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NATIONAL MARINE BIOLOGICAL ANALYTICAL QUALITY CONTROL SCHEME

NMBAQC SCHEME

DEVELOPMENT OF A VIDEO AND PHOTOGRAPHIC RING TEST

INTERIM REPORT: RESULTS OF TEST 1

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Report:

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NOTES:

NMBAQC SCHEME
DEVELOPMENT OF A VIDEO AND PHOTOGRAPHIC RING TEST

INTERIM REPORT – RESULTS OF TEST 1

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1 Aims

The main aim of Test 1 was to provide a 'starting point' in the development of a quality control scheme for benthic video analysis. It was designed (i) to establish the general abilities of those participating in the development scheme to analyse benthic video, using an array of video clips produced with the same equipment, from a variety of locations and habitat types, and (ii) to produce information that will facilitate the refinement of the Test to a stage that is suitable for a 'marketable' quality control assessment scheme.

It is not intended that this early stage of the development will produce 'results' as to whether the participants have, or have not, achieved a particular level of quality. However, some degree of feedback is given for the participants, so that they are able to assess how they have fared in relation to others taking part in the development process.

Recommendations for the refinement and improvement of the next stage of the Test (Test 2) are made at the appropriate places throughout this interim report.

2 Methods

To be included in final report.

3 Results

In all, 21 people, from 11 different organisations, participated in the first stage of this project (Test 1). Two of the organisations sent single returns that had been the joint contribution of four people; and four organisations sent multiple returns, one for each of those participating in the Test (these numbered between 2 and six people per organisation). The remaining organisations submitted one return each, completed by the one person undertaking the Test.

Recommendation 1: Request that only one response is submitted per organisation – the test is not an accreditation scheme for individuals. However, organisations may use the test to train or assess a number of individuals within an organisation.

3.1 Completion of Test:

The test was, on the whole, almost fully completed by the participants. However, some elements of the 'Feedback' form (such as indicating how onerous the Test had been) were not included by some and, in some cases, other data, such as the assignment of biotopes (see section 8a), were not provided. One participant omitted to complete any of the 'Feedback Form', and one part of the species data entry form was not returned by another.

Recommendation 2: Specifically ask participants to complete all parts of the second Test.

3.2 About the Participants

The degree of experience that the participants had of carrying out video survey and video analysis varied widely. It ranged from those with no previous experience of either video survey or analysis to those with 12 years of doing both. It is to be noted that: no indication was given (or asked for) as to the amount of diving experience that any of the respondents had. Diving experience, and therefore experience of observing the seabed substrata and communities, is likely to be an advantage in analysis of benthic video.

Recommendation 3: In Test 2, participants should be asked to provide an indication (on, e.g. a scale of 1-5) of their diving experience.

3.3 Approach to the Test

3.3.1 Equipment used to view the DVD

Only 3 of the 21 participants (Numbers 13, 14 and 21) used the same combination of hardware for viewing the video clips (Appendix 1). At least 7 different versions of software were also used. (Appendix 1).

Differences in the types of equipment and, therefore, to some extent, the clarity and resolution used to view the video clips is likely to be a cause of some of the variability between the respondents (see e.g. Sections 4 & 10 below). Recommendations as to a 'preferred' set of equipment for the purpose of video analysis can be made but, due to differing budgets, policies etc. of participating organisations, this is a varying factor that will inevitably need to be accepted by the QA Scheme.

Recommendation 4: In Test 2, recommend the use of a DVD player and TV monitor as hardware for carrying out the test, as these appear to provide a much better resolution than either a PC or laptop.

3.3.2 Tools and Resources used

i. **Species Identification Guides.** Participants used an extremely limited range of identification guides. None of them used more than 3 different sources and 5 of them did not use any. Overall, 8 books and 3 websites were referred to (Table 1).

Table 1. Species identification Guides referred to during Test 1.

Campbell, A.C (1976) The Hamlyn Guide to the Seashores and Shallow Seas of Britain and Europe. Hamlyn, London.

Dipper, F. (1987) British Sea Fishes. Underwater World Publications. London

Erwin, D. & Picton, (1987) The Marine Conservation Society Guide to Inshore Marine Life. Immel Publishing, London.

Gibbons, B. (2001) Seashore Life of Britain and Europe. New Holland Publishers.

Hayward, J.P. & Ryland, J.S. (Eds.)(1995) Handbook of the Marine Fauna of North-West Europe. Oxford University Press.

Hayward, P.J. & Ryland, J.S. (1998) Cheilistomatous Bryozoa, Part 1: Aeteoidea- Cribrilinoidea. Synopsis of the British Fauna, Vol. 10. Field Studies Council.

Naylor, P. (2005) Great British Marine Animals. Sound Diving Publications, Plymouth.

Phillips-seashore ?? (*No further details given*).

Marine Biodiversity and Ecosystem Functioning EU Network of Excellence (http://www.marbef.org)

Marine Life Information Network (www.marlin.ac.uk)

Encyclopaedia of Marine Life of Britain and Ireland (http://www.habitas.org.uk/marinelife/)

ii. **Sediment Identification/Classification Guides.** Just 3 of the participants used any form of sediment identification/classification guide. Two referred to the Wentworth Scale and only one to the other sediment classification aids provided in the 'Analysis Tools' as part of the Test 1 Information Pack.

iii. **Background References.** Two References other than the identification resources mentioned above were referred to by 4 of the respondents. These both related to biotope classification (Table 2.)

Table 2. Background references referred to during Test 1.

Irving, R. & Wood, C. (2007) The Seasearch Biotope Key (http://seasearch.wisshost.net/downloads/SeasearchBiotopeKeyDec07web.pdf)

The Marine Habitat Classification for Britain and Ireland (version 04.05) (http://www.jncc.gov.uk/page-1584)

Recommendation 5: Revise Reference List supplied as part of the Information Pack to include recommended species and biotope identification guides.

3.4 The Time taken to complete the Test

Not all participants entered the times taken to analyse each of the video clips. Instead some of them entered the time that they took, overall, to carry out the test. Of those who gave lengths of time to analysis each of the video clips, the time they took to analyse single, 1-minute clips ranged between 10 and 120 minutes (Table 3). The mean length of time taken to analyse the different video clips ranged between 29.1 (Clip 9) and 40 (Clip 5) minutes. The mean time taken by each of the different participants to analyse single video clips ranged between 15 and 60 minutes. However, there is some evidence that these times were essentially estimated. The times entered by 8 of the respondents were the same for each of the video clips they analysed. It is likely, therefore, that (a) the times were roughly estimated in retrospect, or (b) an overall time to carry out the full analysis (i.e. all 10 clips) was accurately measured and then divided by 10. There is little evidence that the times get shorter (with increased experience) throughout the Test.

Recommendation 6: Include a start time and end time entry box in the 'Feedback' form as a reminder for participants to accurately measure the length of time they take. This is important as, during a 'real' Test, assessing people's ability to carry out a piece of work to a particular budget, time will be critical.

Recommendation 7: Participants (or potential participants) should be made aware that it can take up to about an hour to analyse one minute of video clip.

Table 3. Time (in minutes) taken by the different participants to analyse each of the video clips.

Participant ID	Clip 1	Clip 2	Clip 3	Clip 4	Clip 5	Clip 6	Clip 7	Clip 8	Clip 9	Clip 10	Average per Clip	Total Time Taken
QAATA												300
QAATB												480
QAATC	60	60	50	40	30	30	30	30	30	30	**39**	390
QAATD	60	60	60	60	60	60	60	60	60	60	**60**	600
QAATE	60	50	45	45	45	45	45	45	45	40	**46.5**	465
QAATF												630
QALTA	20	25	20	25	10	10	15	30	10	10	**17.5**	175
QAMTA	45	40	45	25	40	15	25	35	15	40	**32.5**	325
QAMTB	60	60	60	40	60	30	50	60	30	60	**51**	510
QAMTC	60	60	60	60	120	60	20	60	60	30	**59**	590
QAKTA												960
QABTA	15	15	15	15	15	15	15	15	15	15	**15**	150
QANTA	45	45	45	45	45	45	45	45	45	45	**45**	450
QANTB	30	30	30	30	30	30	30	30	30	30	**30**	480
QAJTA	15	15	15	15	15	15	15	15	15	15	**15**	150
QACTA	20	20	20	20	20	20	20	20	20	20	**20**	200
QACTB	15	15	20	20	70	20	40	50	20	20	**29**	290
QADTA	50	40	40	40	40	40	40	30	30	30	**38**	390
QAFTA	10	10	10	10	10	10	10	10	10	10	**10**	220
QAHTA												
QANTA	30	30	30	30	30	30	30	30	30	30	**30**	300
	37.2	**35.9**	**35.3**	**32.5**	**40**	**29.7**	**30.6**	**35.3**	**29.1**	**30.3**		

3.5 Perceived 'Difficulty' of the Test

Four of the respondents did not complete this part of the Feedback form (Table 4). Of those who did complete the form, none of them found Test 1 easy. The largest number of them (8) found it 'moderately' onerous, while the others found it either 'quite' (5) or 'very' (4) onerous. However, the word 'onerous' is ambiguous and can be interpreted as meaning a variety of descriptions, including 'difficult', 'time-consuming', and 'tedious' and the responses given to this question may, therefore, be misleading.

Recommendation 8: the most appropriate word needs to be found to tease out whether or not participants actually found the Test 'difficult,' or whether they essentially found it a 'drag'. Since data relating to the length of time taken to complete the Test is provided elsewhere in the Feedback form, Test 2 should probably simply ask how 'difficult' participants found the Test.

Table 4. Responses to the question 'How onerous was the Test?'

'Onerous' Score	No data given	Not at all (1)	A bit (2)	Moderately (3)	Quite (4)	Very (5)
No. Of Participants	4			8	5	4

3.6 Habitat Details

3.6.1 Biological Zones

There was some difference of opinion between participants as to the biological zone that the video clips related to (Table 5). Three of the participants (QALTA, QAATD and QAMTC) each thought that one of the video clips (Sullom Voe 1, Sullom Voe 2 and Sullom Voe 2 respectively) covered two biological zones. The other respondents each recorded just one biological zone per video clip. The number of different biological zones allocated by the participants was higher than expected. Between them, they allocated all 4 of the zones to 2 of the video sites (Menai Straits 2 and Sullom Voe 2), 3 to 6 of the sites (Treshnish, Isle of Wight, Menai Straits 1, Poole Bay, North Norfolk 1 and North Norfolk 2) and 2 to the other 2 sites). In no case was there overall agreement as to which biological zone the video clip represented. The highest level of agreement between participants on this relatively straight-forward task, was 85.7%. This inconsistency is likely to have been due to the large range of experience between participants of seabed video. However, the fact that depth data relating to each video clip were not provided in this initial Test is also likely to have been a cause. One of the participants consistently omitted to complete this part of the data sheet and it is likely that he/she, understandably, was not prepared to do so because depth data were not available. Depth data often give a good indication of biological zone.

Recommendation 9: Depth data should form an important part of the video clip metadata given to participants in Test 2.

Table 5. Percentage number of participants who allocated the various Biological Zones to the10 different video clips.

	% Number of Participants scoring each Zone									
Video Clip	1	2	3	4	5	6	7	8	9	10
Site → **Biological Zone ↓**	Treshnish	Isle of Wight	Menai Straits 1	Menai Straits 2	Poole Bay	Sullom Voe 1	Sullom Voe 2	North Norfolk 1	North Norfolk 2	North Norfolk 3
Upper Infralittoral	0.0	0.0	4.8	14.3	14.3	85.7	14.3	0.0	0.0	0.0
Lower Infralittoral	4.8	4.8	42.9	9.5	52.4	9.5	23.8	9.5	14.3	0.0
Upper Circalittoral	23.8	28.6	57.1	33.3	28.6	0.0	52.4	28.6	9.5	14.3
Lower Circalittoral	66.7	61.9	0.0	38.1	0.0	0.0	4.8	52.4	66.7	71.4
1										
% Missing Entries	4.8	4.8	4.8	4.8	4.8	9.5	9.5	9.5	9.5	14.3
% Double Entries			-9.5			-4.8	**-4.8**			
Total %	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

3.6.2 % Substrate

The % Substrate data provided by respondents did not always add up to 100 as required, and so had to be rounded up or down for analysis purposes. This problem can be rectified in future if participants complete the forms on-line and the forms are configured so that they can be submitted only when the data adds up to 100.

Recommendation 10: The % Substrate data entry form should only be provided electronically and should be configured to prevent error in data entry, or participants should be asked to make sure that the data adds up to 100%.

There was clearly some general difficulty in the assessment of % composition of the substrate. In particular, participants struggled to complete sections relating to the grain size of the sand. This is understandable as it is virtually impossible to detect through video alone. This issue will be specifically addressed in Test 2.

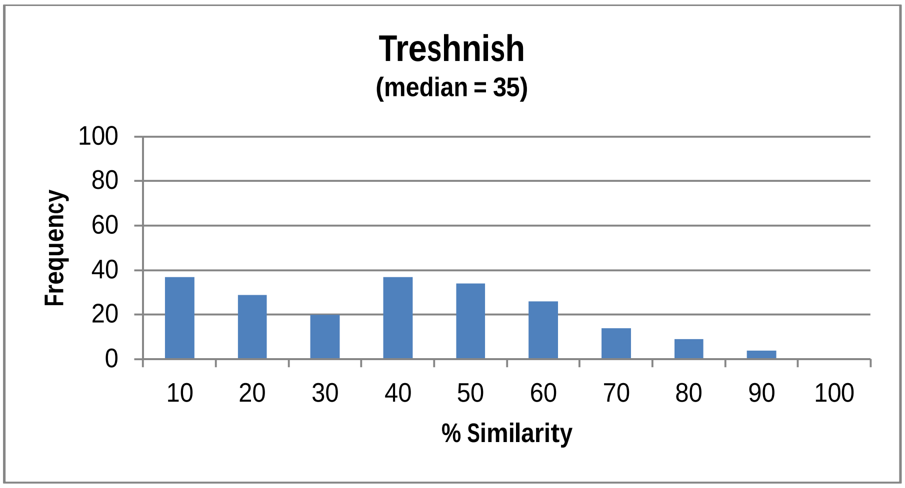
The substrate data were analysed using the Bray-Curtis similarity index in Primer™ v. 6.1.6. This shows that there was relatively little similarity between the abundance scores given by the different participants for the various substrate elements. Mean similarities between participants were highest for the Menai Straits 1 video (Clip 3) at as little as 60.5% (Table 6). Likewise, the median similarity was not higher than 60 for any of the video clips. Furthermore, the upper quartile benchmarks calculated for each of the video clips showed that these were also low. It was as low as 40% in the case of Sullom Voe 2 (Clip7), although in one case (Menai Straits 1 – Clip 3) it reached 75%. In no case was there an exact match between the set of scores given by any two participants. However, there were 95% matches in data for 5 of the video clips (Clips 3, 6, 7, 8 and 9).

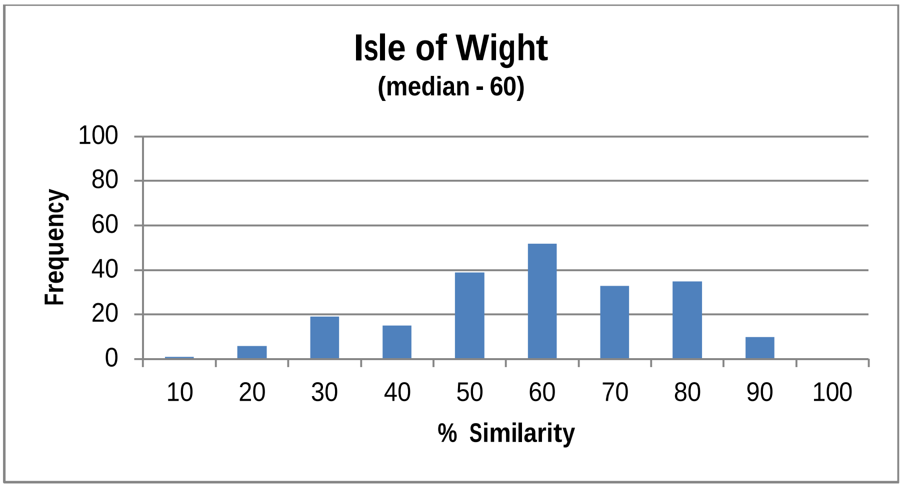
Table 6. Percentage similarities between the sets of abundances allocated for the different substrate types by participants for each of the 10 video clips.

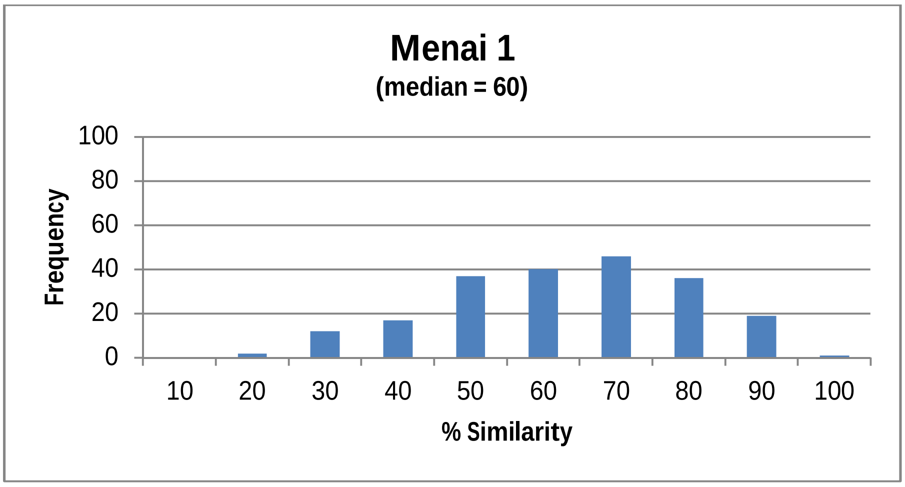
Video Clip	1	2	3	4	5	6	7	8	9	10
	Treshnish	Isle of Wight	Menai Straits 1	Menai Straits 2	Poole Bay	Sullom Voe 1	Sullom Voe 2	North Norfolk 1	North Norfolk 2	North Norfolk 3
Average	35.8	56.4	60.5	49.2	39	36.5	25.8	40.1	34.1	34
Median	35	60	60	50	36	25	15	40	35	32.5
Upper Quartile	50.8	70	75	64	53.8	70	40	65	50	50
Maximum	90	90	95	90	90	95	95	95	95	88.5

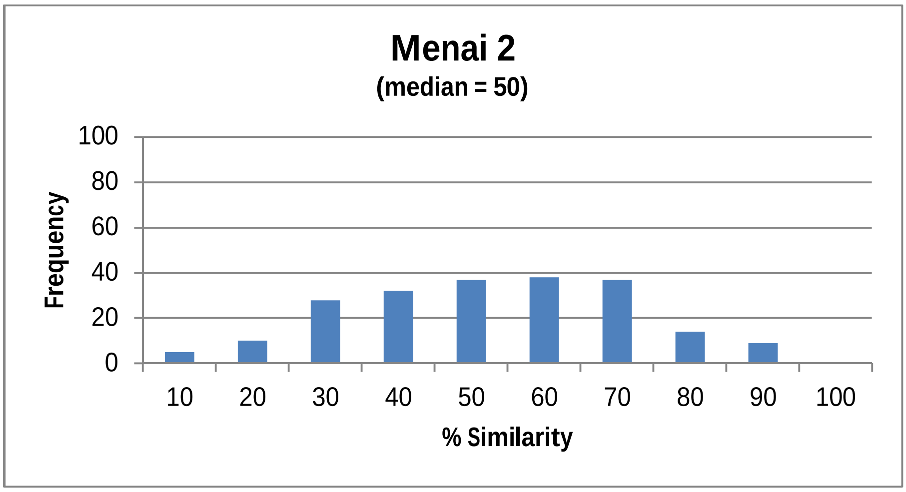
The spread of frequency of similarities is represented in Figures 1(a-j).

Figures 1 (a-j). Frequency of % similarities of responses between individual participants.

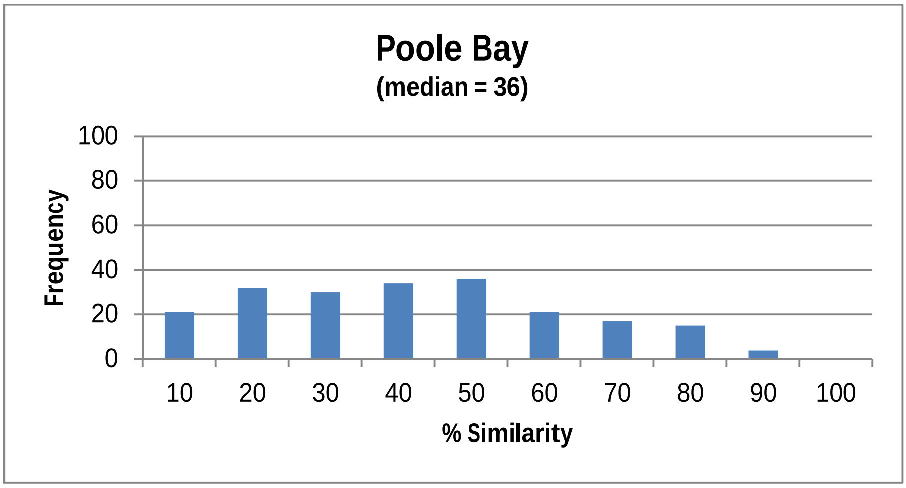
(a)


(b)


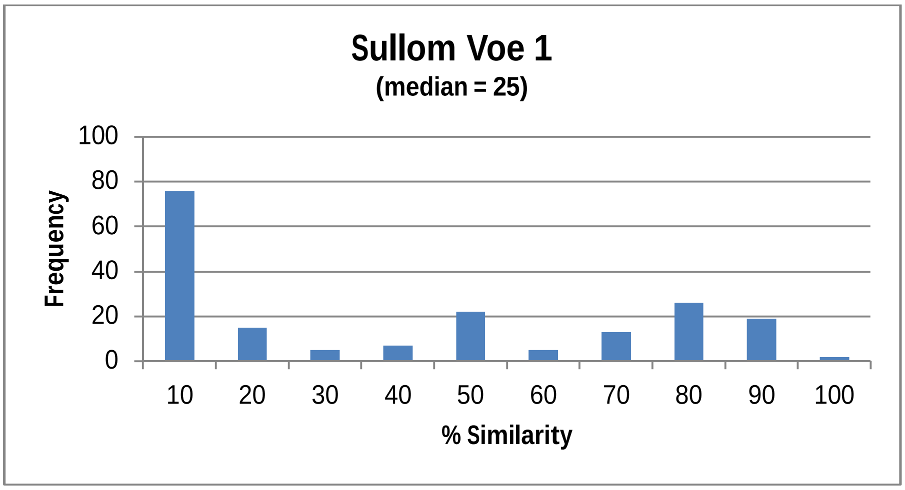
(c)



Menai 2
(median = 50)
Frequency
100
80
60
40
20
0
10 20 30 40 50 60 70 80 90 100
% Similarity

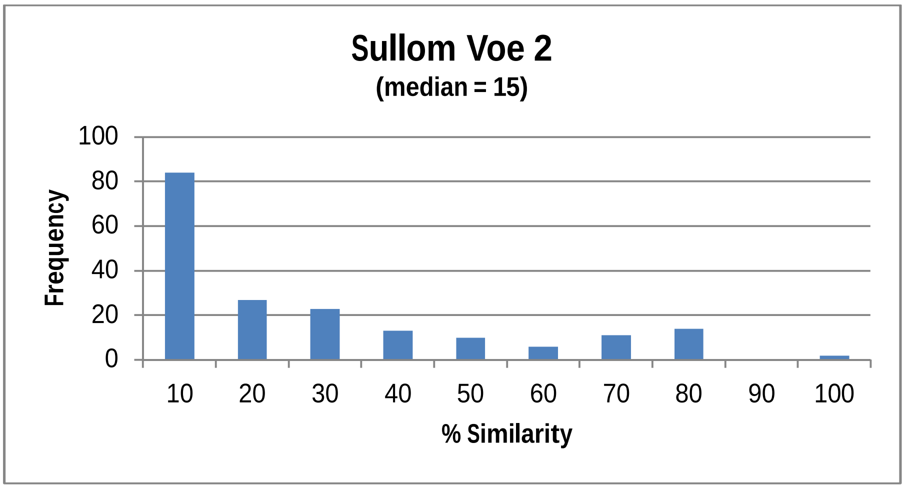
(d)


Poole Bay
(median = 36)
Frequency
100
80
60
40
20
0
10 20 30 40 50 60 70 80 90 100
% Similarity

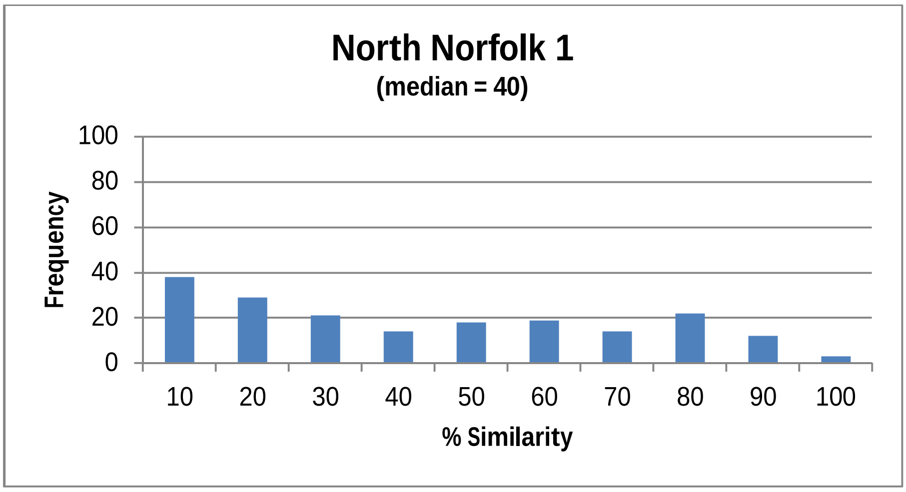
(e)


Sullom Voe 1
(median = 25)
Frequency
100
80
60
40
20
0
10 20 30 40 50 60 70 80 90 100
% Similarity

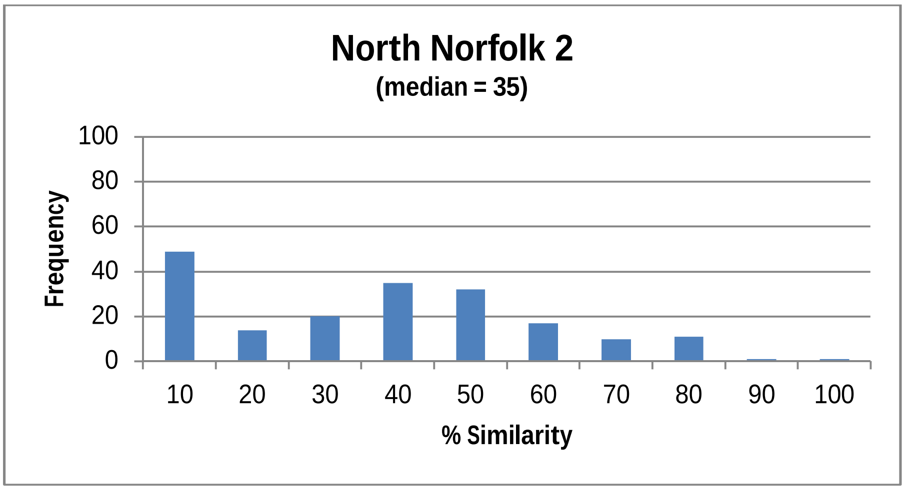
(f)


Sullom Voe 2
(median = 15)
Frequency
100
80
60
40
20
0
10
20
30
40
50
60
70
80
90
100
% Similarity

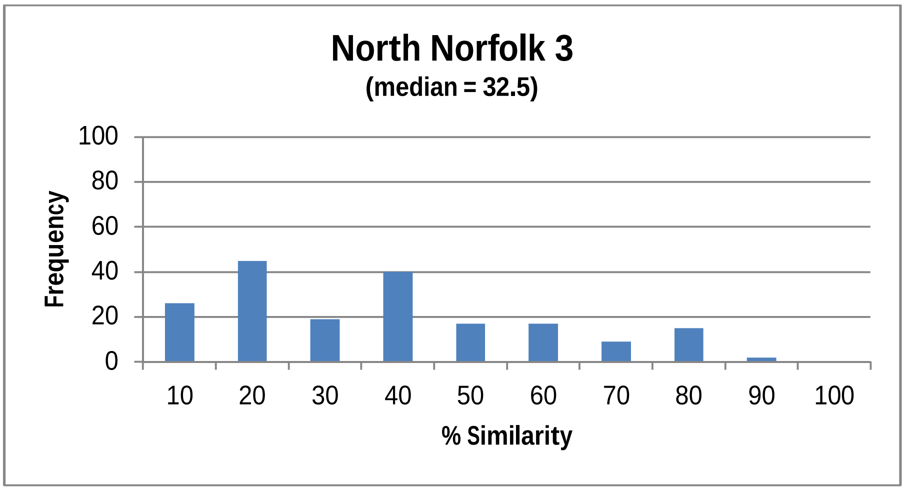
(g)


North Norfolk 1
(median = 40)
Frequency
100
80
60
40
20
0
10
20
30
40
50
60
70
80
90
100
% Similarity

(h)


North Norfolk 2
(median = 35)
Frequency
100
80
60
40
20
0
10
20
30
40
50
60
70
80
90
100
% Similarity

(i)

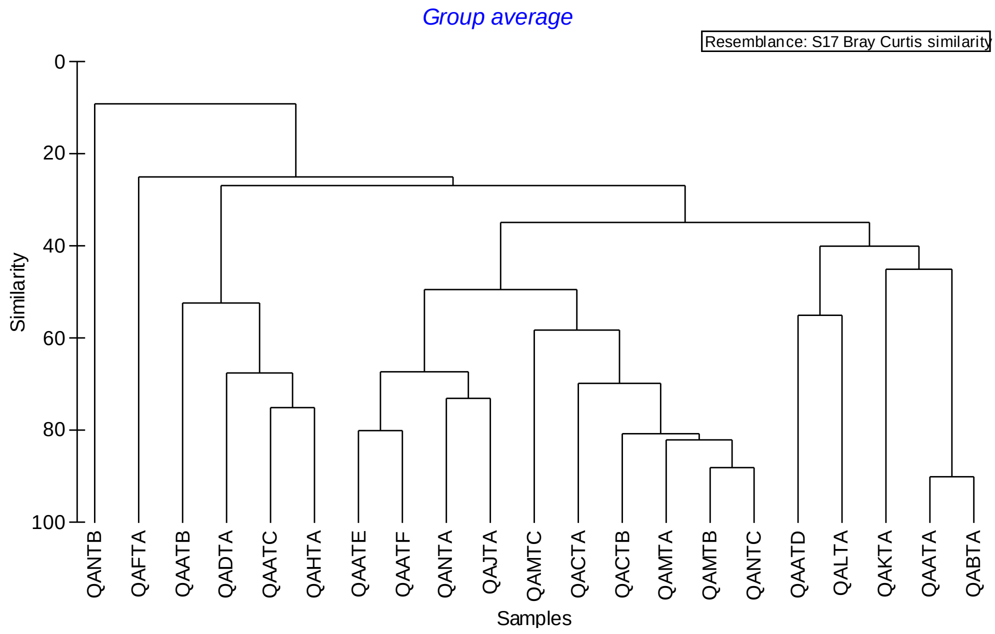


(j)

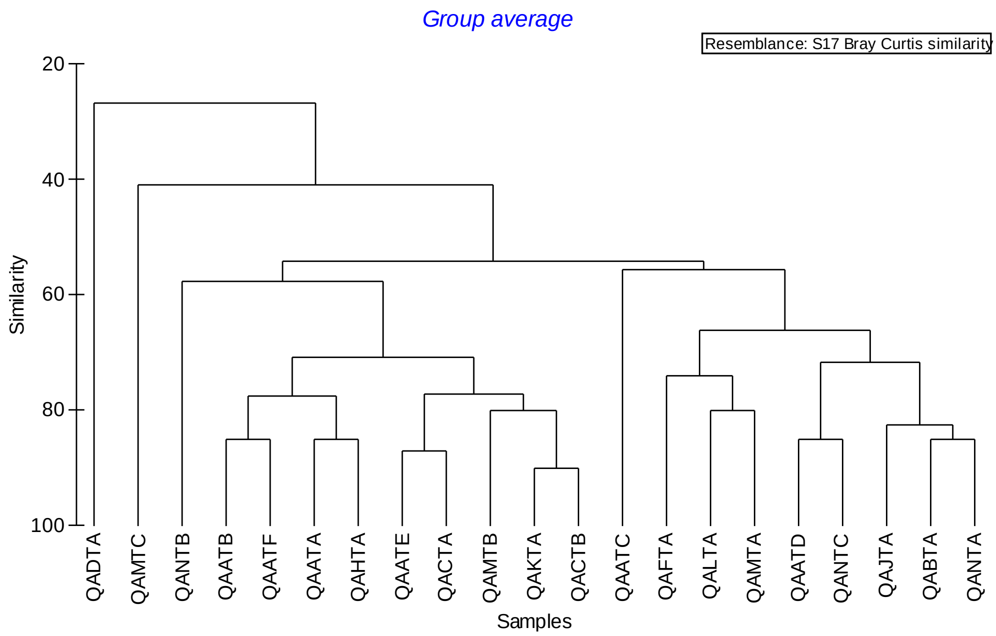
The similarity relationships between different participants are represented in the dendrograms in Figures 2 (a-j). Participants will be able to judge their own position relative to the others by studying these. Interestingly, there was little evidence of clustering of different participants from the same organisation.

Figures 2 (a-j) Dendrograms representing the levels of similarity between the participants' substrate data.

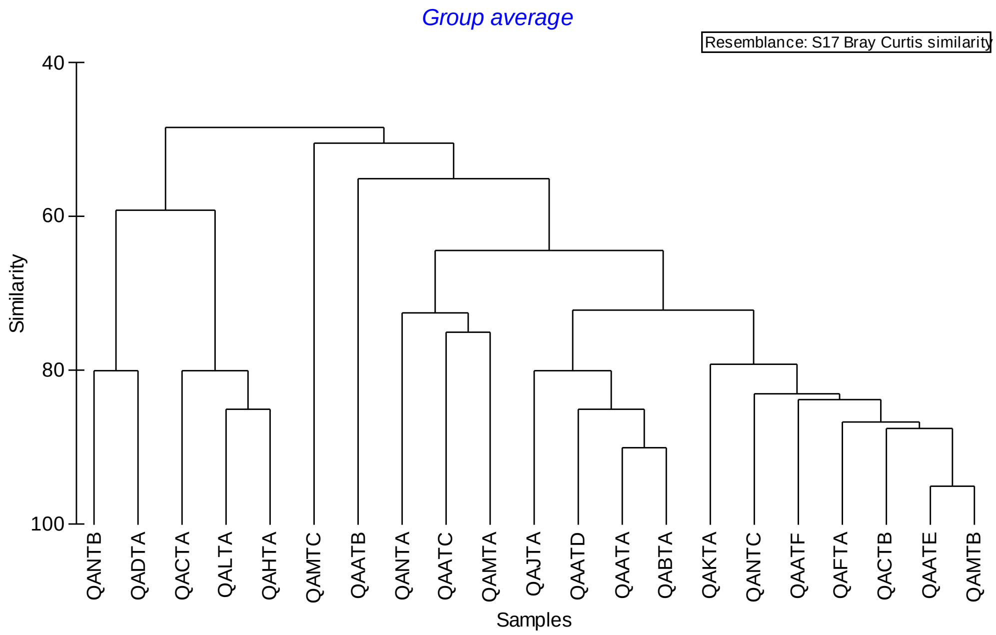
(a) Treshnish



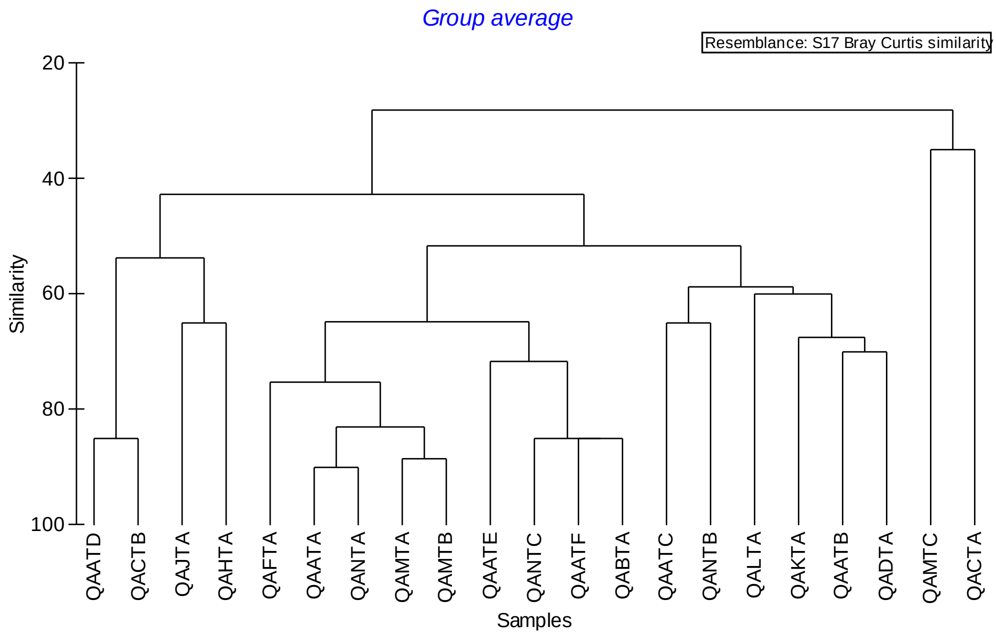
(b) Isle of Wight



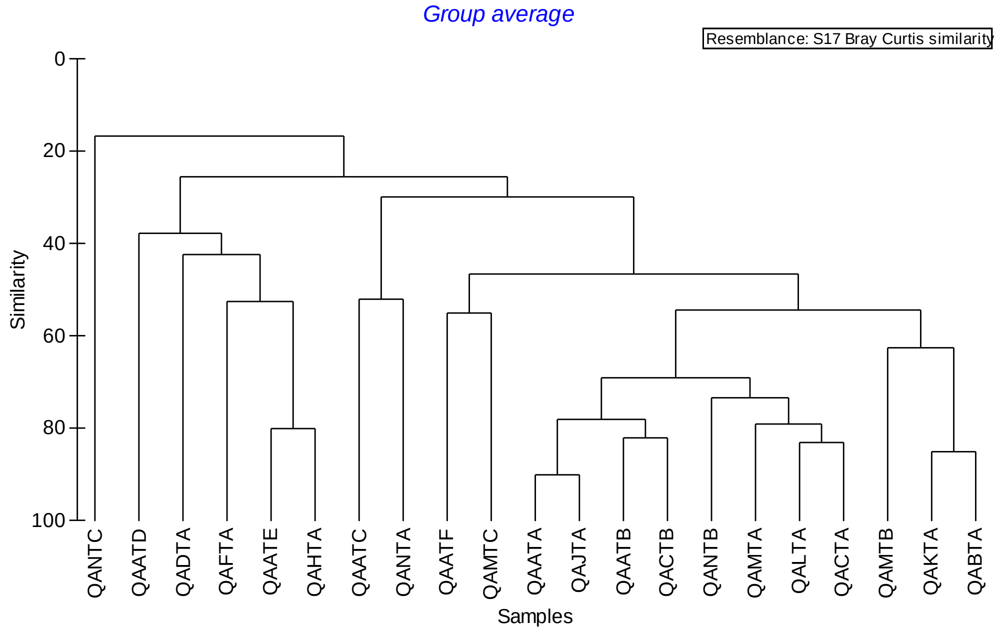
(c) Menai 1



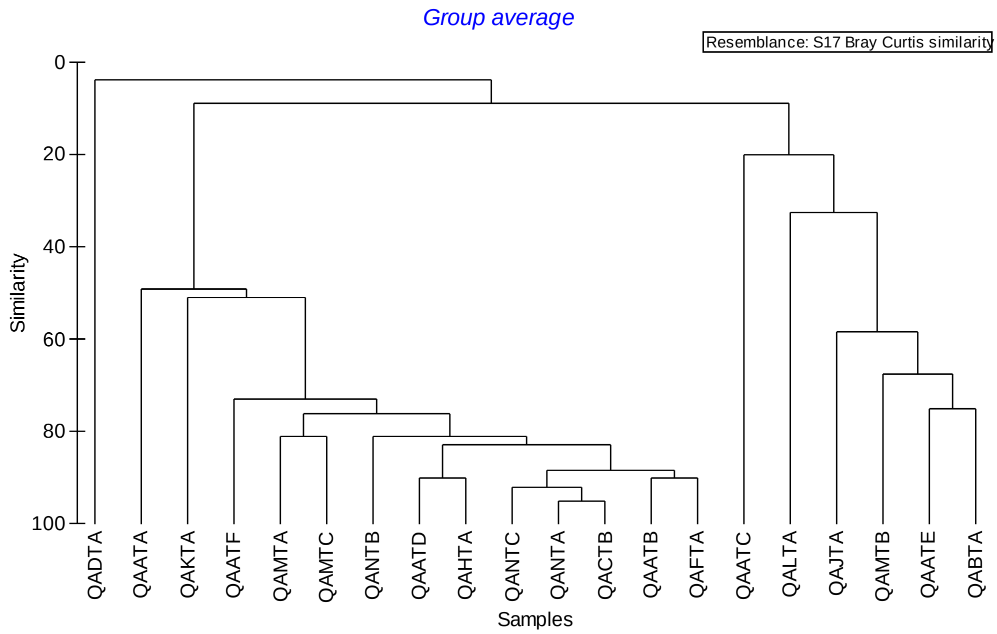
(d) Menai 2



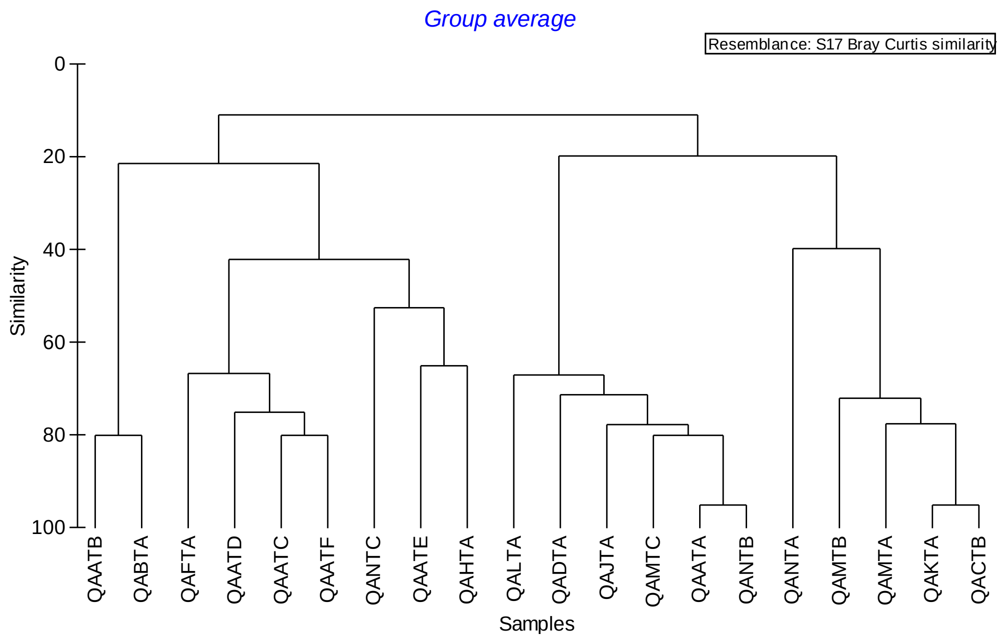
(e) Poole



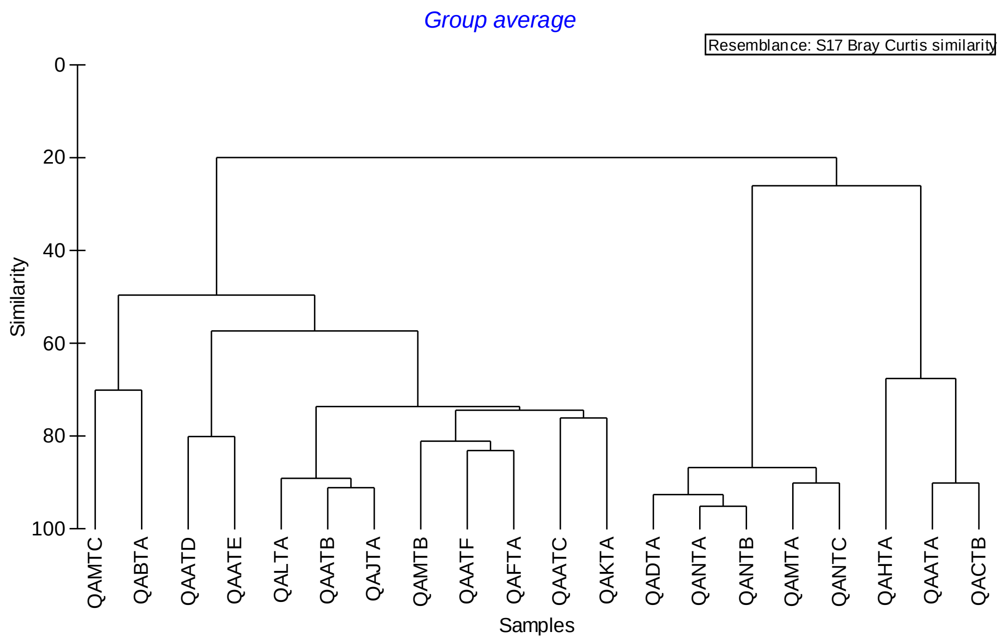
(f) Sullom Voe 1



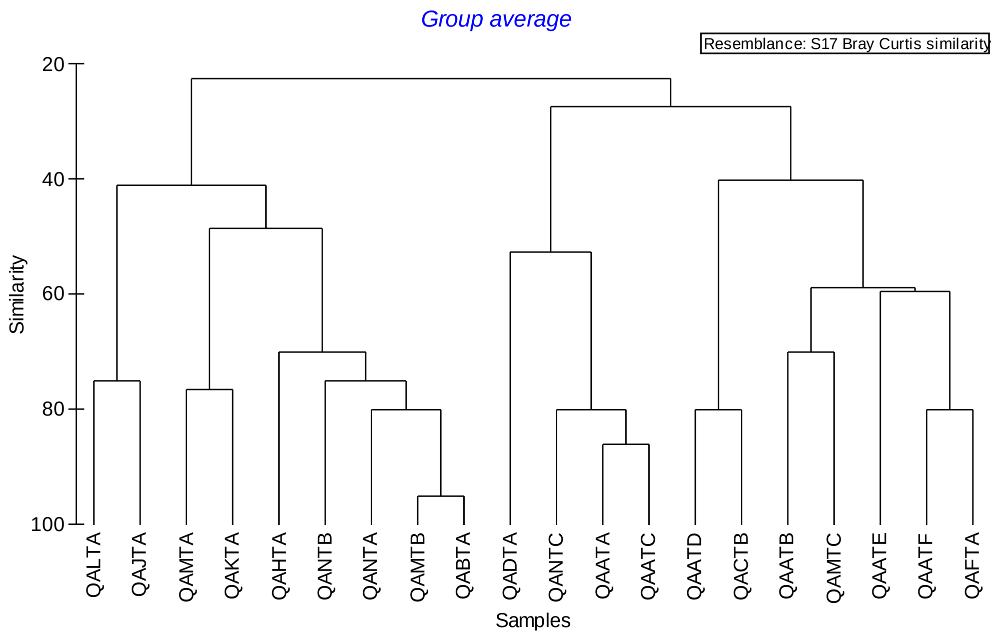
(g) Sullom Voe 2



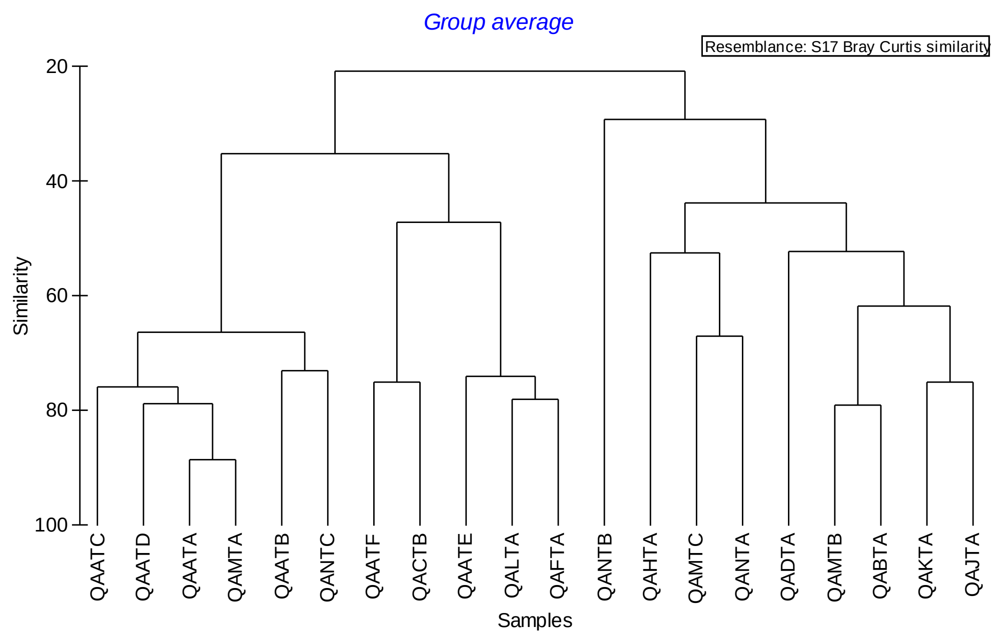
(h) North Norfolk Coast 1



(i) North Norfolk Coast 2



(j) North Norfolk Coast 3



3.6.3 Rock features (scale 1-5)

Participants were asked to score the extent of various rock features on a scale of 1-5. In many instances no data was entered (Table 7) and so no detailed analysis took place. In most cases, this lack of data is clearly because there was very little bedrock or boulder in the video. However, it does raise the question of how to deal with blank entries. Are they blank because there was no such feature or because respondents have omitted to enter the detail? Should there have been a scale of 0-5 and should all blanks be taken as '0'? Inclusion of these features in video assessment may need to be re-considered before the next Test.

Recommendation 11: The value of including of some of the 'Rock Features' in video assessment may need to be re-considered. If included, they should be scored on a scale of 0-5 rather than 1-5, and further guidance should be provided on using these scales.

Table 7. Percentage missing entries relating to Rock Features for each of the video clips.

Video Clip	1	2	3	4	5	6	7	8	9	10
Site	Tresh-nish	Isle of Wight	Menai 1	Menai 2	Poole Bay	Sullom Voe 1	Sullom Voe 2	North Norfolk 1	North Norfolk 2	North Norfolk 3
% Missing Entries	9.5	3.2	6.3	9.5	11.1	68.3	74.6	74.6	60.3	27.0

3.6.4 Rock features (p/a)

There was considerable variability amongst participants as to which rock features they recorded. Some participants recorded the presence of several rock features, whereas others recorded only 1, or even none for the same video clip. The assumption is that if a rock feature is present, then all participants should record it as 'present'; if it is not present, then it should not be recorded (or, ideally it should be recorded as 'absent'). Thus the scores for each of the rock features should either have been 21 (the total number of respondents) x 'present' or 21 x 'absent'. This was not the case (Table 8.) There was a range of numbers of scores indicating the presence of a feature. In no case was a feature scored as 'present' by all 21 participants. 13 of the respondents did not use the 'absent' score; instead the response cells on the data sheet were left blank. It was impossible, therefore, to know if respondents had decided that a particular feature was not present, or if they had simply not fully completed the data sheet. The lack of a complete data set means that the data provided cannot be fully analysed.

Recommendation 12: Instructions for completion of the 'Habitat and Substrate' Data Sheet should include the need to allocate either a 'present' or 'absent' score for each 'Rock feature' listed. As suggested in **Recommendation 10:** (above), it may be possible to configure an electronic version of the 'Habitat and Substrate' Data Entry Form such that it does not allow blank cells.

Table 8. Number of scores, indicating the presence of the various rock features, given by participants.

Video Clip	1	2	3	4	5	6	7	8	9	10
Site →	Tresh-nish	Isle of Wight	Menai Straits 1	Menai Straits 2	Poole Bay	Sullom Voe 1	Sullom Voe 2	North Norfolk 1	North Norfolk 2	North Norfolk 3
Rock Features ↓										
Fissures	2	6	2	5	4	0	0	0	0	0
Gully	0	3	1	0	1	0	0	0	0	0
Cave	0	2	1	1	0	0	0	0	0	0
Tunnel	0	1	1	1	0	0	0	0	0	0
Boulder/Cobble on Rock	1	17	14	16	13	1	0	0	0	0
Boulder/Cobble on Sediment	12	7	11	10	12	5	2	1	3	15
Boulder Holes	0	4	1	0	0	0	0	0	1	1
Scour	5	1	2	1	3	0	0	0	2	2
Sediment on Rock	0	2	2	1	14	3	0	0	1	1

3.6.5 Sediment features (scale 1-5)

Only one 'Sediment feature' (surface relief) was included in this section of the data form. Even so, there was significant variability within the responses. The range of scores given for 'evenness' of surface relief covered at least 3 categories for each of the video clips (Table 9). Again, some of the returns were left blank for this feature. Thus, it was not possible to determine if this was because there was no feature, or because participants simply did not complete the data sheet.

Recommendation 13: Sediment features should be scored on a scale of 0-5, rather than 1-5, and further guidance should be provided on using these scales.

Table 9. Range of scores given to indicate the degree of 'evenness' of the sediment surface for the different video clips.

Video Clip	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Site	**Tresh-**	**Isle of**	**Menai**	**Menai**	**Poole**	**Sullom**	**Sullom**	**North**	**North**	**North**

	nish	Wight	Straits 1	Straits 2	Bay	Voe 1	Voe 2	Norfolk 1	Norfolk 2	Norfolk 3
Range of Score given for Evenness (scale 1-5)	1 - 4	3 - 5	2 - 5	2 – 5	1 - 4	1 - 5	1 – 5	1 - 4	1 - 4	1 - 5

3.6.6 Sediment features (p/a)

The comments, including the recommendations, given in section d. (Rock features) above, also apply to this section (obviously, replacing 'Rock feature' with 'Sediment feature') (see Table 10) and so no further detail is given here.

10. Number of scores, indicating the presence of the various sediment features, given by participants.

Video Clip	1	2	3	4	5	6	7	8	9	10
Site →	Tresh-nish	Isle of Wight	Menai Straits 1	Menai Straits 2	Poole Bay	Sullom Voe 1	Sullom Voe 2	North Norfolk 1	North Norfolk 2	North Norfolk 3
Mounds/Casts	1	0	0	0	1	1	1	6	7	2
Burrows/Holes	0	0	0	0	1	1	3	9	4	1
Tubes	8	1	3	2	1	0	3	17	9	0
Algal Mat	0	0	5	0	5	5	4	0	0	0
Waves/Dunes	4	0	0	0	2	0	0	0	7	4
Ripples	3	0	0	0	0	0	1	1	17	17

3.7 Life Form

3.7.1 Life Form Name

There was a strikingly high number of different Life Forms recorded within video clips. In only one of the video clips (Clip 6 - Sullom Voe 1) did participants agree on the Life Form present (Table 12 and see also Table 11 for Life Form codes.) The number of Life Forms allocated for the other 9 clips ranged between 3 and 9. The participants have clearly not been consistent in their responses to this part of the Test. One respondent (QAMTA) did not allocate any Life Form category (Table 12), and two (QABTA and QAJTA) recorded multiple Life Forms. In addition, several of the participants did not distinguish between 'Tall' and 'Short' Faunal Turf, recording only 'Faunal Turf'. It would appear that those involved in this development scheme interpret Life Forms differently from one another, probably as a result of different levels/types of benthic experience. It is likely that some of them are not fully familiar with the different Life Forms. While it is understandable that certain features have been recorded as several different Life Forms (e.g. 'short faunal turf' and 'faunal bed' for *Mytilus* beds, and 'biogenic structure' and 'tubes in sediment' for *Sabellaria* reef), there will need to be a recognised consensus relating to such features if video analysis is to be meaningful. It is evident from this initial Test (1) that the participants are not using the same baseline for their assessment. This clearly needs to be addressed during the development of the video analysis quality control Test. People applying to sit the 'Quality Control' Test will be expected to be familiar with the different Life Forms, preferably through specific training, before they do so.

Table 11. Codes allocated to the different Life Forms listed in the 'Analysis Tools' section of the Information Pack provided with this Test.

Life Forms	**Code allocated for analysis purposes**
Algal Forest	A
Algal Shrub	B
Algal Turf	C
Algal Mat	D

Algal/Sand Accretion	E
Algal Crust	F
Maerl	G
Sea Grass	H
Mixed Algal/Faunal Turf	I
Mixed Algal/Faunal Crust	J
Tall Faunal Turf	K
Short Faunal Turf	L
Faunal Crust	M
Fauna Resting on Sea Floor	N
Faunal Bed	O
Biogenic structure (e.g. reef)	P
Tubes in sediment	Q

Table 12. Life Form codes (see Table 11 above) representing the Life Forms allocated by the different participants for each of the video clips.

Video Clip	1	2	3	4	5	6	7	8	9	10
Site → / Participant ↓	Tresh-nish	Isle of Wight	Menai Straits 1	Menai Straits 2	Poole Bay	Sullom Voe 1	Sullom Voe 2	North Norfolk 1	North Norfolk 2	North Norfolk 3
QAATA	M	M	J	P	J	A		Q	P	L
QAATB	K,L	L	I	O	J	A	I	N	P	L
QAATC	K,L	I	I	P	C					
QAATD	L	M	M	M	C	A	I	Q	P	L
QAATE	L	L	I	L						
QAATF	L	K,L	I	M	I	A	K	P	P	N
QALTA	K,L	L	I	I	K,L	A				
QAMTA										
QAMTB	K	K	L	L	F	A	K	L	P	K
QAMTC	R	K	I	P	C	A	K	P	P	K
QAKTA	K	K	I	O	J	A	K	Q	P	K
QABTA	K,L,M,Q	K,L,M	I	O,P	E	A	K	Q	P	K,L
QANTA	J	J	J	O	J	A	I	J	P	O
QANTB	Q	M	M	O	C	A	N	P		N
QAJTA	L,Q	K,L,M	I,M	P,N,L	I,J	A	O	Q	P,N	O
QACTA	K	L	I	O	I					
QACTB	K	L	K	P	J	A	O	P	P	O
QADTA	L	L	I	P	E	A	S	Q	P	N
QAFTA	G	L	L	O	J	A			P	
QAHTA	I	I	I	I	I	A	K	J		
QANTA	K	L	J	O	F	A	N	J	Q	N
No. of Life Forms recorded	9	5	5	6	7	1	6	5	3	4
No. of missing entries	1	1	1	1	2	4	7	6	7	7

Recommendation 14: Video clips selected specifically to include particular Life Forms need to be provided, so that it is possible to assess how accurate participants have been in their assessments of this feature.

Recommendation 15: Instructions should specifically include the need to complete the Life Form category on the data entry form.

Recommendation 16: There should be a requirement for people to be familiar with the range of Life Forms described for the British Isles before applying to sit a 'Quality Control' Test.

Recommendation 17: Descriptions of Life Forms (e.g. Richards *et al*., 1995) should be included in the Information Pack provided to candidates. (Currently, there appears to be a lack of literature describing these for the British Isles).

3.7.2 Life Form Abundance

The results show that it was unclear to the participants what scale of abundance should be used. Some of them used the SACFOR scale, while others used % assessments. This, together with the fact that they assessed the type of Life Forms differently (see Section 7a above), means that further analysis of this section would not be worthwhile.

Recommendation 18: Instructions regarding completion of estimated abundances of 'Life Forms' on the data entry sheet need to be clarified for Test 2.

3.8 Biotope Allocation

Participants often did not complete this part of the data entry form. Also, several of the respondents, who had not realised that there were electronic versions of the data entry forms available to them, had hand-written the names of the biotopes they allocated in the small 'box' on the hard copy of the form sent to them; in many cases this was hard to read.

Recommendation 19: Instructions to participants must include the need to complete this section of the Test.

Recommendation 20: As has already been recognised (sections 6b. and 6d. above), data entry forms for the Test will, in future, need to be in electronic form only to ensure a response, but also so as to allow the amount of space required for completion as required.

A wide variety of biotopes were allocated. Between 3 and 9 were recorded for each of the video clips (Table 13) even though the clips were only of a 1-minute duration. It is also of note that these were often at different levels in the Habitat Classification Hierarchy (see www.jncc.gov.uk/MarineHabitatClassification).

Table 13. Number of different Biotopes allocated by participants for each of the video clips.

Video Clip No.	Site	No. of different Biotopes allocated
1	Treshnish	6
2	Isle of Wight	4
3	Menai Straits 1	6
4	Menai Straits 2	3
5	Poole Bay	9
6	Sullom Voe 1	7
7	Sullom Voe 2	5
8	North Norfolk 1	7
9	North Norfolk 2	3
10	North Norfolk 3	7

Table 14. Numbers of participants allocating the different biotopes for video clips 1-3.

Video Clip No.	**Site**	**Biotope Names allocated**	**Participants allocating Biotopes**	**No. of Participants allocating Biotope**
1	Treshnish	None	QAATB, QAATC, QAATD, QAATE, QALTA, QABTA, QANTA, QANTB, QAFTA, QANTA	10
		Circa-littoral mixed substrata	QAATA	1
		Circa-littoral Rock	QAATF	1
		High energy circalittoral rock	QACTA	1
		Circalittoral coarse sediment	QAMTA, QAMTB, QAMTC, QAKTA, QAJTA, QAHTA	6
		Circalittoral mixed sediment	QACTB	1
		Mixed faunal turf community	QADTA	1
2	Isle of Wight	None	QAATA, QAATB, QAATC, QAATD, QAATE, QALTA, QABTA, QANTA, QANTB, QAFTA, QAHTA	11
		Circalittoral Rock	QAATF, QACTA, QAHTA	3
		Mixed Faunal Turf	QAMTA, QAMTB, QAMTC, QACTB	4
		Sparse sponges, *Nemertesia* spp. and *Alcyonidium diaphanum* on circa-littoral substrata	QAKTA, QADTA,	2
		Flustra foliacea on slightly scoured silty circa-littoral rock	QAJTA,	1
3	Menai Straits 1	None	QAATA, QAATB, QAATC, QAATD, QAATE, QALTA, QABTA, QANTA, QANTB, QAFTA, QANTA	11
		Circa-littoral Rock	QAATF, QAHTA	2
		Very tide swept faunal communities	QAMTA	1
		Mixed faunal turf communities	QAMTB	1
		Foliose red seaweed on exposed lower infralittoral rock	QAMTC, QACTA, QACTB, QAJTA	4
		High energy infralittoral rock	QAKTA	1
		Anemones, including *Corynactis viridis*, crustose sponges and colonial ascidians on very wave exposed or wave surged vertical infralittoral rock	QADTA,	1

It would appear that the respondents were often reluctant to allocate Biotopes. Many of them did not allocate any biotopes at all. For the first three video clips alone only around half of them did so (Table 14.). Those who did so were often unsure of their assessment. Confidence Levels in Biotope allocation ranged throughout the scale (1-5: low to high) for 7 of the video clips, and the median confidence level score tended to be '3' or '4', rather than the fully confident '5'(Table 15). This relative lack of confidence in biotope evaluation is a common feature of benthic analysis generally (J F-S - personal observation) and this is something that will need to be properly addressed as part of this development scheme. Some projects involving benthic video analysis may not necessarily require the allocation of Biotopes, but, where allocation of biotopes is a requirement for the aims of particular project, analysers will certainly need to be familiar with these (e.g. as outlined in Connor *et al*., 2004). Biotope assignment should form an important part of the video analysis assessment. There may well be a need for focused training schemes to rectify this issue.

Recommendation 21: Consider the need nationally to provide training for the proper evaluation of biotopes. Biotope recognition training may even need to be a pre-requisite for sitting the video analysis assessment Test.

Table 15. Summary of 'Confidence Levels' for Biotope allocation given by participants.

Video Clip No.	Site	Range of 'Confidence Level' scores for allocation of Biotopes (scale 1-5: low – high)	Median 'Confidence Level' scores for allocation of Biotopes
1	Treshnish	1-5	3
2	Isle of Wight	1-5	4
3	Menai Straits 1	1-5	3
4	Menai Straits 2	1-5	4
5	Poole Bay	1-5	2.5
6	Sullom Voe 1	2-5	3.5
7	Sullom Voe 2	1-5	4
8	North Norfolk 1	2-5	3
9	North Norfolk 2	2-5	4
10	North Norfolk 3	1-5	3

In addition, it may be that the short duration of the video clips (1 minute) simply did not provide sufficient information to properly assess biotopes.

Recommendation 22: Increase duration of video clips provided for Test 2.

3.9 Quality of video clips

The 'quality' of the video clips provided for analysis, as judged by the participants, has not been fully analysed for this interim report, due to questions arising over the issue of whether each video clip is 'fit for purpose' or not. A video clip of a certain quality might be entirely sufficient for one purpose (e.g. habitat classification) but not for another (e.g. species diversity assessment). Suffice at this stage is to mention that there was characteristic variation in the data produced in this section, ranging through the whole spectrum of poor/moderate/good for each of the video clips.

3.10 Species Data

60% of respondents approached the completion of the 'species data' form accurately, by entering the names (to species or generic level) of the species they recognised in the 'Species Name' column and, if they could not identify the species, by entering them under the relevant higher taxonomic category in the 'generic taxonomic description' column. 40% of respondents appeared to misunderstand the instructions and included all taxonomic levels in the 'Species Name' column. Use of the word 'Generic' for groups such as 'Bryozoa', or 'orange sponge' on the Species data entry form is confusing - the term 'Higher Taxonomic Description' should be used instead.

Recommendation 23: The instructions for completing the 'Species data entry form' need to be more clear with a better explanation of what is required.

One participant did not use the SACFOR abundance scale, but instead used 'very high-very low'. Participants often omitted to include an abundance score for some of the species they listed.

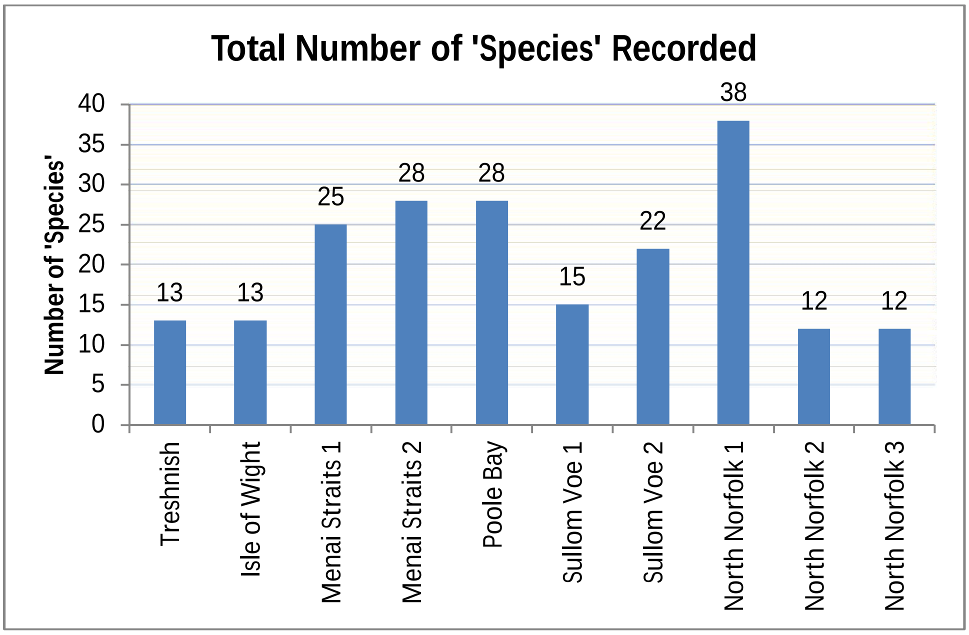
Recommendation 24: The requirement to check the species abundance entries needs to be emphasised and an electronic data entry form, that does not allow blank cells, should be provided for in future Tests.

Overall, 124 organisms, identified to either generic or specific level, were recorded from the 10 video clips by the participants (Appendix 2).

However, this figure is likely to be an over-representation because, while some respondents identified organisms to the species level, others may have identified the same ones only to the generic level (e.g. *Pagurus bernhardus* v. *Pagurus* sp., or *Spirorbis spirobis* v. *Spirorbis* sp.).

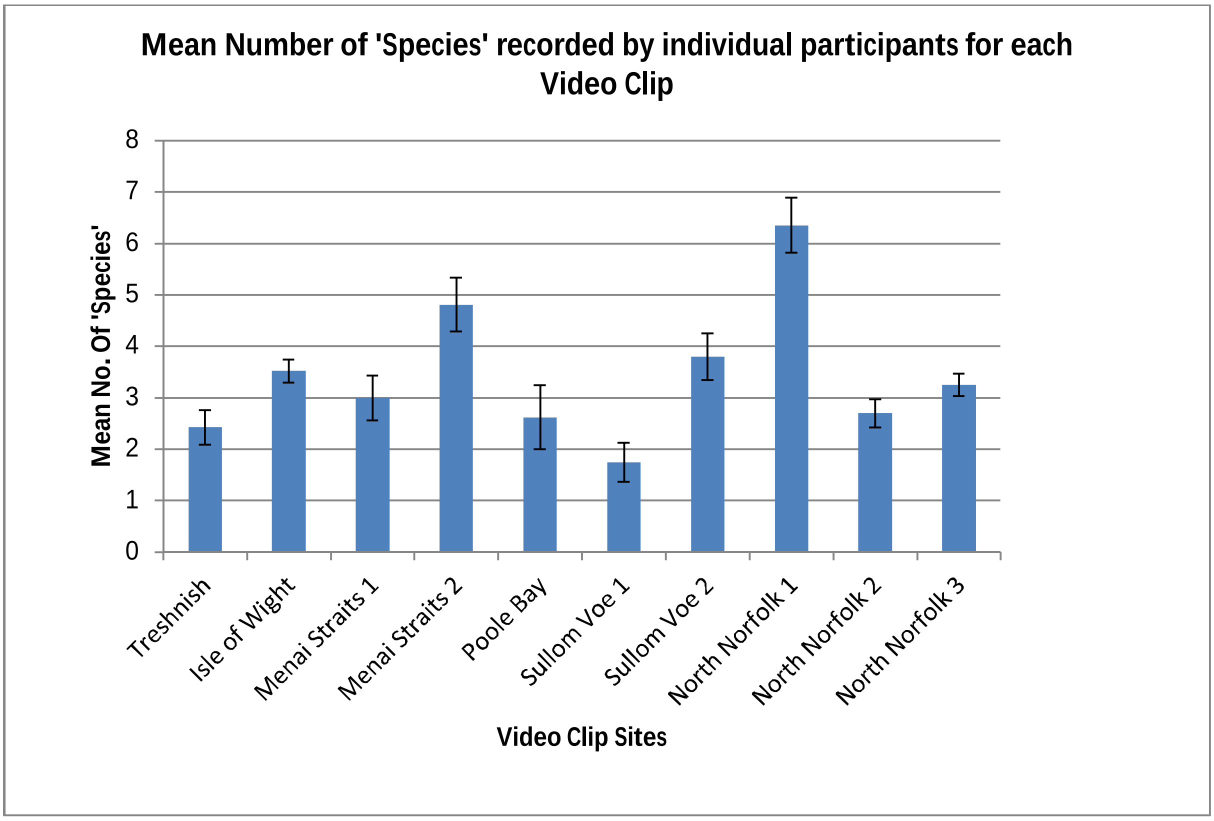
The numbers of organisms (referred to here as 'species') recorded for the different video clips ranged between 12 and 38 (Figure 3).

Figure 3. Number of different 'species' recorded for the different video clips.



Interestingly, however, the number of species recorded by individual respondents was much lower than the total number of different species noted for each video clip (Figure 4; See also Appendix3).

Figure 4. The Mean Number of 'Species' recorded by individual participants for each Video Clip.



This was because the different respondents were ‘recognising’ different sets of species.

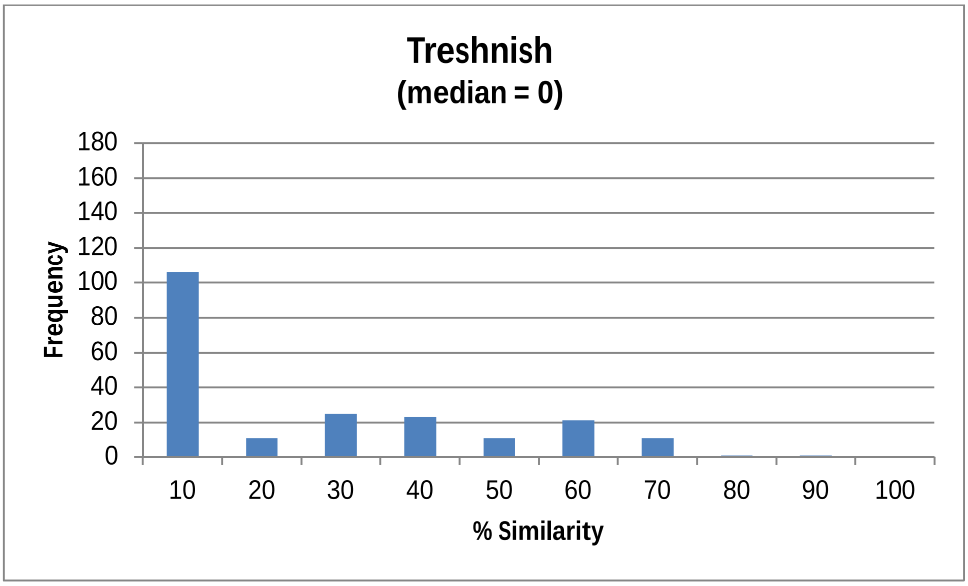
Like the substrate data, the species data were analysed using the Bray-Curtis similarity index in Primer™ v. 6.1.6. This shows that there was relatively little similarity between the abundance scores given by the different participants for the various 'species'. Mean similarities between participants were highest for the Isle of Wight video (Clip 2) at as little as 66% (Table 16). Overall, the % similarity median (i.e. half of the % similarity scores) was very low. There was no similarity at all between at least half of the respondents in 4 of the video clips (Clips 1, 3, 5 & 6). However, at least half of the similarity scores between participants were over 60% in 2 of the video clips (72% for Clip 2 (Isle of Wight) and 61.7% for Clip 4 (Menai Straits 2). The upper quartile benchmarks (representing the level at which the top 25% of the similarity scores 'cut off') calculated for each of the video clips showed that these were also low. It was as low as 9.1% in the case of Poole Bay (Clip 5), although it was higher than 60% in four cases (Isle of Wight – Clip 2; Menai Straits 2 – Clip 4; North Norfolk 2 – Clip 9 and North Norfolk 3 – Clip 10). There was an exact (100%) match between the set of abundance scores given by at least one pair of participants in each of 6 of the video clips (Clips 2, 4, 6, 7, 9 and 10).

Table 16. Percentage similarities between the sets of abundances allocated for the 'species' recorded by the participants for each of the 10 video clips.

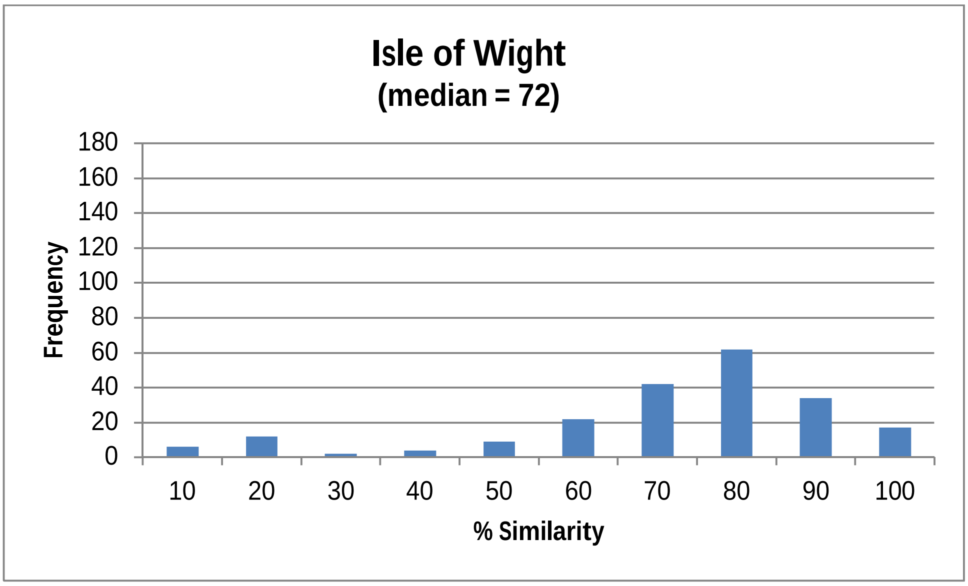
SITE	Tresh-nish	Isle of Wight	Menai Straits 1	Menai Straits 2	Poole Bay	Sullom Voe 1	Sullom Voe 2	North Norfolk 1	North Norfolk 2	North Norfolk 3
Video Clip	1	2	3	4	5	6	7	8	9	10
Average	20.2	66.0	12.6	57.7	7.8	9.2	43.4	25.5	37.0	50.4
Median	0	72	0	61.7	0	0	44.4	25.6	29.3	56
Upper Quartile	36.9	80	20	73.2	9.1	0	55.9	40.9	66.1	69.5
Maximum	90	100	84.8	100	60.9	100	100	81.5	100	100

Figures 5(a-j) indicate the spread of degree of similarity between respondents in the abundance scores that they allocated for the 'species' that they 'identified' from the different video clips.

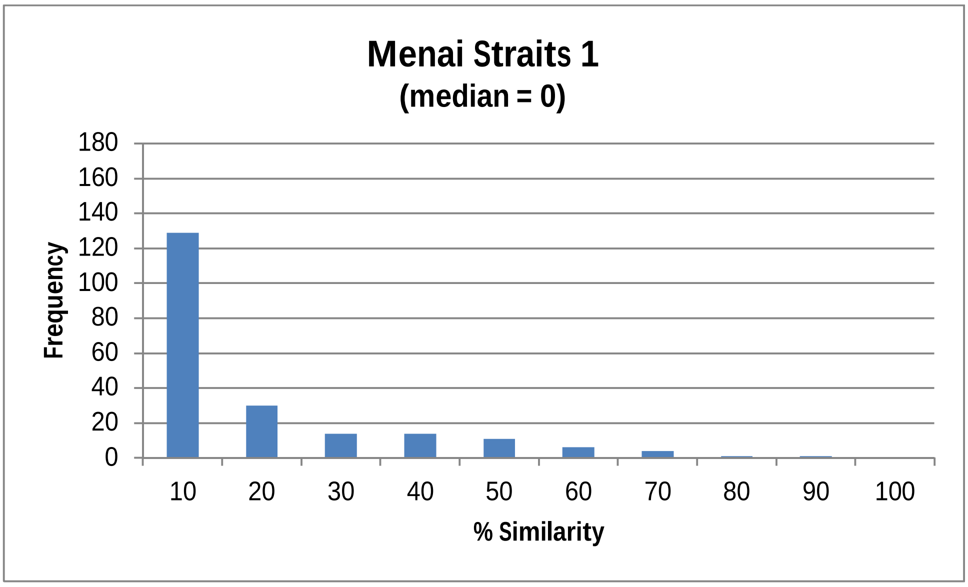
Figure 5 (a-j). The Frequency of % similarities of responses between individual participants.



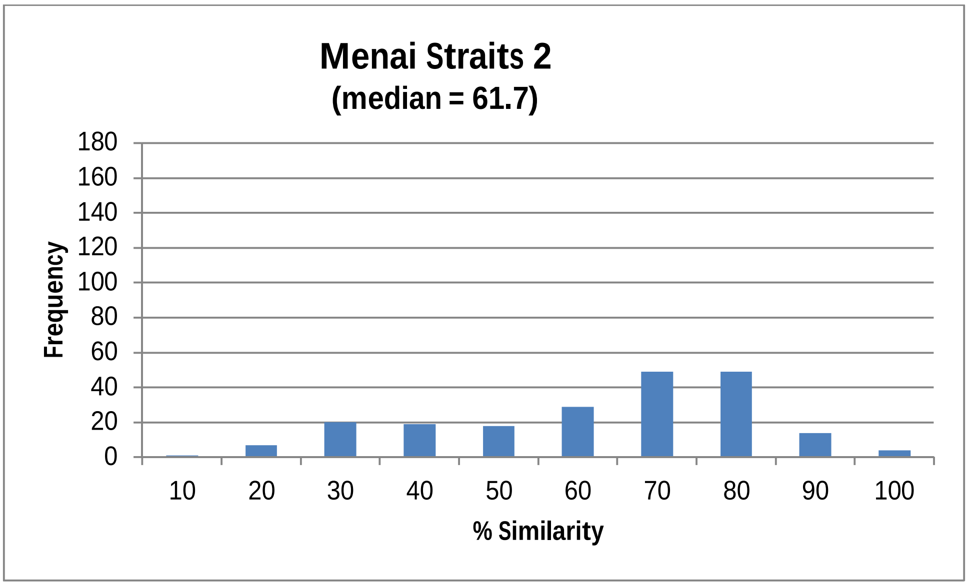
(a)



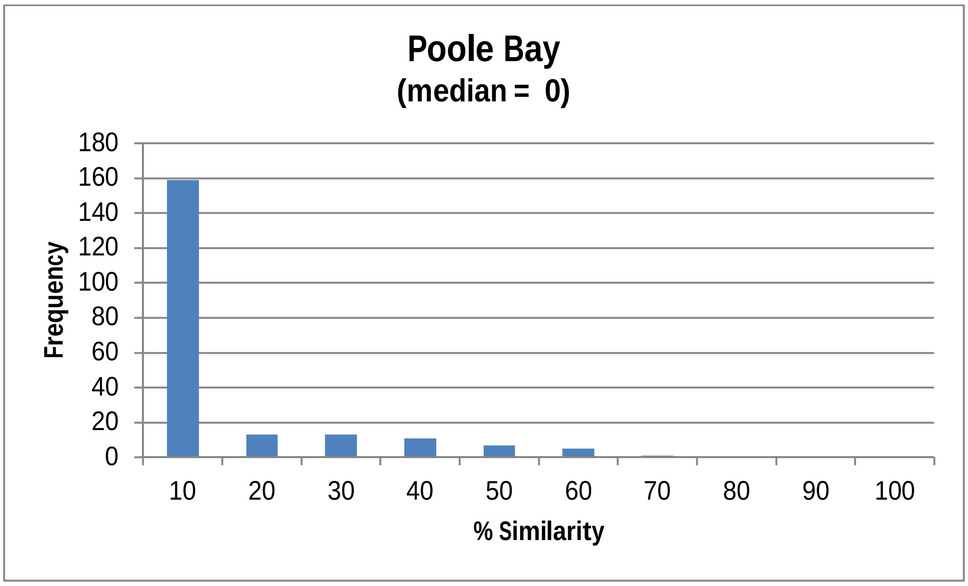
(b)


Menai Straits 1
(median = 0)
180
160
140
120
100
80
60
40
20
0
Frequency
10
20
30
40
50
60
70
80
90
100
% Similarity

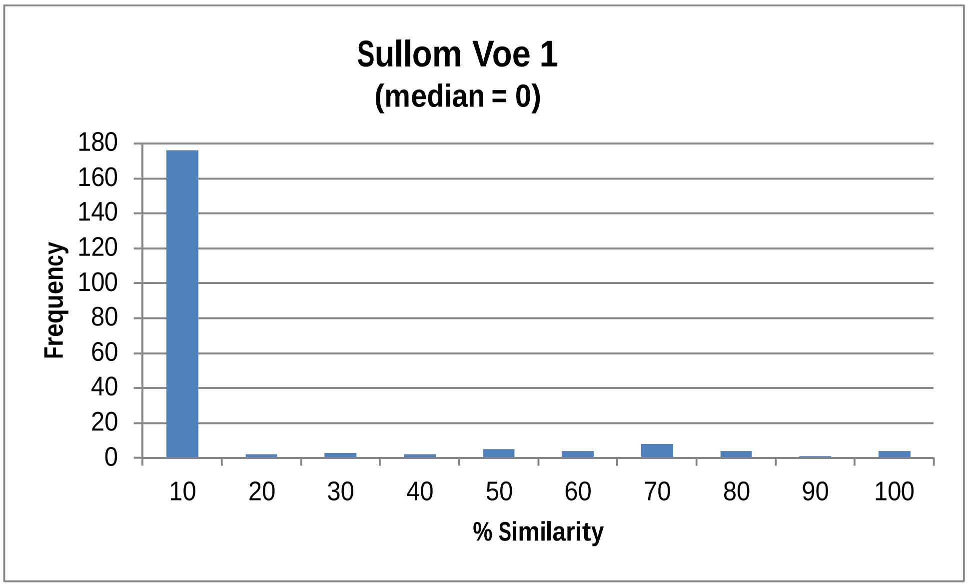
(c)


Menai Straits 2
(median = 61.7)
180
160
140
120
100
80
60
40
20
0
Frequency
10
20
30
40
50
60
70
80
90
100
% Similarity

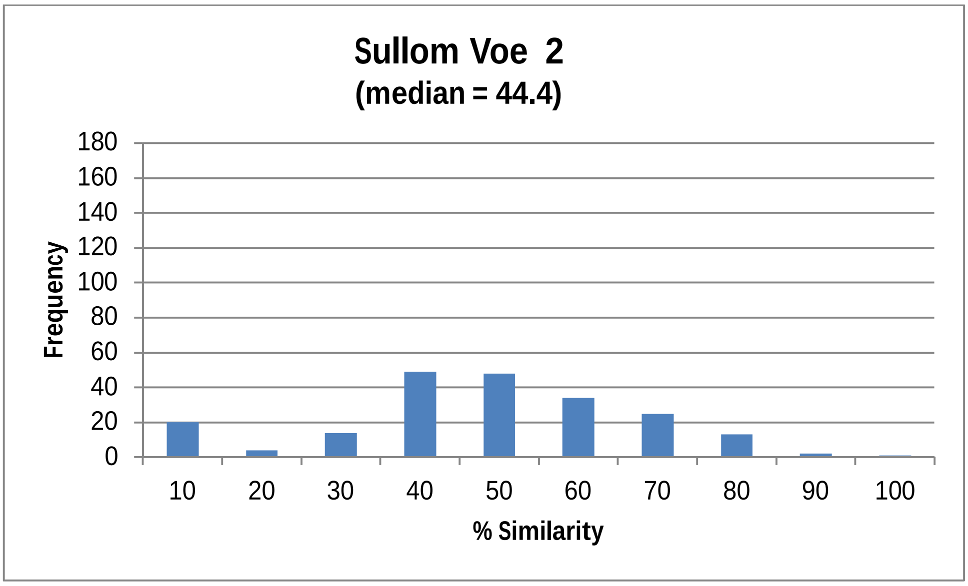
(d)


Poole Bay
(median = 0)
180
160
140
120
100
80
60
40
20
0
Frequency
10
20
30
40
50
60
70
80
90
100
% Similarity

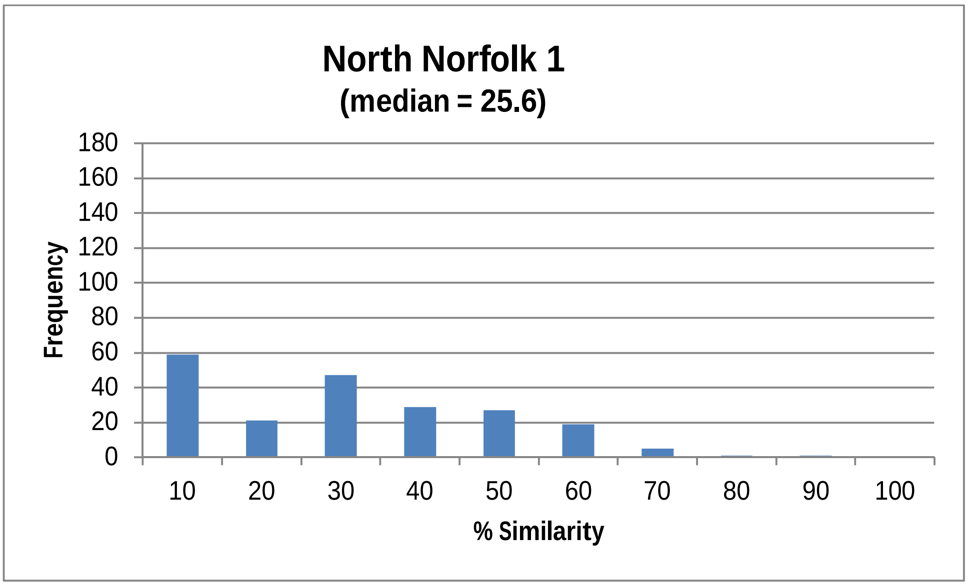
(e)


Sullom Voe 1
(median = 0)
Frequency
180
160
140
120
100
80
60
40
20
0
10
20
30
40
50
60
70
80
90
100
% Similarity

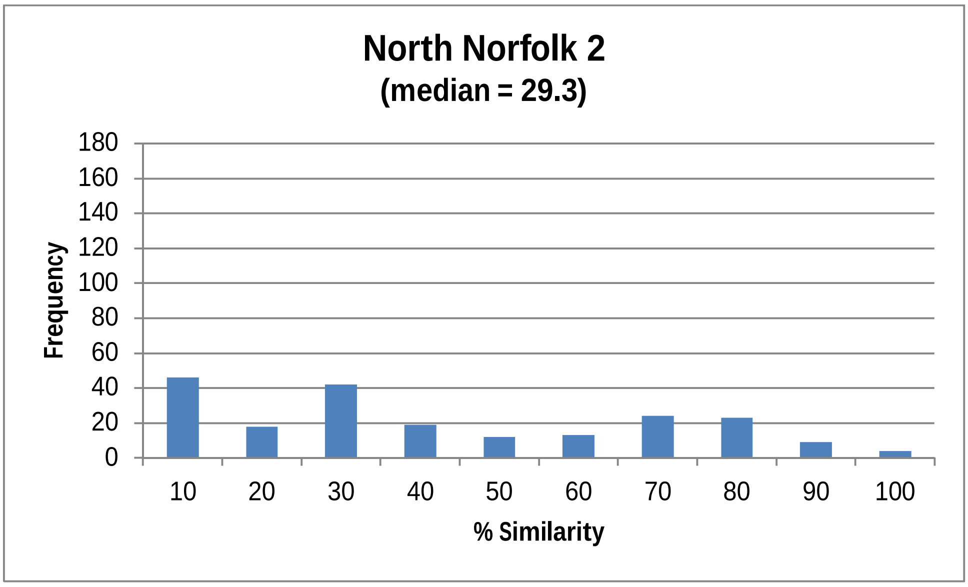
(f)


Sullom Voe 2
(median = 44.4)
Frequency
180
160
140
120
100
80
60
40
20
0
10
20
30
40
50
60
70
80
90
100
% Similarity

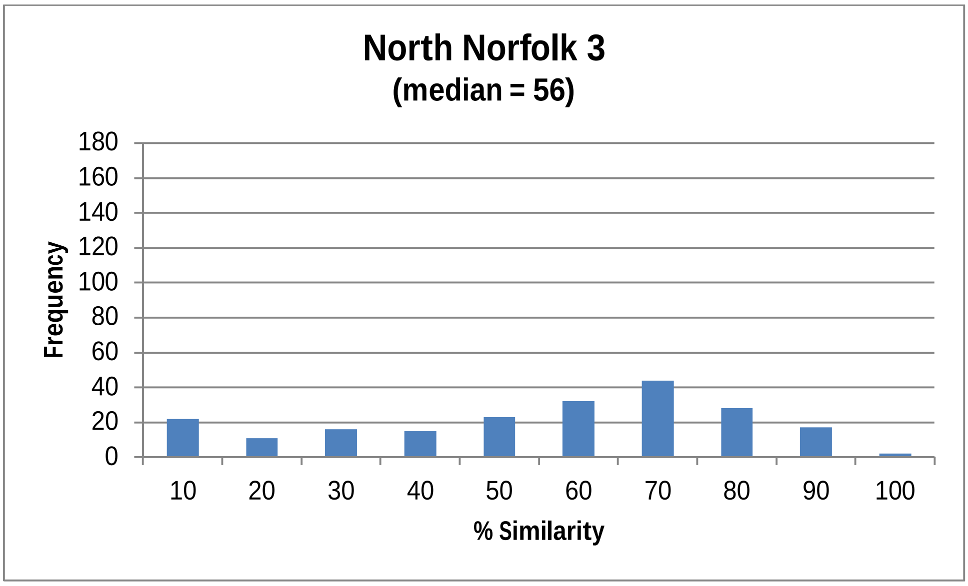
(g)


North Norfolk 1
(median = 25.6)
Frequency
180
160
140
120
100
80
60
40
20
0
10
20
30
40
50
60
70
80
90
100
% Similarity

(h)



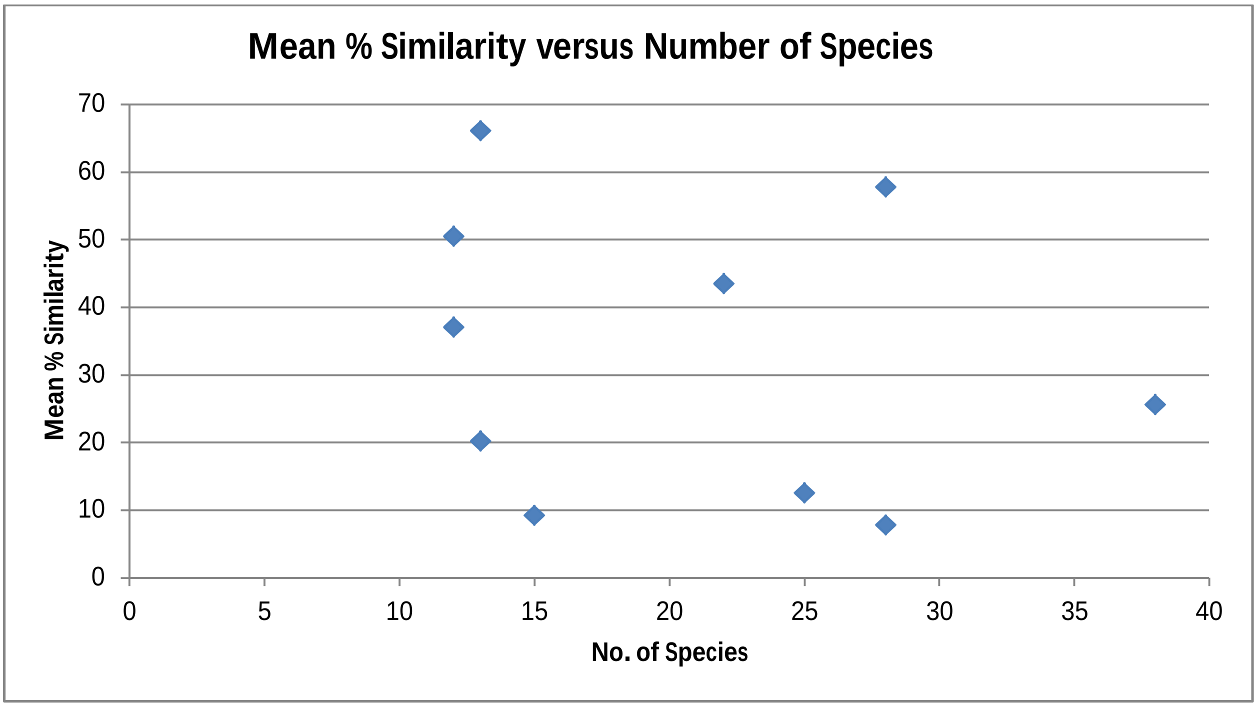
(i)



(j)

The % similarity of returns was apparently not a function of the number of species observed in the video clips, as might have been expected. There was no evidence that the level of similarity between participants was related to the total number of species recorded for each of the video clips (Figure 6; $p>0.05$ [Spearman Rank Correlation; $Rs = -0.0582$]).

Figure 6. Overall relationship between % Similarity (of species/abundance records returned by participants) and Number of Species

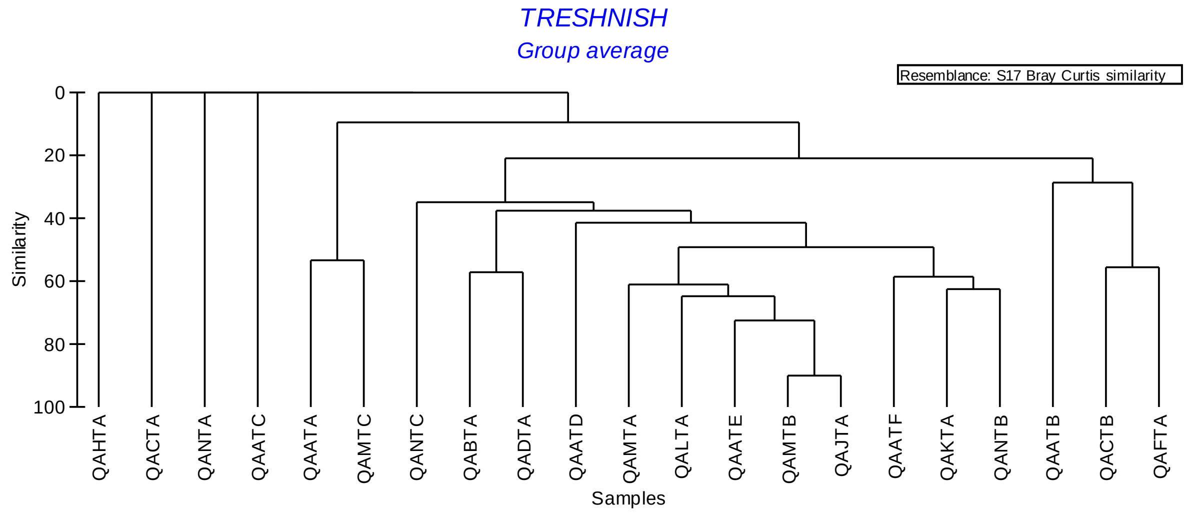


The ability to recognise marine species is key to the process of video analysis for seabed classification. It is one of the main determinants that will be used to assess an individual's performance in the Video Analysis Quality Control procedure. This first stage of the development of the Quality Control Scheme (Test I) has revealed a wide range of individuals' ability to record species accurately. There was a wide discrepancy not only in the numbers of species recorded by different individual respondents, but also in the abundance scores that were assigned by them.

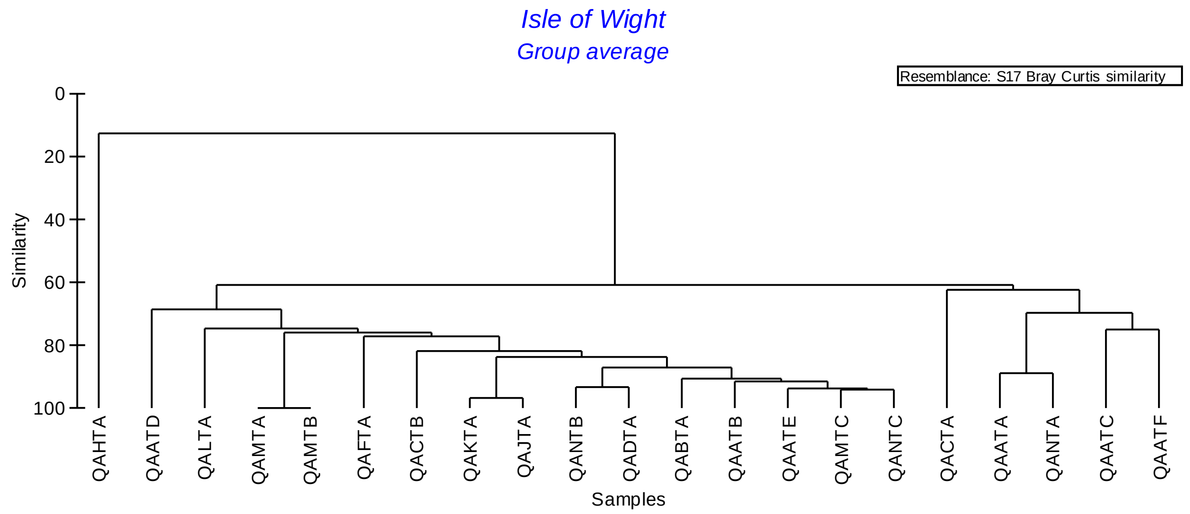
The dendrograms given in Figures 7 (a-j) illustrate the relationships between the different participants in relation to the sets of species abundance data that they returned. Participants will be able to judge their own position relative to others by studying these.

Figures 7 (a-j) Dendrograms representing the levels of similarity between the participants' species abundance data.

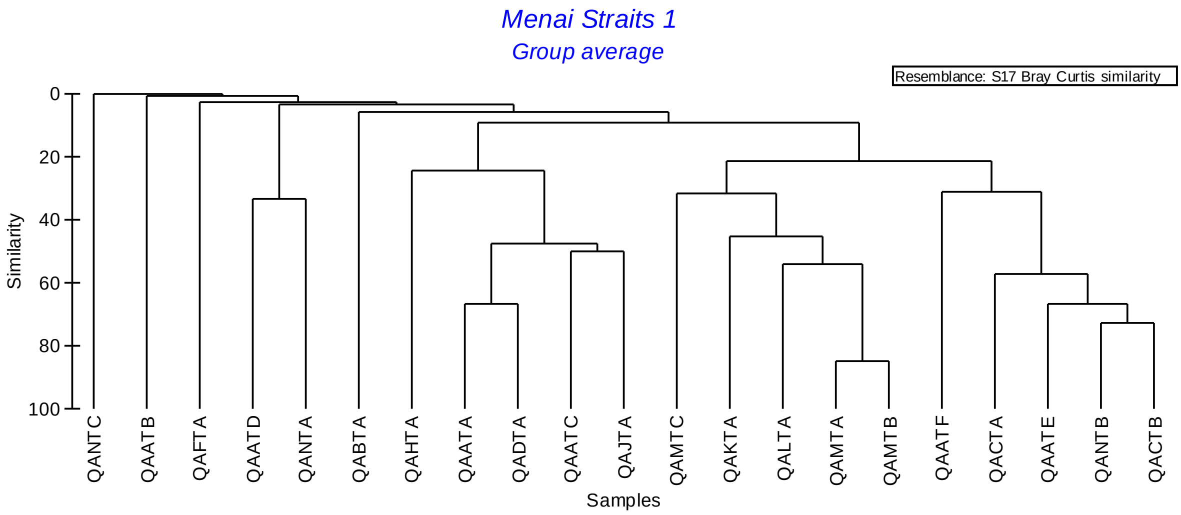
(a)


TRESHNISH
Group average
Resemblance: S17 Bray Curtis similarity
Similarity
0
20
40
60
80
100
QAHTA
QACTA
QANTA
QAATC
QAATA
QAMTC
QANTC
QABTA
QADTA
QAATD
QAMTA
QALTA
QAATE
QAMTB
QAJTA
QAATF
QAKTA
QANTB
QAATB
QACTB
QAFTA
Samples

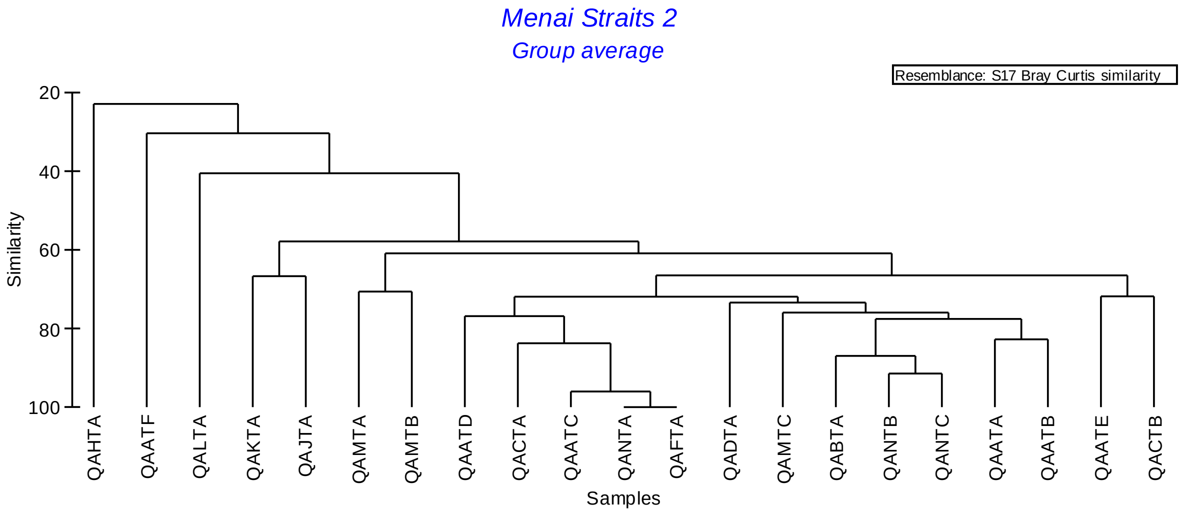
(b)


Isle of Wight
Group average
Resemblance: S17 Bray Curtis similarity
Similarity
0
20
40
60
80
100
QAHTA
QAATD
QALTA
QAMTA
QAMTB
QAFTA
QACTB
QAKTA
QAJTA
QANTB
QADTA
QABTA
QAATB
QAATE
QAMTC
QANTC
QACTA
QAATA
QANTA
QAATC
QAATF
Samples

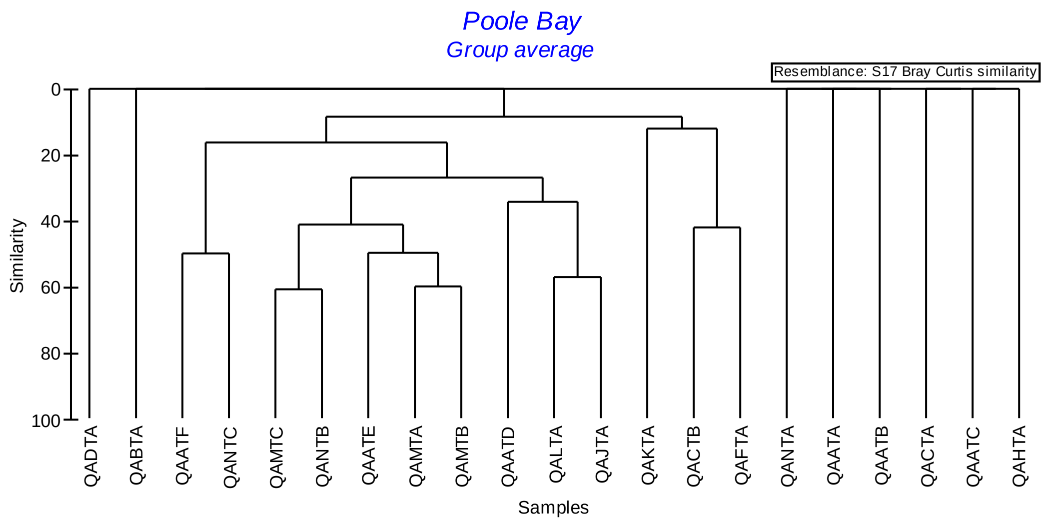
(c)


Menai Straits 1
Group average
Resemblance: S17 Bray Curtis similarity
Similarity
0
20
40
60
80
100
QANTC
QAATB
QAFTA
QAATD
QANTA
QABTA
QAHTA
QAATA
QADTA
QAATC
QAJTA
QAMTC
QAKTA
QALTA
QAMTA
QAMTB
QAATF
QACTA
QAATE
QANTB
QACTB
Samples

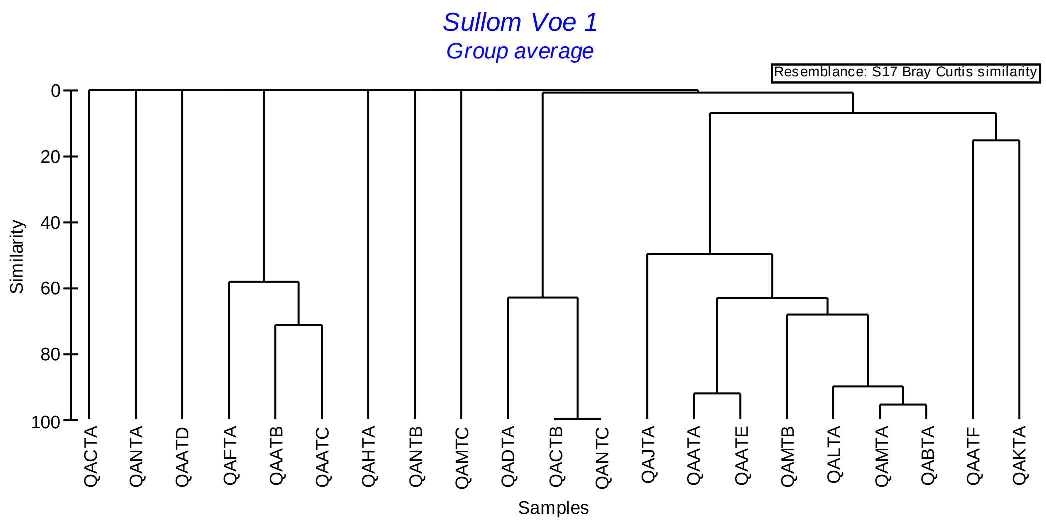
(d)


Menai Straits 2
Group average
Resemblance: S17 Bray Curtis similarity
Similarity
20
40
60
80
100
QAHTA
QAATF
QALTA
QAKTA
QAJTA
QAMTA
QAMTB
QAATD
QACTA
QAATC
QANTA
QAFTA
QADTA
QAMTC
QABTA
QANTB
QANTC
QAATA
QAATB
QAATE
QACTB
Samples

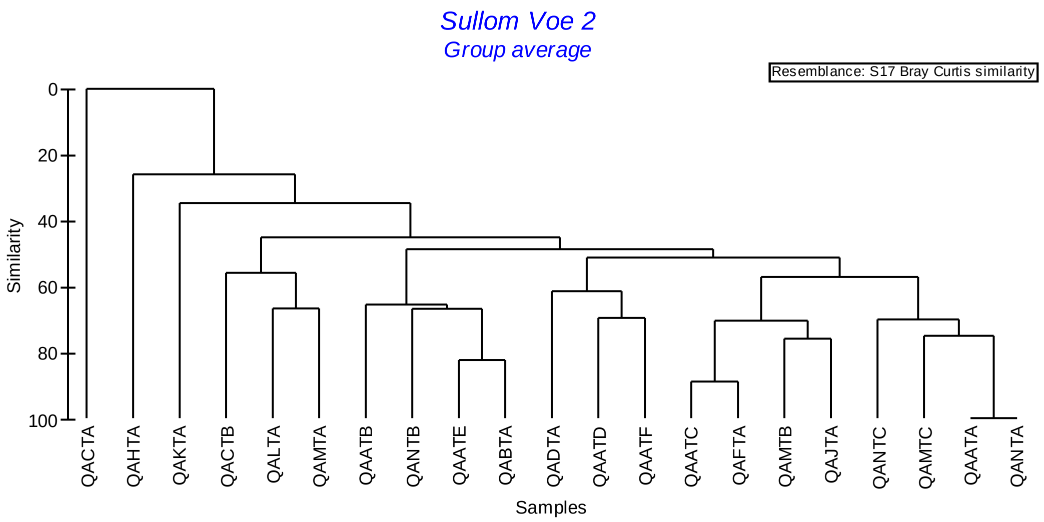
(e)


Poole Bay
Group average
Resemblance: S17 Bray Curtis similarity
Similarity
0
20
40
60
80
100
QADTA
QABTA
QAATF
QANTC
QAMTC
QANTB
QAATE
QAMTA
QAMTB
QAATD
QALTA
QAJTA
QAKTA
QACTB
QAFTA
QANTA
QAATA
QAATB
QACTA
QAATC
QAHTA
Samples

(f)

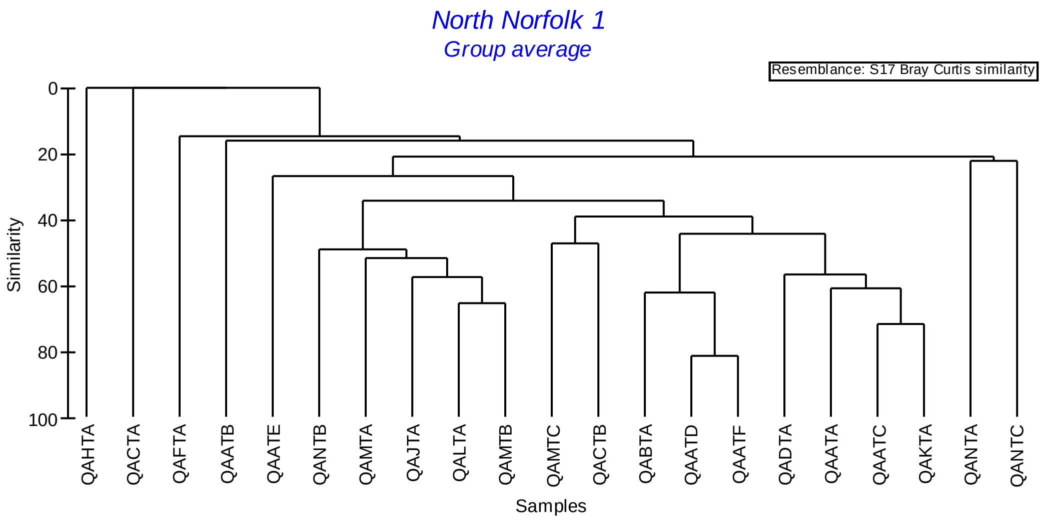

Sullom Voe 1
Group average
Resemblance: S17 Bray Curtis similarity
Similarity
0
20
40
60
80
100
QACTA
QANTA
QAATD
QAFTA
QAATB
QAATC
QAHTA
QANTB
QAMTC
QADTA
QACTB
QANTC
QAJTA
QAATA
QAATE
QAMTB
QALTA
QAMTA
QABTA
QAATF
QAKTA
Samples

(g)



Sullom Voe 2
Group average
Resemblance: S17 Bray Curtis similarity
Similarity
0
20
40
60
80
100
QACTA
QAHTA
QAKTA
QACTB
QALTA
QAMTA
QAATB
QANTB
QAATE
QABTA
QADTA
QAATD
QAATF
QAATC
QAFTA
QAMTB
QAJTA
QANTC
QAMTC
QAATA
QANTA
Samples

(h)



North Norfolk 1
Group average
Resemblance: S17 Bray Curtis similarity
Similarity
0
20
40
60
80
100
QAHTA
QACTA
QAFTA
QAATB
QAATE
QANTB
QAMTA
QAJTA
QALTA
QAMTB
QAMTC
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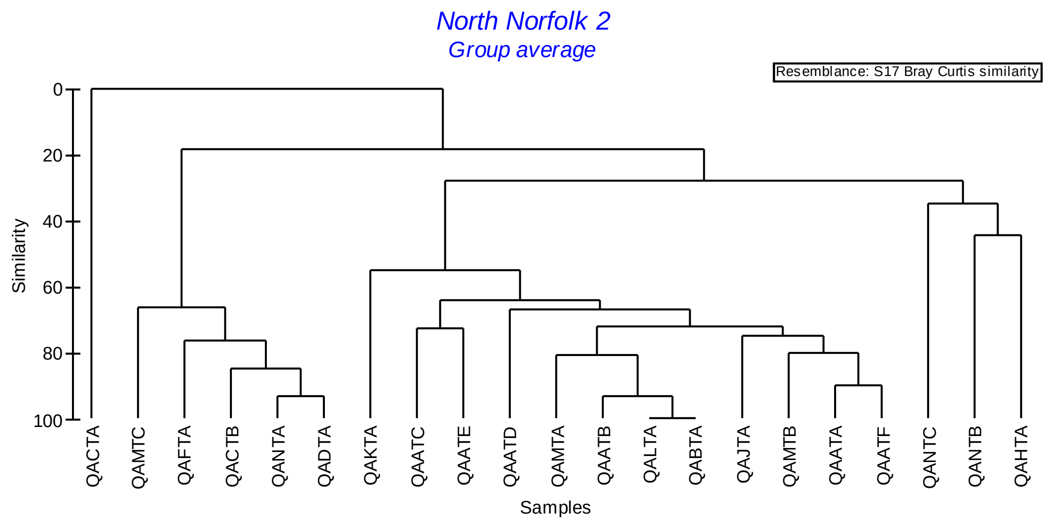
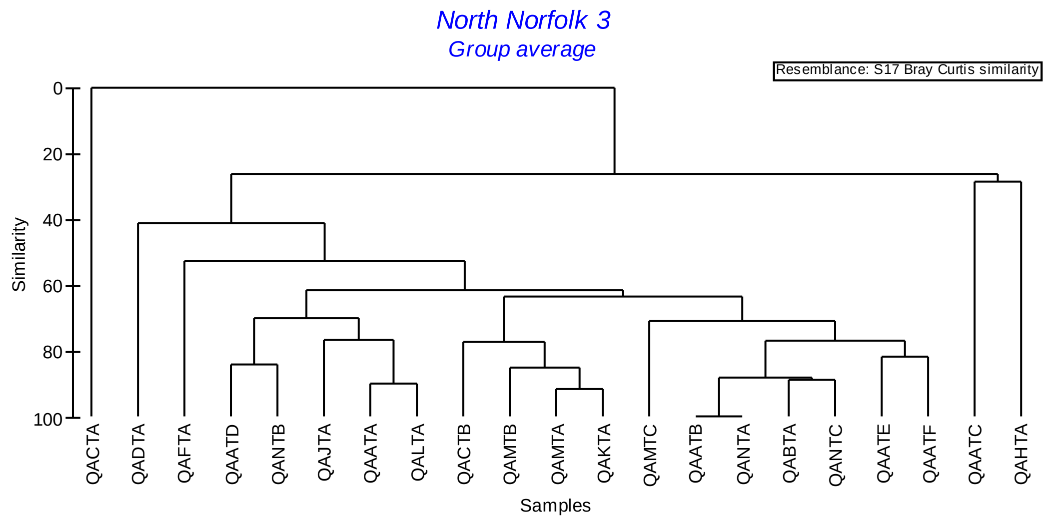
QAATD
QAATF
QADTA
QAATA
QAATC
QAKTA
QANTA
QANTC
Samples

(i)



(j)



The similarity level between the data returns submitted by participants represented in these dendrograms appears to be generally quite low. However, it is important to remember that the returns are made up, not only of the varying number of species that the different participants have recorded, but also the abundances scores that they allocated to them. In other words, they represent a combination of the ability to recognise species and also an ability to assess the appropriate abundance score on the SACFOR scale.

!00% similarity, indicating exactly matching lists of species and an exactly matching allocation of abundance scores to those species, is unlikely to be achieved using video material. There will always need to be room for subjective interpretation of species abundances using this technique for benthic analysis. Nonetheless, there may be a need for training in the assessment of species recognition and abundance.

Recommendation 25: Consider the need for training in species identification and abundance assessment for video analysis.

Assessment of species identification may need to be carried out using a 'sliding scale' approach since different levels of expertise are required to identify different types of organisms. It is reasonable to expect candidates to be able to identify species which are large, common and very distinctive (e.g. *Asterias rubens*, *Cancer pagurus*), but it is not reasonable to expect them to identify small, less common, less obvious species (e.g. *Antennella secundaria*, *Bicellariaella ciliata*). It is suggested that certain 'sets' (i.e. categories) of species are scored differently during marking of the assessment Test.

Recommendation 26: Consider the need to categorise marine species for the purposes of assessing candidates' ability to identify species.

In view of the above recommendation, the species listed as part of the results of Test 1 (Appendix 2) have been reorganised to investigate which species might be categorised together in a species 'Recordability' scheme, as explained below:

If a species was truly present in the video then, theoretically, all 21 participants should have recorded it. On this assumption, the actual number of participants that recorded that particular species gives the level of deviation from the expected. For example, if a species was recorded in just one of the video clips and 4 people recorded it then it was recorded on 4/21x100 percentages of the times that it could have been recorded (21/21 x 100 %). If it was recorded in 4 of the video clips and was recorded on, say 11 occasions, then it was recorded on 11/84x100 percent of the potential times that it should have been spotted. This can therefore be used as an indication of how 'recordable' a species has been. The species list given in Appendix 2 has been re-organised to provide an overview of how 'recordable' a particular species - in other words, how frequently it was recorded compared with how frequently it could have been recorded (Appendix 4). This also provides an indication of how much confidence can be put into the recordings being correct (i.e. the more frequently a species was recorded by participants, the more likely it was to have been present). However, it is to be noted that this process is complicated by the fact that some people may have identified the organism only to generic level whereas others have identified them to species level (e.g. *Botryllus* sp. V. *Botryllus schlosseri*).

Interestingly, there appeared to be little relationship between actual records of species compared with potential number of records. Only 6 (7.44%) of the species were recorded on more than (even only) 50% of the times that they potentially could have been (Appendix 4). These were *Virgularia mirabilis, Mytilus edulis, Asterias rubens, Sabellaria spinulosa, Alcyonium digitatum* and *Nemertesia antennina,* all relatively large and common (even if localised) species.

There was a long 'tail' of 'species' (48 [38.7%]) which, overall, had been recorded on only one occasion. Explanations for this include (1) these species were present but went un-noticed except once (perhaps because of their small size, or because of the poor quality of the video being analysed), (2) they were present but only one person had the taxonomic skills to recognise them, (3) they were wrongly identified, or (4) only part of the organisms were in view on the video. Whatever the reason, there can be little confidence in such records.

This sort of level of confidence, for what might be relatively uncommon species, may not be an issue for certain applications of video analysis (e.g. habitat classification). However, where the aims of a piece of video analysis work relates, for instance, to biodiversity, then these levels of confidence in species presence would be unacceptable. Ways in which this situation can be improved need to be considered since video analysis, on its own, will have limitations. Video analysis, combined with still photography is already part of the standard benthic survey technique, and this should help to rectify this problem to a large extent. It is expected that stills analysis, combined with video analysis, will form part of Test 2.

Recommendation 27: Include still photographs in association with video for the identification of species in Test 2. This should included a comparison of the ability to identify species (a) using video only, and (b) using the same video, together with stills.

Only 6 of the 21 participants recorded the 'Species Codes' as was intended. Most did not complete this section of the species data entry form. This was clearly due to lack of appropriate instruction.

Recommendation 28: Instructions regarding Species Codes need to be made more clear and the Species list provided needs to be accurately referred to.

3.11 Feedback Comments

There were a large number of helpful feedback comments from the participants. These related to video quality (including duration of clips), the potential usefulness of associated grab samples and still images, technical issues, data entry issues, errors and omissions in the data entry forms, guidance and terminology, substrate and species categories, life form and biotope classification, and the scales used (Appendix 5). Some of the issues raised have already been addressed during the process of analysing the returns. The other comments listed in Appendix 5 will be addressed as appropriate, before the next Test (2) is circulated.

4 Conclusion

Test I has helped to provide a good overview of the video analysis abilities of those participating in the development scheme. The wide variation in the responses provided by the participants has helped to determine the elements of the Test that require refinement. While there are a number of factors that might have contributed to the inconsistencies, such as different quality of hardware used, the most likely explanation is that of varying degrees of experience of video survey and analysis. This has raised the question of how much experience of benthic video survey and analysis (including species identification and abundance assessment) that prospective candidates would be expected to have. It has been suggested that some form of training may need to be provided before they would be eligible to take the assessment Test. In particular this might include life form and biotope recognition, substrate abundance assessment, species identification, species abundance assessment, and use of different abundance scales.

It is clear from this first analysis, that the data entry forms should be completed electronically. Some of the participants had not realised that electronic versions of the forms they were asked to complete were available to them on the Resource CD provided (as mentioned in the 'Guidance' document). Consequently, they felt limited in their responses by the amount of space available on the hard copy. As a result, some of the detail returned, such as that relating to the references they used, was incomplete. In the next stage of the project (Test 2) all forms will be sent electronically. Electronic submission would also help to streamline the process by, for instance, preventing blank data cells to be returned, and would also facilitate collation of the data.

28 Recommendations are given as a result of the first round of the development of the Ring Test. These will be considered for incorporation in Test 2. The participants' feedback comments will also help to refine Test 2.

In addition, a marking scheme will be introduced in Test 2. It is evident that some sort of 'yardstick' against which to assess the quality of the candidates' data is required. Video clips specifically selected to show the presence of known features (e.g. known substrates, known rock features, known species, known life forms and biotopes etc.) will be provided for the Test. Thus, a 'right' or 'wrong' response can be given, and marked accordingly. However, in some cases, there will also need to be scope in the marking scheme for a range of responses (e.g. % cover of substrate, and abundances of some of the smaller organisms, e.g. *Pomatoceros* sp.).

5 References

Connor, D. W., Allen, J. H., Golding, N., Howell, K. L., Lieberknecht, L. M., Northen, K.O.and Reker J. B. (2004) The Marine Habitat Classification For Britain And Ireland Version 04.05 JNCC, Peterborough. ISBN 1 861 07561 8 (internet version) www.jncc.gov.uk/MarineHabitatClassification

Richards, A., Bunker, F., & Foster-Smith, R., 1995. *Handbook for marine intertidal phase 1 habitat mapping - version 3.95. Countryside Council for Wales, Bangor, Natural Sciences Report, no.* 95/96/1

6 Appendices

Appendix 1. Equipment used to view the video clips.

Participant No.	DVD Player Make	DVD Player Model	DVD Player Software	Screen Make	Screen Model	Screen Resolution
1	Samsung laptop	P28	PowerDVD5.0	Dell E	E197FP	1280 x 1024
2	Dell Computer	Optiplex 745	PowerDVD	Dell		
3	Samsung laptop	P28	Windows Media Player	laptop screen		
4	Dell Computer		WinDVD			
5	Dell Computer	T3400	PowerDVD D4	Dell Computer	1907FPV	1280 x 1024, 75 Hz
6	Toshiba	Satellite Pro	WinDVD	N/A	N/A	N/A
7	Dell PC	Optiplex GX620	Intervideo WinDVD4	Dell	N/A	? 72-804
8	PC	Intel Pentium 4 CPU	Nero7 - Vision	Acer	AL1912	1152 x 864
9	PC	IPC Multimedia Lifestyle 330	Nero7 - Vision	ATI RADEON	XPRESS 200M Series	1280 x 800 pixels
10	HP Compaq computer	DC3700	Intervide WinDVD 5	CI BOX 22"	LE2262	1680 x 1050 pixels
11	HP XW Computer	4600	WinDVD/Media Player	Dell		
12	Dell Computer	Precision 490	Windows Media Player	Dell Computer	N/A	N/A
13	Panasonic DVD Player	DMR E55		Philips	21PT5457/05	
14	Panasonic DVD Player	DMR E55		Philips	21PT5457/05	
15	Acer computer	Aspire 5610 laptop	Window Media Player	projector		laptop (1280 x 800)
16	Dell Computer	Optiplex GX620	Windows Media Player	Dell	2007 FP	1600 x 1200
17	Dell Computer	Precision 490	Avid Liquid Pro 7 + Jogshuffle	Dell screen	2407 WFPb (24" LCD)	1920 x 1200 pixels)
18	Hewlett Packard Compaq nc4200 computer	Agency Series HSTNN - CO2C	InterVideo WinDVD5	NEC	Accusync LCD72VM	1024 by 768 pixels
19	Dell computer	Latitude D610	windows media player	Dell	Radeon x 300	1152 x 864 pixels
20	N/A	N/A	N/A	N/A	N/A	N/A
21	Panasonic DVD Player	DMR5		Philips	21PT5457/05	

Appendix 2. Taxonomic list of organisms recorded from the 10 video clips provided.

No.	Species Name	MCS Species Directory Code
1	*Clathrina coriacea*	C11
2	*Sycon ciliatum*	C133
3	*Dysidea fragilis*	C1670
4	*Suberites sp.*	C414
5	*Halichondria sp.*	C632
6	*Halichondria panicea*	C651
7	*Mycale similaris*	C733
8	*Esperiopsis (Amphilectus) fucorum*	C758
9	*Esperiopsis fucorum*	C758
10	*Hemimycale columella*	C984
11	*Tubularia sp.*	D163
12	*Tubularia indivisa*	D166
13	*Halecium sp.*	D390
14	*Halecium halecinum*	D392
15	*Abietinaria sp.*	D408
16	*Hydrallmania falcata*	D424
17	*Sertularia sp.*	D433
18	*Sertularia argentea*	D434
19	*Nemertesia sp.*	D462
20	*Nemertesia antennina*	D463
21	*Nemertesia ramosa*	D466
22	*Hartlaubella gelatinosa*	D510

23	*Obelia sp.*	D517
24	*Alcyonium digitatum*	D596
25	*Swiftia pallida*	D608
26	*Virgularia mirabilis*	D618
27	*Cerianthus lloydii*	D632
28	*Cerianthus lloydii*	D632
29	*Urticina sp.*	D682
30	*Urticina eques*	D683
31	*Urticina felina*	D684
32	*Metridium senile*	D710
33	*Sagartia sp.*	D712
34	*Sagartia elegans*	D713
35	*Cereus pedunculatus*	D717
36	*Sabellaria sp.*	P1115
37	*Sabellaria alveolata*	P1116
38	*Sabellaria spinulosa*	P1117
39	*Lanice conchilega*	P1195
40	*Sabella pavonina*	P1320
41	*Pomatoceros sp.*	P1339
42	*Pomatoceros triqueter*	P1341
43	*Spirorbis sp.*	P1391
44	*Spirorbis spirorbis*	P1396
45	*Balanus sp.*	R74
46	*Balanus balanus*	R76
47	*Balanus crenatus*	R77
48	*Pagurus sp.*	S1454

49	*Pagurus bernhardus*	S1457
50	*Maja sp.*	S1514
51	*Maja squinado*	S1515
52	*Cancer pagurus*	S1566
53	*Liocarcinus sp.*	S1577
54	*Necora puber*	S1589
55	*Carcinus maenas*	S1594
56	*Jassa sp.*	S568
57	*Gibbula sp.*	W157
58	*Gibbula cineraria*	W163
59	*Mytilus sp.*	W1693
60	*Mytilus edulis*	W1695
61	*Pecten maximus*	W1771
62	*Sepia sp.*	W2304
63	*Littorina sp.*	W294
64	*Crepidula fornicata*	W439
65	*Euspira sp.*	W492
66	*Nucella lapillus*	W687
67	*Buccinum undatum*	W708
68	*Vesicularia spinosa*	Y131
69	*Pentapora foliacea*	Y148
70	*Flustra foliacea*	Y187
71	*Bugula sp.*	Y240
72	*Alcyonidium sp.*	Y73
73	*Alcyonidium diaphanum*	Y76
74	*Alcyonidium gelatinosum*	Y77

75	*Asterias rubens*	ZB100
76	*Echinus sp.*	ZB195
77	*Echinus esculentus*	ZB198
78	*Solaster endeca*	ZB72
79	*Stolonica socialis*	ZD124
80	*Botryllus sp.*	ZD125
81	*Botryllus schlosseri*	ZD126
82	*Diazona violacea*	ZD74
83	*Ascidia sp.*	ZD87
84	*Merlangius merlangus*	ZG123
85	*Pollachius pollachius*	ZG135
86	*Trisopterus minutus*	ZG144
87	*Labrus mixtus*	ZG400
88	*Callionymus sp.*	ZG451
89	*Callionymus lyra*	ZG452
90	*Gobius niger*	ZG467
91	*Gobius paganellus*	ZG468
92	*Pomatoschistus sp.*	ZG476
93	*Pomatoschistus microps*	ZG478
94	*Pomatoschistus minutus*	ZG479
95	*Lepidorhombus whiffiagonis*	ZG549
96	*Limanda limanda*	ZG572
97	*Microstomus kitt*	ZG574
98	*Solea solea*	ZG591
99	*Palmaria palmata*	ZM170
100	*Corallina officinalis*	ZM205

101	*Lithothamnion sp.*	ZM235
102	*Calliblepharis ciliata*	ZM319
103	*Cystoclonium purpureum*	ZM322
104	*Dilsea carnosa*	ZM328
105	*Chondrus crispus*	ZM345
106	*Phyllophora crispa*	ZM407
107	*Phyllophora pseudoceranoides*	ZM409
108	*Chlyocladia verticillata*	ZM449
109	*Rhodymenia (Palmaria) psuedopalmata*	ZM468
110	*Halurus flocculosa*	ZM539
111	*Delesseria sanguinea*	ZM594
112	*Membranoptera alata*	ZM612
113	*Phycodrys rubens*	ZM616
114	*Petalonia fascia*	ZR187
115	*Dictyopteris membranacea*	ZR311
116	*Dictyota dichotoma*	ZR313
117	*Laminaria sp.*	ZR349
118	*Laminaria digitata*	ZR350
119	*Laminaria hyperborea*	ZR351
120	*Laminaria ochroleuca*	ZR353
121	*Saccharina latissima (Laminaria saccharina)*	ZR354
122	*Ulva sp.*	ZS174
123	*Ulva lactuca*	ZS179
124	*Cladophora sp.*	ZS195

Appendix 3. Number of 'Species' recorded by individual participants for each of the Video Clips.

	QAATA	QAATB	QAATC	QAATD	QAATE	QAATF	QALTA	QAMTA	QAMTB	QAMTC	QAKTA	QABTA	QANTA	QANTB	QAJTA	QACTA	QACTB	QADTA	QAFTA	QAHTA	QANTA
Treshnish	1	3	0	4	4	4	4	2	4	3	4	2	0	2	4	0	3	1	3	0	3
Isle of Wight	3	3	1	5	3	3	5	5	5	4	4	4	2	3	4	3	4	3	4	3	3
Menai Straits 1	2	2	1	5	2	3	5	5	5	6	7	1	1	2	4	2	1	3	5	1	0
Menai Straits 2	3	4	2	5	4	4	12	9	7	4	7	5	2	5	5	3	5	4	2	5	4
Poole Bay	0	2	0	3	4	2	4	4	6	5	12	0	0	3	3	0	4	0	1	1	1
Sullom Voe 1	1	2	1	0	1	1	3	2	5	0	7	2	0	0	3	?	1	2	2	1	1
Sullom Voe 2	1	4	2	3	2	5	4	5	4	3	10	3	1	5	4	?	6	6	2	3	3
North Norfolk 1	3	4	5	9	4	5	8	11	10	7	8	4	3	6	9	?	8	8	4	7	4
North Norfolk 2	3	2	1	5	2	3	2	3	4	5	5	2	2	2	4	?	2	2	1	2	2
North Norfolk 3	3	2	2	4	3	3	4	4	5	4	4	2	2	3	4	?	5	2	4	3	2

Appendix 4. Percentage frequency with which species were recorded out of a maximum possible numbers of times (see explanation above).

Species Name	Species Code	Total No. of Participants recording this species (Maximum of 10 [Video clips] x 21 [participants] = 210)	No. Of Sites at which this species was recorded	% No. Participants recording species out of a maximum possible
Virgularia mirabilis	D618	20	1	95.2
Mytilus edulis	W1695	20	1	95.2
Asterias rubens	ZB100	38	2	90.5
Sabellaria spinulosa	P1117	12	1	57.1
Alcyonium digitatum	D596	58	5	55.2
Nemertesia antennina	D463	34	3	54.0
Flustra foliacea	Y187	52	5	49.5
Pagurus bernhardus	S1457	29	3	46.0
Lanice conchilega	P1195	26	3	41.3
Saccharina latissima (Laminaria saccharina)	ZR354	8	1	38.1
Cancer pagurus	S1566	21	3	33.3
Alcyonidium diaphanum	Y76	14	2	33.3
Carcinus maenas	S1594	18	3	28.6
Callionymus lyra	ZG452	10	2	23.8
Botryllus schlosseri	ZD126	5	1	23.8
Pomatoceros sp.	P1339	30	7	20.4

Esperiopsis (Amphilectus) fucorum	C758	12	3	19.0
Hemimycale columella	C984	4	1	19.0
Urticina sp.	D682	4	1	19.0
Spirorbis sp.	P1391	4	1	19.0
Limanda limanda	ZG572	4	1	19.0
Microstomus kitt	ZG574	4	1	19.0
Laminaria hyperborean	ZR351	4	1	19.0
Urticina feline	D684	11	3	17.5
Delesseria sanguine	ZM594	7	2	16.7
Pomatoceros triqueter	P1341	15	5	14.3
Nemertesia ramose	D466	9	3	14.3
Ulva lactuca	ZS179	9	3	14.3
Sabellaria alveolata	P1116	6	2	14.3
Pagurus sp.	S1454	6	2	14.3
Sagartia sp.	D712	3	1	14.3
Nucella lapillus	W687	3	1	14.3
Pentapora foliacea	Y148	3	1	14.3
Merlangius merlangus	ZG123	3	1	14.3
Trisopterus minutes	ZG144	3	1	14.3
Laminaria sp.	ZR349	3	1	14.3
Laminaria digitata	ZR350	3	1	14.3
Alcyonidium sp.	Y73	5	2	11.9
Pomatoschistus sp.	ZG476	5	2	11.9
Halichondria panacea	C651	6	3	9.5
Sertularia sp.	D433	6	3	9.5
Balanus sp.	R74	6	3	9.5

Necora puber	S1589	4	2	9.5
Callionymus sp.	ZG451	4	2	9.5
Tubularia indivisa	D166	2	1	9.5
Obelia sp.	D517	2	1	9.5
Sabellaria sp.	P1115	2	1	9.5
Sabella pavonina	P1320	2	1	9.5
Spirorbis spirorbis	P1396	2	1	9.5
Maja sp.	S1514	2	1	9.5
Buccinum undatum	W708	2	1	9.5
Bugula sp.	Y240	2	1	9.5
Gobius niger	ZG467	2	1	9.5
Gobius paganellus	ZG468	2	1	9.5
Lepidorhombus whiffiagonis	ZG549	2	1	9.5
Lithothamnion sp.	ZM235	2	1	9.5
Dictyota dichotoma	ZR313	2	1	9.5
Ulva sp.	ZS174	2	1	9.5
Cladophora sp.	ZS195	2	1	9.5
Liocarcinus sp.	S1577	6	4	7.1
Vesicularia spinosa	Y131	6	4	7.1
Dysidea fragilis	C1670	3	2	7.1
Halichondria sp.	C632	3	2	7.1
Metridium senile	D710	3	2	7.1
Pomatoschistus minutes	ZG479	3	2	7.1
Calliblepharis ciliate	ZM319	3	2	7.1
Petalonia fascia	ZR187	3	2	7.1
Halecium sp.	D390	7	5	6.7

Nemertesia sp.	D462	4	3	6.3
Tubularia sp.	D163	5	5	4.8
Suberites sp.	C414	3	3	4.8
Sertularia argentea	D434	3	3	4.8
Corallina officinalis	ZM205	3	3	4.8
Cerianthus lloydii	D632	2	2	4.8
Ascidia sp.	ZD87	2	2	4.8
Membranoptera alata	ZM612	2	2	4.8
Clathrina coriacea	C11	1	1	4.8
Sycon ciliatum	C133	1	1	4.8
Mycale similaris	C733	1	1	4.8
Esperiopsis fucorum	C758	1	1	4.8
Halecium halecinum	D392	1	1	4.8
Abietinaria sp.	D408	1	1	4.8
Hydrallmania falcate	D424	1	1	4.8
Hartlaubella gelatinosa	D510	1	1	4.8
Swiftia pallid	D608	1	1	4.8
Cerianthus lloydii	D632	1	1	4.8
Urticina eques	D683	1	1	4.8
Sagartia elegans	D713	1	1	4.8
Cereus pedunculatus	D717	1	1	4.8
Balanus balanus	R76	1	1	4.8
Balanus crenatus	R77	1	1	4.8
Maja squinado	S1515	1	1	4.8
Jassa sp.	S568	1	1	4.8
Gibbula sp.	W157	1	1	4.8

Gibbula cineraria	W163	1	1	4.8
Mytilus sp.	W1693	1	1	4.8
Pecten maximus	W1771	1	1	4.8
Sepia sp.	W2304	1	1	4.8
Littorina sp.	W294	1	1	4.8
Crepidula fornicate	W439	1	1	4.8
Euspira sp.	W492	1	1	4.8
Alcyonidium gelatinosum	Y77	1	1	4.8
Echinus sp.	ZB195	1	1	4.8
Echinus esculentus	ZB198	1	1	4.8
Solaster endeca	ZB72	1	1	4.8
Stolonica socialis	ZD124	1	1	4.8
Botryllus sp.	ZD125	1	1	4.8
Diazona violacea	ZD74	1	1	4.8
Pollachius pollachius	ZG135	1	1	4.8
Labrus mixtus	ZG400	1	1	4.8
Pomatoschistus microps	ZG478	1	1	4.8
Solea solea	ZG591	1	1	4.8
Palmaria palmate	ZM170	1	1	4.8
Cystoclonium purpureum	ZM322	1	1	4.8
Dilsea carnosa	ZM328	1	1	4.8
Chondrus crispus	ZM345	1	1	4.8
Phyllophora crispa	ZM407	1	1	4.8
Phyllophora pseudoceranoides	ZM409	1	1	4.8
Chlyocladia verticillata	ZM449	1	1	4.8
Rhodymenia (Palmaria) psuedopalmata	ZM468	1	1	4.8

Halurus flocculosa	ZM539	1	1	4.8
Phycodrys rubens	ZM616	1	1	4.8
Dictyopteris membranacea	ZR311	1	1	4.8
Laminaria ochroleuca	ZR353	1	1	4.8

Appendix 5. Feedback Comments from the Participants.

Tester/ Organisation	
	Video Quality
QAA	*Poor video quality*
QAATB	*Poor quality and fast speed of camera exasperating and time consuming.*
QAA	*Camera speed too fast - blurred and distorted images making identification unreliable/impossible, esp. for smaller species.*
QAATB	*Speed of camera meant images blurred and distorted when paused.*
QAA	*"Leaping around" made footage lose focus and, therefore, validity.*
QAC	*Quality of video was generally poor (to appalling). Why are we using material that is over 10 years old and not best suited for the purpose of determining habitats and applying MNCR classification? The acquisition method appears to have used a soft tow camera, as developed by Envision for CCW, and the resulting footage is extremely poor by modern-day standards. One clip appeared to be of a diver-held video, but the majority of the 60 seconds was completely obscured by algae over the lens - why was this clip selected in the first place? We are surprised, and not at all encouraged, at the selection of material for this first exercise.*
QABTA	*Footage didn't fill the screen and not great resolution - the video samples didn't stop very often and were quite high speed - limit the number of speedy ones to give people something to ID (though appreciate testing ID of poor quality footage).*
QADTA	*Up and down movement and speed of film made ID of species quite difficult, freezing/pausing footage often resulted in blurred image.*
QAA	*Lighting made sediment description different.*
QAA	*Vertical orientation of video footage would have been preferred (providing speed adjusted).*
QALTA	*Playback quality on computers is pretty poor and low resolution - due to codec used to create the DVD?*
QALTA	*Quality of video dictates what it can be used for i.e.* *1) for monitoring purposes - need well lit, slow tows, high res, close & video views, plenty of pauses, 100m tows (or known sample size) and multiple hits of biotopes from known area,* *2) for biotope inventory surveys - need replicate data from several (100m) tows to decide on biotope labels and confirm biotope existence, i.e. the data from each run is clustered using MDS and each cluster 'combined' to play spot the biotope; can't do this from one-off short tows as these provide*

	insufficient data and needs better quality footage *3) habitat & conspicuous species data used for basic ground-truthing & habitat mapping (not biotopes) - this is the quality of footage in this ring test trial,* *4) habitat only from poor quality footage using old cameras with poor lighting.*
	Video Analysis
	Video clip length
QAA	*Not long enough for clear judgement of area and habitat.*
QAC	*All clips are far too short and give insufficient materal to form an adequate species list and get an adequate appreciation of the habitat - need about 5 minutes.*
QAC	*Great difficulty applying SACFOR to 1-minute clip especially when quality is poor.*
QAKTA	*Volume of clips too large (perhaps 5); longer and higher quality clips from representative habitats - focus on rare/important, easily mis-classified habitats to gain consensus and target weak knowledge.*
QAATB	*Video clips good for identifying habitat detail but very inaccurate and little value in species identification.*
	Associated grab samples/stills images
QAA	*Sediment description difficult to ascertain from video without grab sample.*
QAMTA	*Grab sample associate with clip useful if looking for a specific species for high res biotoping, but if not then it would be too expensive/destructive.*
QAKTA	*Grab sample associated with clip would not be useful, not in the context of the method.*
QAMTA	*Stills image useful only if higher definition than video.*
QADTA	*Still image at 2-3 points along the film sample would probably encompass majority of what was picked up on film but with greater accuracy in ID, plus additional species may be picked up which could not otherwise be seen easily through the moving image.*
QAATB	*Stills would have been much better for species identification.*
	Technical comments
QAHTA	*Need camera field of image indicated.*
QABTA	*Using windows media player it was confusing - 'title 3' related to 'clip 2' for example.*
	Biotope classification

QAMTA	*Majority of time spent on id of out-of-focus smaller animals and biotope classification.*
QAMTC	*Lots of time spent trying to aquaint with biotope manual, not included in times given - that would have meant hours!*
QAMTB	*Analysis sped up over 10 clips after getting eye in, more familiar with forms, and species names and codes already written in.*
	Forms
	Data entry and general
QAA	*Useful framework.*
QAC	*Appears that very little thought has gone into designing these recording forms for video analysis. We already knew that the MNCR recording forms are not adequate or appropriate to this medium, and we anticipated substantial development of a new recording system prior to this first Ring Test exercise.*
QAA	*Long and tedious.*
QACTB	*Form lacks common sense!*
QAA	*Lack of space for answers.*
QAATD	*Space not big enough to write in.*
QABTA	*Not enough space to fill in by hand, especially life forms or biotope codes, and no space to fill in more than one.*
QAC	*Not enough space to fill in by hand, increase the row height for writing.*
QAA	*Contents page for CD in guidance notes is essential as some testers didn't find species directory.*
QAKTA	*Too much info required on species form.*
QANTB	*Can we get all forms electronically?*
	Mistakes
QAA	*Inconsistencies between guidance notes and forms for sediment size classification.*
QAC	*Error in Folk triangle diagram labelling - says gravel is from 4-6mm, should be - 64mm.*
QAMTC	*Typo on benthic species and habitat form - requests sections 3-7 to be filled, but no section 7 and a large section 2 - should it be 'complete section 2-6'?*
	Omissions

QAMTA	*Add row asking 'was video fit for purpose/adequate for its use'?*
QAA	*Needs 'unknown' percentage category for substrate classification where could not be determined.*
QAC	*Insufficient metadata supplied. Information on depth is essential, and information on tow lenth, tow speed, type of camera (drop camera, sledge, dever etc.) would be useful.*
QAHTA	*Metadata needed on depth, environmental conditions and camera field of image scale.*
QAC	*Need to at least be consistent with the level of metadata supplied in other NMBAQC ring tests.*
	Guidance and terminology
QAA	*Glossary of terms to aid consistency and standardisation of meaning (e.g. Poor, medium, good for video footage is subjective, SACFOR scale (because dependent on tester experience)).*
QAMTA	*Video 'quality' - does this mean technical visual quality or is it fit for purpose?*
QAA	*Don't undertake biotope mapping therefore understanding of JNCC classification variable, therefore assistance necessary.*
QADTA	*More guidance needed on 'rock features' - were all three features applicable to any hard surface whether it was bedrock or cobble, or did "surface relief" and "texture" only pertain to bedrock?*
QAMTC	*'Completeness of video sample' - unaware of what this means - of course more video would be useful, but only if better quality for better species identification. Not sure how you would make a useful comment in this box.*
QAATC	*Clarification wanted of 'boulder holes' and 'scour' on habitat form.*
QAMTA	*'Surface relief of rock (even-rugged)' - should be for overall relief of habitat not just individual boulders?*
QAMTA	*'Surface relief of sediment (even-uneven)' - does this include boulders on sediment, or cobbles and pebbles?*
QAMTA	*Generic taxonomic description' - guidance was unclear as to whether this was to include species already individually listed, or whether this is just for the additional 'stuff' we are unsure of.*
QANTC	*Didn't understand why species name and generic taxonomic description were split into two columns*
QABTA	*Further guidance needed on waves/ripples, life form abundance, tall and short faunal turf, SACFOR scale, generic taxonomic description (how does it fit in?)*
QANTB	*More guidance required on how to fill out the benthic species form - confused by what was required in some of the columns (e.g. Characteristic species).*

QAA	*'Characteristic species' section is dependent of experience of biotope classification.*
QAC	*Change Folk triangle to the 'reduced' version used in MESH and Seamap - this has 4 classes only that reflect the sediment classification used in the MNCR habitat classification.*
	Substrate/Species categories and usefulness
QAC	*Substrate categories are far too specious and impossible to apply to video - who can differentiate between medium and fine sand? Radical changes needed to the way in which the substrate part of the habitat is recorded. Suggest this should be aligned more with the substrate types used in the MNCR Classification (rock, mixed, coarsse, mud and sand, sand and mud).*
QAA	*Sediment descriptions of fine/medium/coarse sand not necessary because can't see them.*
QAA	*Sediment classification should have listed purely sediment type, then section on algae cover, wood/debris etc, rather than combining.*
QAMTC	*'Sediment on Rock' - from talking to people who have responsibility for inputting data, this means a bank of sediment sweeping up and making a substantial covering on the rock - is this obvious or will people just think it means a light sand/silt deposition, which will occur in many more substrates - possible misunderstanding?*
QAMTC	*Sediment Descriptions' - huge variability between testers, depending how sensitive their eyes were to minor fractions and quality of video. Impossible to be sure about med/fine sand - can often see silt component but not able to gauge exact percentage. This is good for rough guide only, unless substrate is very specifically within a very narrow range of description.*
QACTB	*Sediment classes too specious*
QAATD	*Sand particle sizes and boulder sizes on habitat forms - pointless division!*
QAA	*Unecessary for boulder size to be sub-divided.*
QACTB	*Rock texture, rock features- unnecessary.*
QANTC	*Too many rock and sediment features.*
QAMTC	*Algae' - not happy that features of 'substrate' that must add up to 100%; has bedrock cobbles, sand etc. in the same section as algae. If I want to say that the substrate has a lot of bedrock, I can be prevented from doing that by having to attribute the percentage I would use for bedrock to algae - losing information?*
QACTB	*Large disconnect between forms and habitat classification, forms have little to do with MNCR habitat descriptions.*
QANTC	*Didn't understand why species name and generic taxonomic description were split into two columns.*

	Lifeform and biotopes classification
QAATD	*'Life form name and abundance' - should be included in substrate description.*
QAMTC	*Life Form Abundance' - does this use the SACFOR scale? Not obvious. Using % of substrate overall would seem more useful. 'Tall faunal turf' and 'tubes in sediment' in one case - not obvious which column to use in the SACFOR for life form abundance.*
QAMTC	*Biotope Code assignation - very unhappy with this, have to choose closest to substrate but species don't match, or species and substrate doesnt match, and often doesn't match area/depth etc. E.g. had to raise it up to SS.SMx.CMx rather than with FlyHyd as the sediment description seems accurate but the species compliment is not. The extra definition is even better for the substrate definition, but the dominating and key species are definitely not Flustra or Hydrallmania. This happens in most biotope assignations - lower level biotopes could be used as a coverall, but would use the higher level classification if the species complement was a little more convincing or the video was clearer to confirm the presence of some species.*
QAATC	*Clarification wanted of 'lifeform name' and 'lifeform abundance'.*
QAMTC	*Biotope Name 2' - assume this is for listing a second biotope in video, not for purpose of listing a second choice of biotope ofr consideration?*
QACTB	*Biotope name 2 – unnecessary.*
QAMTA	*Guidance on life forms - if more than 1 allowed per clip (yes!), and whether state each one separately or as a mixed category.*
QAA	*Life form and biotope section problematic.*
QAATB	*Life form and biotope classification far too arbitrary - clips could have fallen into several categories - need to be simplified and improved.*
QAA	*Need guidance notes for life form section - difficult to understand.*
QABTA	*Not enough space to fill in life forms or biotope codes, and no space to fill in more than one.*
QAN	*Biotope classifications unnecessary - thought we'd switched to EUNIS.*
QALTA	*Life form and biotopes not necessary- not applicable for quality of video shown here.*
QADTA	*Life form did not cover all instances.*
QAFTA	*Life form cell unnecessary.*
	Scales - ease of use
QABTA	*Quality of video should be rated 1-5, not poor/mod/good.*

QAMTC	*Scale of 1-5 for rock features - very subjective as a result of what habitat each surveyor has experienced e.g. Craggy 2m-deep gulleys off Skomer, would make all others look very small, so people's idea of a small or large gully will vary and not tally with aim of the form itself. Same for other rock features scored on a 1-5 basis.*
QALTA	*Need a score to indicate what the data from each video could be used for e.g. Basic habitat only (poor), habitat and conspicuous spp. (OK), biotope (good), monitoring quality (top).*
QAC	*1-5 point scales need more guidance on how to use e.g. In rows for sediment>mounds and sediment>burrows, how does one differentiate an absence from a null record. If you enter 1, does this mean absent or low presence? If you make no entry, odes this mean absence or no record? Should use null entry to indicate 'no observation made' and use a zero value to indecate that an observation that the feature was absent.*
QAC	*Disagree with giving a confidence rating for the ID as it encourages guessing, and the scale is open to subjective applications. Far better to maintain a high confidence in ID by moving to an appropriate level in taxonomic hierarchy where you are confident you have the correct ID e.g. if you can't ID Pomatoceros triqueter, just enter Pomatoceros - very few taxa can be ID'd to species level using moving video.*
QAA	*Clarification of numbers next to bedrock would have been helpful.*
QAMTC	*'Life Form Abundance' - does this use the SACFOR scale? Not obvious. Using % of substrate overall would seem more useful. 'Tall faunal turf' and 'tubes in sediment' in one case - not obvious which column to use in the SACFOR for life form abundance.*
	Overall
	Positive
QAMTC	*Enjoyed the test - regularly hear complaints about biotope assignation, so interested in feedback.*
QAA	*Rewarding.*
QAA	*Training, guidelines and standardisation will enable consistent approach.*
QAA	*Took forward to results and future development of scheme.*
QALTA	*Essential as more and more monitoring has legal weight behind it.*
	Negative
QAA	*Challenging.*
QAATB	*Very time consuming.*
QANTA	*Suggest longer deadline or shorter/fewer video clips.*
QANTB	*Longer deadline, especially in summer which is peak survey season.*

QANTB	*Took too long to read through everything and actually do the test and filling in forms etc. not sure three biologist working in this office will be allowed a day each to do this kind of test in future, especially as only use video to monitor gross effects.*