 132.0	PASS	0.6351	0.5950 - 0.8924	*PASS*	90.0	98.32	PASS	
LB0601	OS12	19	18.9 - 23.1	PASS	105	97.2 - 118.8	PASS	3.7957	2.9770 - 4.4654	*PASS*	90.0	97.65	PASS	PASS
LB0601	OS13	17	18.9 - 23.1	**Fail**	78	75.6 - 92.4	PASS	0.5068	0.4867 - 0.7301	*PASS*	90.0	96.30	PASS	
LB0602	OS11	68	66.6 - 81.4	PASS	770	889.2 - 1086.8	**Fail**	-	-	-	90.0	74.21	**Fail**	
LB0602	OS12	31	33.3 - 40.7	**Fail**	102	117.9 - 144.1	**Fail**	-	-	-	90.0	76.60	**Fail**	**Fail**
LB0602	OS13	52	52.2 - 63.8	**Fail**	633	667.8 - 816.2	**Fail**	-	-	-	90.0	70.98	**Fail**	
LB0604	OS11	8	6.0 - 10.0	PASS	28	25.2 - 30.8	PASS	0.2091	0.0992 - 0.1488	**Fail**	90.0	89.29	**Fail**	
LB0604	OS12	10	8.0 - 12.0	PASS	23	20.7 - 25.3	PASS	0.0051	0.0027 - 0.0041	**Fail**	90.0	95.65	PASS	PASS
LB0604	OS13	50	46.8 - 57.2	PASS	179	164.7 - 201.3	PASS	8.9193	5.7216 - 8.5824	**Fail**	90.0	94.48	PASS	
LB0605	OS11	13	12.0 - 16.0	PASS	59	54.0 - 66.0	PASS	-	-	-	90.0	95.80	PASS	
LB0605	OS12	30	34.2 - 41.8	**Fail**	116	294.3 - 359.7	**Fail**	-	-	-	90.0	49.56	**Fail**	**Fail**
LB0605	OS13	27	28.8 - 35.2	**Fail**	109	97.2 - 118.8	PASS	-	-	-	90.0	67.28	**Fail**	
LB0606	OS11	24	24.3 - 29.7	**Fail**	676	1026.0 - 1254.0	**Fail**	0.4662	0.2512 - 0.3768	**Fail**	90.0	73.02	**Fail**	
LB0606	OS12	22	19.8 - 24.2	PASS	198	180.0 - 220.0	PASS	15.1476	11.1029 - 16.6543	*PASS*	90.0	99.50	PASS	**Fail**
LB0606	OS13	36	36.9 - 45.1	**Fail**	102	107.1 - 130.9	**Fail**	0.7012	0.5244 - 0.7866	*PASS*	90.0	90.50	PASS	
LB0607	OS11	36	36.0 - 44.0	PASS	212	222.3 - 271.7	**Fail**	108.0479	81.3752 - 122.0628	*PASS*	90.0	87.15	**Fail**	
LB0607	OS12	10	11.0 - 15.0	**Fail**	518	472.5 - 577.5	PASS	0.7273	0.3982 - 0.5972	**Fail**	90.0	98.56	PASS	PASS
LB0607	OS13	20	18.9 - 23.1	PASS	2665	2394.9 - 2927.1	PASS	0.8464	0.5263 - 0.7895	**Fail**	90.0	98.24	PASS	
LB0608	OS11	-	-	-	-	-	-	-	-	-	90.0	-	-	
LB0608	OS12	-	-	-	-	-	-	-	-	-	90.0	-	-	**Fail**
LB0608	OS13	-	-	-	-	-	-	-	-	-	90.0	-	-	
LB0609	OS11	-	-	-	-	-	-	-	-	-	90.0	-	-	
LB0609	OS12	-	-	-	-	-	-	-	-	-	90.0	-	-	n/a
LB0609	OS13	-	-	-	-	-	-	-	-	-	90.0	-	-	
LB0610	OS11	12	10.0 - 14.0	PASS	2341	2094.3 - 2559.7	PASS	2.9710	1.0740 - 1.6110	**Fail**	90.0	99.23	PASS	
LB0610	OS12	35	31.5 - 38.5	PASS	168	157.5 - 192.5	PASS	5.0570	3.1029 - 4.6543	**Fail**	90.0	90.38	PASS	PASS
LB0610	OS13	29	26.1 - 31.9	PASS	1542	1352.7 - 1653.3	PASS	1.6530	0.4947 - 0.7421	**Fail**	90.0	98.13	PASS	
LB0611	OS11	7	5.0 - 9.0	PASS	20	18.0 - 22.0	PASS	1.5500	1.1009 - 1.6513	*PASS*	90.0	100.00	PASS	
LB0611	OS12	12	10.0 - 14.0	PASS	51	45.9 - 56.1	PASS	4.2700	2.8349 - 4.2523	**Fail**	90.0	98.04	PASS	PASS
LB0611	OS13	14	12.0 - 16.0	PASS	29	27.0-33.0	PASS	2.8650	1.9400 - 2.9100	*PASS*	90.0	98.31	PASS	
LB0612	OS11	11	9.0 - 13.0	PASS	359	319.5 - 390.5	PASS	0.3119	0.2705 - 0.4057	*PASS*	90.0	99.16	PASS	
LB0612	OS12	13	11.0 - 15.0	PASS	541	507.6 - 620.4	PASS	1.8924	1.5321 - 2.2981	*PASS*	90.0	97.92	PASS	PASS
LB0612	OS13	3	2.0 - 6.0	PASS	122	108.0 - 132.0	PASS	0.0144	0.0136 - 0.0204	*PASS*	90.0	95.87	PASS	

Table 15. Summary of the performance of participating laboratories in the Own Sample (OS) exercises with respect to the NMBAQCS / NMMP standards.

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	NMMP Flag
LB0613	OS11	9	7.0 - 11.0	PASS	16	14.0 - 18.0	PASS	0.4440	0.4489 - 0.6733	**Fail**	90.0	100.00	PASS	
LB0613	OS12	7	5.0 - 9.0	PASS	30	27.0 - 33.0	PASS	0.1282	0.1263 - 0.1895	*PASS*	90.0	70.00	**Fail**	PASS
LB0613	OS13	8	7.0 - 11.0	PASS	17	25.2 - 30.8	**Fail**	0.0038	0.0044 - 0.0066	**Fail**	90.0	75.56	**Fail**	
LB0614	OS11	11	9.0 - 13.0	PASS	37	33.3 - 40.7	PASS	6.6767	5.6350 - 8.4526	*PASS*	90.0	100.00	PASS	
LB0614	OS12	9	7.0 - 11.0	PASS	30	26.1 - 31.9	PASS	0.5053	0.4692 - 0.7038	*PASS*	90.0	98.31	PASS	PASS
LB0614	OS13	12	10.0 - 14.0	PASS	123	126.9 - 155.1	**Fail**	1.1268	1.0438 - 1.5656	*PASS*	90.0	92.42	PASS	
LB0615	OS11	21	18.9 - 23.1	PASS	136	119.7 - 146.3	PASS	1.4686	0.9861 - 1.4791	*PASS*	90.0	98.14	PASS	
LB0615	OS12	9	7.0 - 11.0	PASS	81	73.8 - 90.2	PASS	0.6229	0.3913 - 0.5869	**Fail**	90.0	66.26	**Fail**	PASS
LB0615	OS13	13	11.0 - 15.0	PASS	199	173.7 - 212.3	PASS	3.0957	2.1579 - 3.2369	*PASS*	90.0	88.78	**Fail**	
LB0617	OS11	8	8.0 - 12.0	PASS	2026	1899.9 - 2322.1	PASS	0.6854	0.4130 - 0.6194	**Fail**	90.0	97.27	PASS	
LB0617	OS12	7	5.0 - 9.0	PASS	465	413.1 - 504.9	PASS	0.5271	0.3758 - 0.5636	*PASS*	90.0	98.70	PASS	PASS
LB0617	OS13	6	3.0 - 7.0	PASS	21	18.0 - 22.0	PASS	0.0063	0.0112 - 0.0168	**Fail**	90.0	97.56	PASS	
LB0618	OS11	-	-	-	-	-	-	-	-	-	90.0	-	-	
LB0618	OS12	-	-	-	-	-	-	-	-	-	90.0	-	-	n/a
LB0618	OS13	-	-	-	-	-	-	-	-	-	90.0	-	-	
LB0619	OS11	52	47.7 - 58.3	PASS	995	909.9 - 1112.1	PASS	-	-	-	90.0	97.81	PASS	
LB0619	OS12	39	38.7 - 47.3	PASS	835	856.8 - 1047.2	**Fail**	-	-	-	90.0	92.89	PASS	PASS
LB0619	OS13	25	22.5 - 27.5	PASS	383	351.0 - 429.0	PASS	-	-	-	90.0	97.80	PASS	
LB0623	OS11	2	.0 - 4.0	PASS	3	1.0 - 5.0	PASS	0.0330	0.0121 - 0.0181	**Fail**	90.0	100.00	PASS	
LB0623	OS12	14	12.0 - 16.0	PASS	96	86.4 - 105.6	PASS	0.0840	0.0374 - 0.0560	**Fail**	90.0	98.96	PASS	PASS
LB0623	OS13	5	3.0 - 7.0	PASS	16	10.0 - 14.0	**Fail**	0.0150	0.0047 - 0.0071	**Fail**	90.0	85.71	**Fail**	
LB0624	OS11	-	-	-	-	-	-	-	-	-	90.0	-	-	
LB0624	OS12	-	-	-	-	-	-	-	-	-	90.0	-	-	**Fail**
LB0624	OS13	-	-	-	-	-	-	-	-	-	90.0	-	-	
LB0625	OS11	20	18.9 - 23.1	PASS	3814	3356.1 - 4101.9	PASS	-	-	-	90.0	98.21	PASS	
LB0625	OS12	21	18.9 - 23.1	PASS	796	748.8 - 915.2	PASS	-	-	-	90.0	97.79	PASS	PASS
LB0625	OS13	3	1.0 - 5.0	PASS	8	6.0 - 10.0	PASS	-	-	-	90.0	100.00	PASS	
LB0628	OS11	19	18.0 - 22.0	PASS	462	432.0 - 528.0	PASS	-	-	-	90.0	97.92	PASS	
LB0628	OS12	10	11.0 - 15.0	**Fail**	11	13.0 - 17.0	**Fail**	-	-	-	90.0	84.85	**Fail**	PASS
LB0628	OS13	19	18.9 - 23.1	PASS	446	421.2 - 514.8	PASS	-	-	-	90.0	97.29	PASS	

Table 16. Summary of the performance of participating laboratories in the Particle Size (PS) exercises with respect to the NMBAQC / NMMP standards.

PS14 Target range = 0.0 - 12.6

	PS14	
LabCode	Actual	Flag
LB0601	0.0	PASS
LB0602	31.0	**Fail**
LB0604	0.0	PASS
LB0605	1.4	PASS
LB0606	0.0	PASS
LB0607*	1.3	PASS
LB0609	0.8	PASS
LB0610	0.1	PASS
LB0611	-	Deemed Fail
LB0612*	1.3	PASS
LB0613	0.2	PASS
LB0614	0.3	PASS
LB0615*	1.3	PASS
LB0617*	1.3	PASS
LB0618	0.8	PASS
LB0623	-	Deemed Fail
LB0624*	1.3	PASS
LB0625	0.0	PASS
LB0626*	1.3	PASS
LB0627	0.4	PASS
LB0628	0.5	PASS

PS15 Target range = 71.7 - 91.7

	PS15	
LabCode	Actual	Flag
LB0601	72.3	PASS
LB0602	-	Deemed Fail
LB0604	96.0	**Fail**
LB0605	76.2	PASS
LB0606	80.2	PASS
LB0607*	74.7	PASS
LB0609	87.4	PASS
LB0610	-	Deemed Fail
LB0611	-	Deemed Fail
LB0612*	74.7	PASS
LB0613	85.1	PASS
LB0614	76.4	PASS
LB0615*	74.7	PASS
LB0617*	74.7	PASS
LB0618	88.6	PASS
LB0623	-	Deemed Fail
LB0624*	74.7	PASS
LB0625	72.2	PASS
LB0626*	74.7	PASS
LB0627	89.2	PASS
LB0628	-	Deemed Fail

"-" no return and/or data from laboratory. See text, Section 6, for details.
"*" = centralised analysis

Table 17. Comparison of the overall performance of laboratories in 1996/97, 1997/98, 1998/99 and 1999/2000 with respect to the NMBAQC / NMMP standards.

Year	Component	Exercise	Pass	Fail	Deemed Fail	% Pass	%Pass (excluding deemed failures)
Yr 03 (1996/97)	OS	02, 03, 04	11	3	9	48	79
Yr 04 (1997/98)		05, 06, 07	12	1	8	57	92
Yr 05 (1998/99)		08, 09, 10	11	3	5	58	79
Yr 06 (1999/00)		11, 12, 13	14	3	2	74	82
Yr 03 (1996/97)	PS	08, 09	27	1	20	56	96
Yr 04 (1997/98)		10, 11	25	3	22	50	89
Yr 05 (1998/99)		12, 13	21	7	17	47	75
Yr 06 (1999/00)		14, 15	33	2	7	79	94

Table 18. Comparison of each laboratory's performance in the Own Sample exercise in 1996/97, 1997/98, 1998/99 and 1999/2000.

LabCode	Scheme Year 3 **1996/97**	Scheme Year 4 **1997/98**	Scheme Year 5 **1998/99**	Scheme Year 6 **1999/00**
LB0601	**FAIL/Deemed Fail**	PASS	PASS	PASS
LB0602	**Deemed Fail**	PASS	PASS	**FAIL**
LB0603	-	-	**FAIL**	-
LB0604	PASS	PASS	PASS	PASS
LB0605	**Deemed Fail**	**FAIL/Deemed Fail**	**Deemed Fail**	**FAIL**
LB0606	PASS	**FAIL**	PASS	**FAIL**
LB0607	**FAIL**	**Deemed Fail**	PASS	PASS
LB0608	n/p	**Deemed Fail**	**FAIL**	**Deemed Fail**
LB0609	n/p	PASS	n/p	n/p
LB0610	PASS	PASS	PASS	PASS
LB0611	**FAIL**	**Deemed Fail**	**Deemed Fail**	PASS
LB0612	PASS	PASS	PASS	PASS
LB0613	PASS	PASS	PASS	PASS
LB0614	PASS	PASS	PASS	PASS
LB0615	PASS	PASS	PASS	PASS
LB0616	-	-	n/p	-
LB0617	**Deemed Fail**	PASS	**FAIL**	PASS
LB0618	-	n/p	n/p	n/p
LB0619	PASS	**Deemed Fail**	**Deemed Fail**	PASS
LB0620	n/a	n/p	n/a	n/a
LB0621	n/a	n/p	n/a	n/a
LB0622	**Deemed Fail**	**Deemed Fail**	**Deemed Fail**	n/a
LB0623	-	**Deemed Fail**	**Deemed Fail**	PASS
LB0624	PASS	**Deemed Fail**	n/a	**Deemed Fail**
LB0625	PASS	PASS	n/a	PASS
LB0626	-	n/a	n/a	n/a
LB0627	PASS	PASS	n/a	n/a
LB0628	-	-	-	PASS

Key: n/p - opted not to participate in OS exercise this year
n/a - not applicable (do not subscribe to OS)
"-" - not in scheme this year
Fail/Deemed Fail - insufficient data supplied

Figures

Figure 1. Particle size distribution curves resulting from analysis of replicate samples of sediment distributed as PS14. Seven samples analysed by sieve and seven samples analysed by Laser.

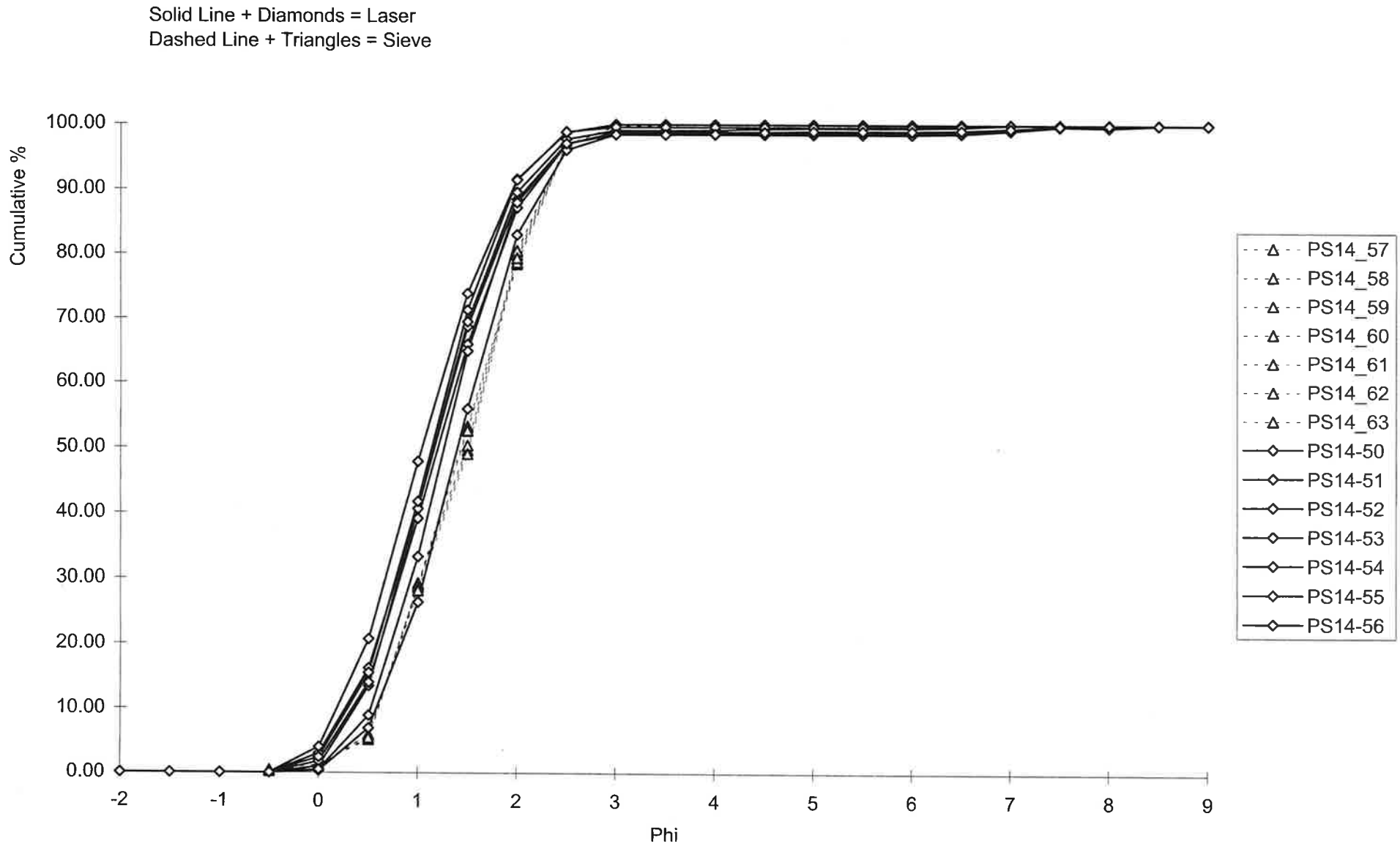


Figure 2. Particle size distribution curves resulting from analysis of fourteen replicate samples of sediment distributed as PS15. Seven samples analysed by sieve-pipette and seven samples analysed by Laser.

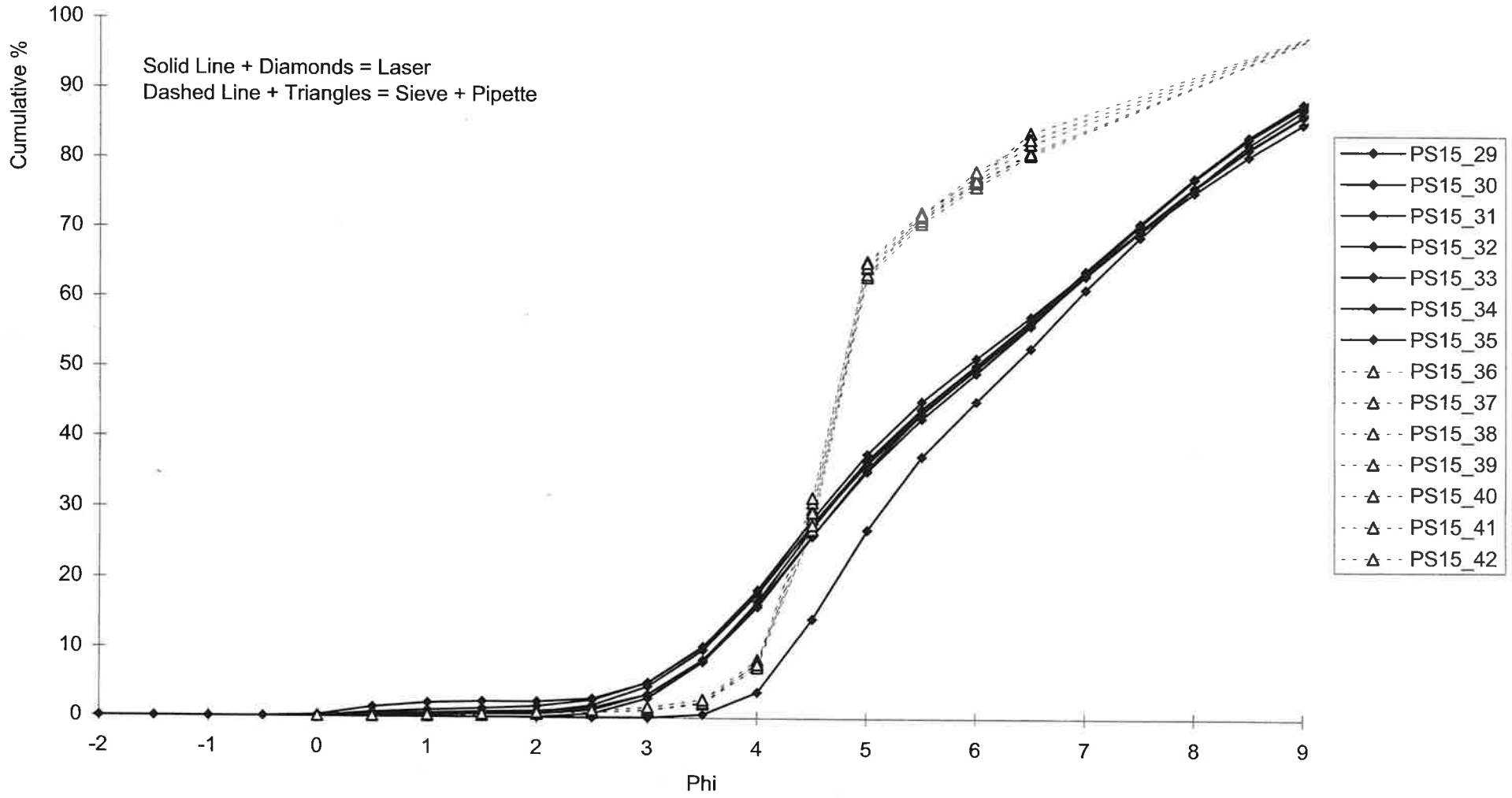


Figure 3. Particle size distribution curves from participating laboratories for sediment samples from PS14. The average values for the AQC analysis of replicates are included.

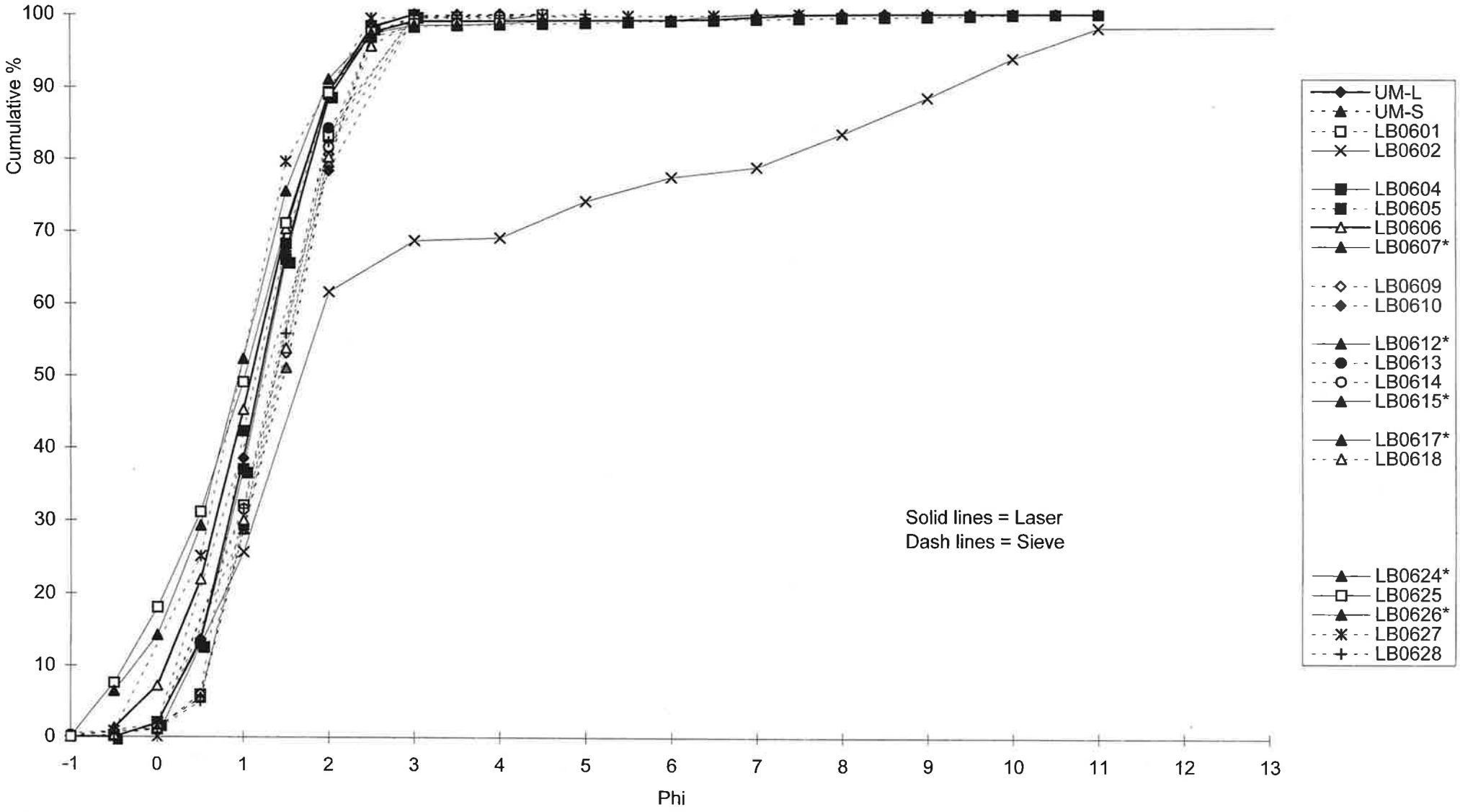


Figure 4. Particle size distribution curves from participating laboratories for sediment samples from PS15. The average values for the AQC analysis of replicates are included.

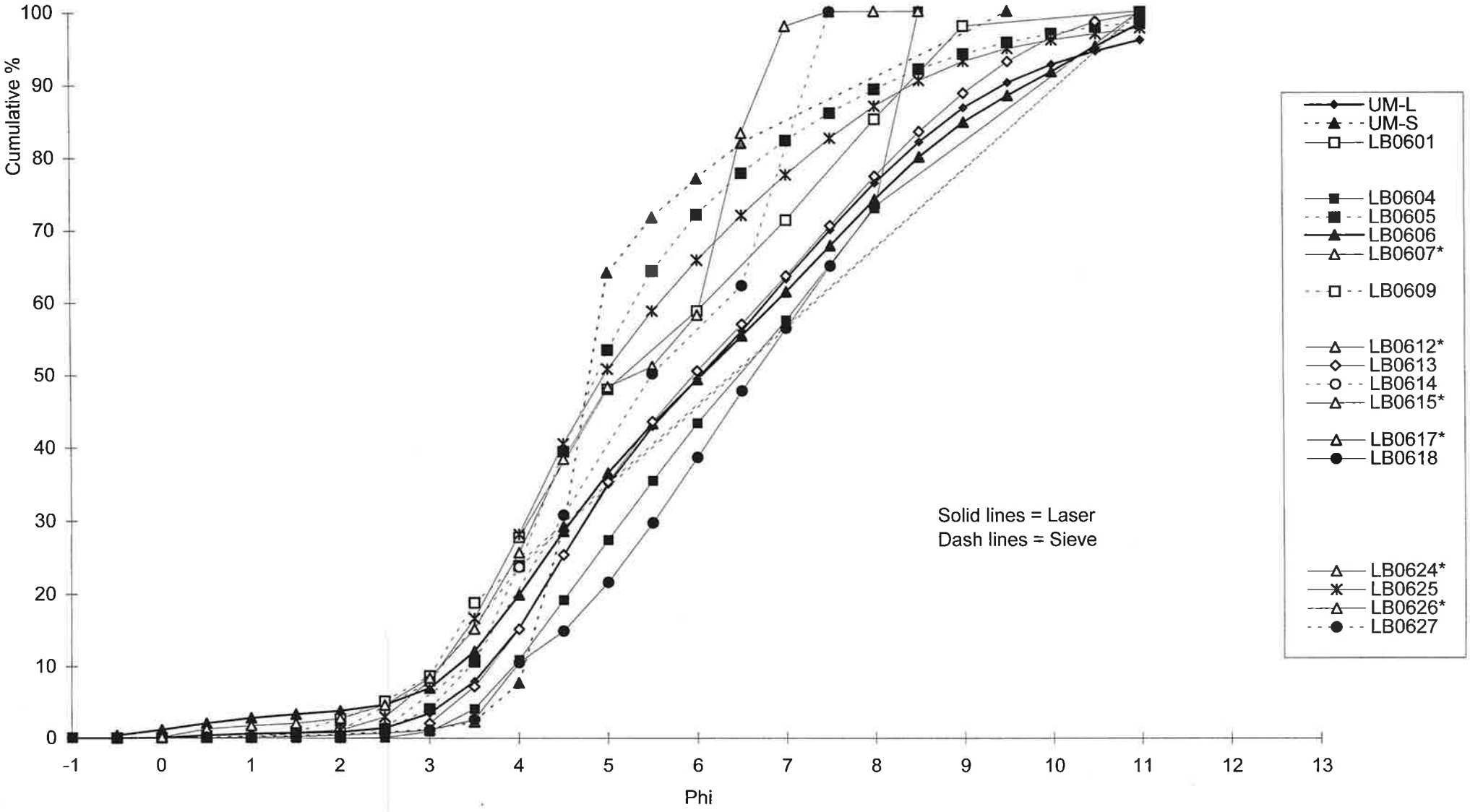


Figure 5. The number of differences from the AQC identification of specimens distributed in RT14 for each of the participating laboratories. Arranged in order of increasing number of differences.

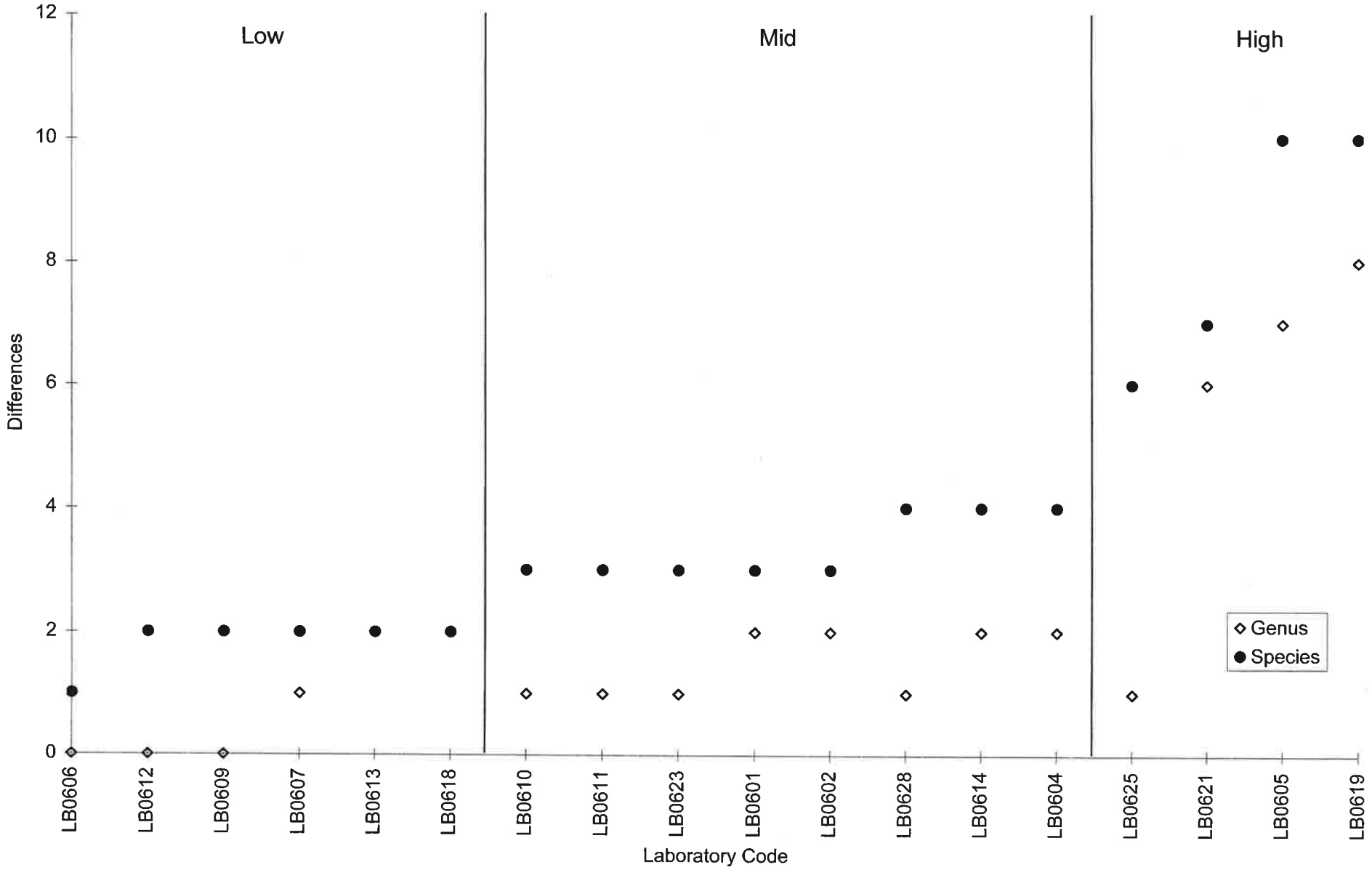
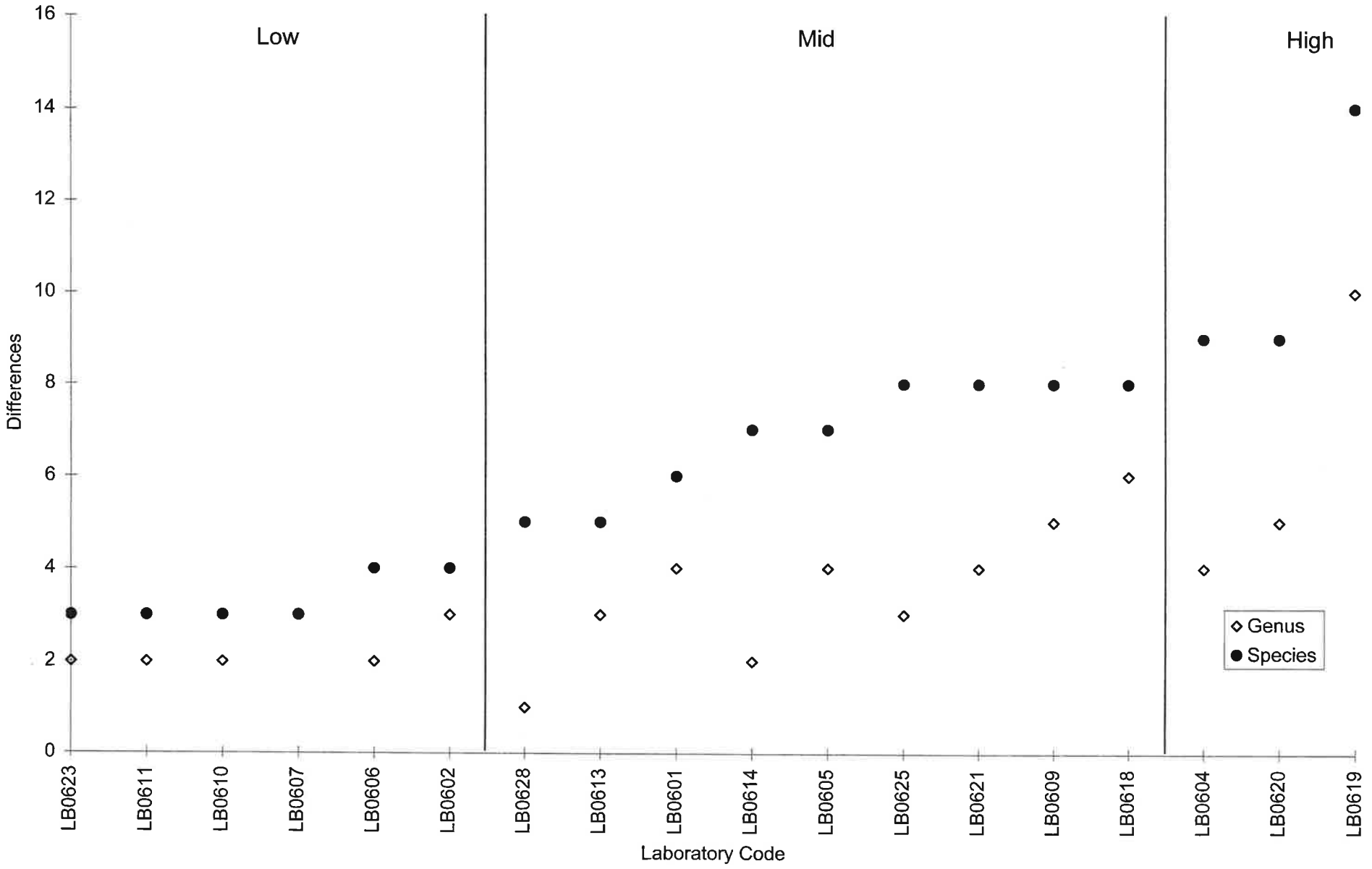


Figure 6. The number of differences from the AQC identification of specimens distributed in RT15 for each of the participating laboratories. Arranged in order of increasing number of differences.



Appendix 1

List of groups from which specimens should be selected for LR04.

	Major Group	Group	Note
1	Oligochaeta	Tubificidae	
2	Polychaeta	Ampharetidae or Terebellidae	Choose one
3	Polychaeta	Cirratulidae	
4	Polychaeta	Maldanidae or Sabellidae	Choose one
5	Polychaeta	Hesionidae or Paraonidae	Choose one
6	Polychaeta	Phyllodocidae	
7	Polychaeta	Sigalionidae or Polynoidae	Choose one
8	Polychaeta	Spionidae	
9	Polychaeta	Capitellidae	
10	Polychaeta	Syllidae	
11	Polychaeta	Syllidae	
12	Polychaeta	Glyceridae, Goniadidae, Opheliidae, Sphaerodoridae, Eunicida or Magelonidae	Choose one from the list
13	Crustacea	Pontoporeiidae	
14	Crustacea	Lysianassidae	
15	Crustacea	Another gammaridean amphipod family	Choose another family
16	Crustacea	Decapoda	
17	Crustacea	Mysidacea	
18	Crustacea	Tanaidacea	
19	Mollusca	Gastropoda - Opisthobranchia	
20	Mollusca	Gastropoda - non Opisthobranchia	
21	Mollusca	Tellinidae	
22	Mollusca	Mytilidae	
23	Mollusca	Caudofoveata, Scaphopoda, Solenogastres or Polyplacophora	Choose one from the list
24	Echinodermata	Echinoidea, Holothurioidea or Asteroidea	Choose one from the list
25	Other	Sipuncula, Pycnogonida or Chordata (inverts)	Choose one from the list

Appendix 2

Description of Scheme Standards

In the sixth year of the Scheme (1999/2000) required levels of performance were set by the NMBAQC steering committee for the Own Sample and Particle Size Analysis exercises. The flags applied to the various exercises 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 the three Own Samples received from each laboratory. 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.

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.

1.1 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.

1.2 Own Sample - Total Biomass target

The total value should be within ±20% of the value obtained from re-analysis of the sample.

1.3 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%.

1.4 Own sample - Overall flag

An overall flag for the Scheme 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).

Because of the considerable variation in the estimation of biomass (as discussed in earlier reports; (NMBAQC Scheme Annual report 1996/97, Section 3.2.5) the flag for this component has not been included in the determination of the overall flag for the

OS exercises. This is the same approach as applied for previous years. Laboratories failing to supply OS or PS data have automatically been assigned a fail flag by default.

2. Particle Size Analysis - Silt-Clay fraction

Only a single aspect of the PS exercises has been considered when preparing the table of flags indicating performance with respect to the Scheme standard. Laboratories are required to determine the silt-clay (<63μm) fraction to within ±10 percentage points of the mean of the results from all laboratories.

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. A "Deemed fail" flag has been assigned if the required summary statistics were not also provided by the laboratory.

Appendices

APPENDIX 1

NATIONAL MARINE BIOLOGICAL AQC CO-ORDINATING COMMITTEE

Dr. M. Service (Chair)	Department of Agriculture, Northern Ireland
Mrs. E. Hamilton (Secretary)	SEPA East
Mrs. A. Henderson (Contract Manager)	SEPA West
Dr. M. Elliott	University of Hull
Mr. D. Moore	FRS
Dr. H. Rees	CEFAS
Mr. R. Proudfoot	Environment Agency
Mr. A. Robinson	Environment Agency
Mr. J. Breen*	IRTU/Industrial Science Centre
Mr. D. Connor	JNCC

(*to be replaced by Mr. T. Mackie of IRTU - March 2000)

APPENDIX 2

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

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 NMMP.
2. Interact with Scottish Environmental Protection Agency (SEPA) as managers of the
3. contract.
4. Review other organisations / laboratories that should be approached to join the scheme.
5. Agree and set an annual budget and itemise contributions from individual participants.
6. Agree the funding requirements of SEPA to service the scheme and the committee.
7. Develop all necessary definitions.
8. Develop and document an overall plan for the scheme.
9. Receive and review reports from participating laboratories on any problems arising from internal and external AQC exercises.
10. Receive and review reports from SEPA on the management of the scheme.
11. Establish the frequency and location of committee meetings.
12. Receive and review reports from the tendering organisation on AQC exercises.
13. As necessary, establish ad-hoc groups to address problems as they arise and provide members to chair each sub-group.
14. Produce an annual report which will be presented to MPMMG for information.
15. Establish links and stimulate collaboration with international intercomparison exercises.
16. Encourage accreditation and co-ordinate in-house AQC policy.
17. Make recommendations and receive reports from participating laboratories on in-house AQC.
18. Establish a timetable and dates for reports.

APPENDIX 3

NATIONAL MARINE BIOLOGICAL AQC SCHEME

ROLE OF THE CONTRACT MANAGER

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 of 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 1999/2000

AES Ltd.; Centre for Environment, Fisheries and Aquaculture Science (CEFAS); Department of Agriculture Northern Ireland (DANI); Environment Agency; EMU Environmental Ltd.; ERT (Scotland) Ltd.; Fisheries Research Services (FRS Marine Lab Aberdeen); Hebog Environmental; Institute of Estuarine and Coastal Sciences (IECS); Industrial Science Centre / Industrial Research and Technology Unit (IRTU Northern Ireland); SEAS Ltd.; Scottish Environment Protection Agency (SEPA); Zeneca (now AstraZeneca).