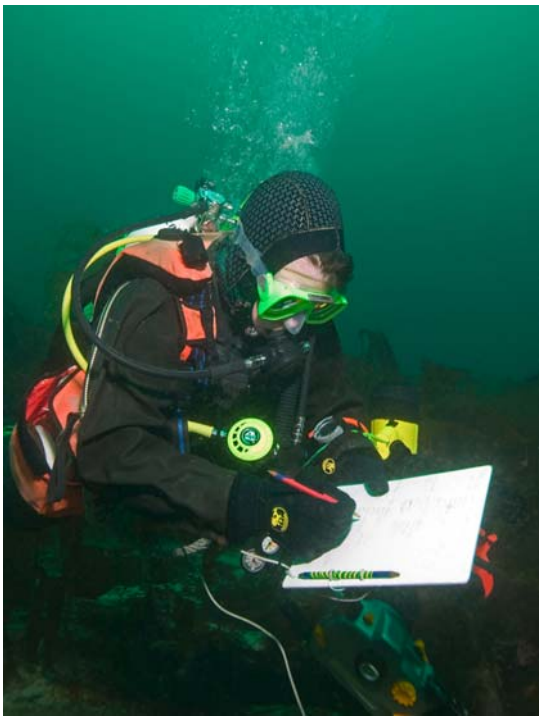
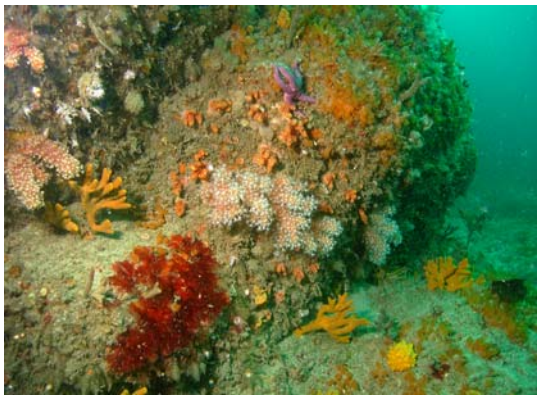
JOINT NATURE CONSERVATION COMMITTEE

JNCC Report No: 418

Assigning Biotopes to Seasearch Data

Marine Conservation Society (MCS) & Seasearch





December 2007

Marine Conservation Society

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Contents

The Seasearch Biotope Key – December 2007 is produced as a separate document.

Executive Summary

This report demonstrates the outcomes of a programme to assign JNCC biotopes to volunteer marine data provided through the Seasearch programme.

Seasearch is providing the main source of volunteer data on UK marine species and habitats. JNCC wishes to make better use of the data, especially for habitat mapping, by ensuring that JNCC biotopes are assigned to suitable Seasearch data. This comprised 356 Seasearch Survey records in 2006, but has risen in 2007.

It was the original intention that both a Biotope Key would be prepared to enable those dealing with the Seasearch data to assign biotopes in future and also that a significant number of Survey forms would have been biotope coded and entered into the Marine Recorder database by the end of this contract.

In the event the preparation of a Biotope Key involved much more work and a much more complex document than anticipated and assessors did not find it straightforward to use it in conjunction with the JNCC website.

A consistency check was carried out and it became clear that with the current level of guidance available the level of consistency between assessors was unsatisfactory and that it would be unwise to assign biotopes to a large number of Seasearch forms at the present time.

Accordingly work has focused on making the Biotope Key less repetitive of material already available on the JNCC website and following a standard key approach concentrating on the features of biotopes provided within Seasearch data.

The revised key was completed by mid November and has been used (with the JNCC website) in a second consistency check, the results of which continue to show that an acceptable level on consistency between assessors is still not being achieved.

Amendments to the Seasearch Survey form are proposed to provide better information for biotope assignment purposes and these will be initiated for the 2008 survey season. The accompanying Guidance Notes and the Seasearch Surveyor Training Programme will be revised to emphasise the information needed for biotope assignment.

However, we do not believe that we have yet reached a stage where JNCC biotopes can be consistently assigned to Seasearch survey data. We are not confident that the changes to be implemented above will resolve the problems in inconsistency since they are, to a great extent, the result of the way the hierarchy of biotopes has been devised.

We will therefore implement the improvements to forms and training, circulate the revised biotope manual but not commence the process of allocating biotopes to 2007, or earlier data, until we can be more confident of a consistent outcome.

1. Background

1.1 Seasearch Data

Seasearch was conceived in the late 1980s as an initiative between the then Nature Conservancy Council and the Marine Conservation Society (MCS) to provide data on marine habitats and species collected by volunteer divers to supplement the Marine Nature Conservation Review (MNCR) programme then being initiated. The initial recording forms were based closely on MNCR forms and were used on a number of Seasearch expeditions in the 1980s and 1990s.

The value of volunteer data was recognised by a number of other organisations and Seasearch was developed along broadly parallel lines by MCS, Scottish Natural Heritage, Dorset Wildlife Trust and Sussex Seasearch.

In 1999 the organisations involved came together and formed the Seasearch Steering Group in order to achieve the full potential of the project. This involves a wide range of organisations and individuals working together. The current membership of the Steering Group comprises:

Marine Conservation Society (MCS)
The Wildlife Trusts (TWT)
Joint Nature Conservation Committee (JNCC)
Natural England (NE)
Countryside Council for Wales (CCW)
Scottish Natural Heritage (SNH)
Environment and Heritage Service (Northern Ireland) (EHS)
Environment Agency (EA)
British Sub-Aqua Club (BSAC)
Professional Association of Diving Instructors (PADI)
Scottish Sub-Aqua Club (SSAC)
Sub-Aqua Association (SAA)
Marine Biological Association (*MarLIN*)
Nautical Archaeology Society (NAS)
and independent marine life experts

The Steering Group sought to widen the appeal of Seasearch to recreational divers by appointing a National Coordinator and the development of a three tier recording programme to allow volunteers to take part at an appropriate level for their skills. The recording forms were revised and a training programme was developed prior to a re-launch of the project in 2003.

Today Seasearch is a UK-wide project which is the main provider of volunteer data on marine habitats and species. There is a National Coordinator and a team of Local Coordinators involved in delivering training, organising surveys and promoting recording by volunteer divers. In excess of 1,000 ovservation and survey forms are completed annually and all data is entered into the JNCC's Marine Recorder database and made available in this format to all of the conservation agencies and local biological data centres who wish to receive it. The data is contributed to the National Biodiversity Network (NBN) and is available for all to access freely through the NBNGateway website.

The habitat data collected includes written descriptions, sketches and the identification of seabed types and seabed cover types. The range of seabed types comprises:

- Rocky reef
- Boulders
- Cobble/pebbles
- Mixed ground
- Sand/gravel
- Mud
- Wreckage
- other

The seabed cover types recorded are:

- kelp forest
- kelp park
- mixed seaweeds
- encrusting pink algae
- short animal turf on rocks
- tall animal turf on rocks
- animal bed (specified)
- sediment with life apparent
- barren sediment

The seabed cover types are entered into Marine Recorder in the Biotopes section as a separate category of biotope to the JNCC biotope suite.

The Seasearch Survey Form (the higher level at which data is recorded) should provide sufficient information to allow the assignment of a JNCC biotope code. There is a box on the form to allow this to be done, but prior to this exercise there was no guidance to recorders, post-survey assessors or data entry personnel on how to go about the process. Consequently very little of the Seasearch Survey Form data has had biotope codes assigned. The survey form data comprised 356 Seasearch Survey records in 2006, but this has risen in 2007.

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1.2 Aims of this contract

The JNCC has supported Seasearch and funds have been used primarily to support the entry of data into Marine Recorder and its management and transfer to the NBNGateway.

In addition to the general support JNCC wished to see the Seasearch survey data assigned JNCC biotopes and sought the undertaking of the following:

1. Assign biotopes to 250 Survey Forms (2003-2005) from different geographical areas and including JNCC's priority area of NE Scotland
2. Produce a short report on how the two habitat schemes fit together and advise on any adjustments to Seasearch Survey form which would aid biotope assignment in future
3. Prepare a biotope checklist or key to aid in future biotope assignment of Seasearch data
4. Test the assignment validity by assigning biotopes to all 2006 survey form data (340 forms)
5. Provide revised NBNDATA file with all biotope assigned data to date.

The reminder of this document analyses the work undertaken and the development of the exercise in response to the initial results.

2 Outcomes

2.1 Biotope Key (Phase 1)

MCS sub contracted three elements of the programme to Sea-Scope, a contractor with experience both of Seasearch and the JNCC biotope codes. These were:

1. the preparation of a biotope checklist or key for entering Seasearch data
2. the assignment of 250 survey forms in two stages
3. advise on and implement adjustments to the Seasearch survey form

In the event, within the funding made available the contractor was able only to prepare the key and assign 25 forms.

The Draft Seasearch Biotope Key was produced in mid June and is available but not attached as it has been superseded

The document comprised:

Introduction (2 pages)

Making sense of biotopes – an explanation of the concept of biotopes and how the JNCC biotope codes are constructed (4 pages)

How to use the key – further explanation and how to enter the data into Marine Recorder (3 pages)

Your habitat description – a key to assess habitats into the three relevant broad habitats (infralittoral rock, circalittoral rock and sublittoral sediment), explanations of the exposure and tidal streams categories, and tables showing the level 3 main habitats and the range of biotopes within them (21 pages)

Summary descriptions of biotopes – a summary of each of the biotopes considered relevant to Seasearch records, derived mainly from the JNCC website (123 pages)

Quick Search – a list of some distinctive biotopes which can be identified without going through the full key process (2 pages)

Appendicies – definition of terms, the full suite of JNCC biotopes listed (16 pages)

2.2 Assessment of Biotopes

25 Seasearch Survey Forms were coded by SeaScope. These are shown in Annex 1 and cover sites from 4 surveys in NE Scotland dating from 2005 and 2006.

The draft biotope key was distributed to a range of Seasearch data entry personnel together with a questionnaire. The aim was for them to use the document to assign codes to a limited number of Survey Forms from their own area and to report back on how they found the process and the key. There was a closing date of the end of July for responses. Responses were received from four assessors who had coded a further 95 forms covering locations as diverse as NE Scotland, Northern Ireland, Isles of Scilly, Lyme Bay and the Channel Islands.

This means that a total of 120 forms had codes assigned.

A summary of the responses to the questionnaire, which also includes comments from JNCC, is shown in Annex 2. It was clear that assessors did not find the process straightforward and had relatively little confidence in the biotope assessments they had made. Whilst parts of the draft Biotope Key were felt to be helpful, others were less so and some assessors felt the information already available on the JNCC website was more helpful. It was therefore considered important to assess the consistency of the allocations before encouraging the coding of large numbers of forms as originally intended.

2.3 Quality Assurance Check (Phase 1)

The purpose of this additional stage was to test the consistency of biotopes allocated by different assessors using the draft biotope key. A set of 10 Seasearch Survey Forms was distributed, containing descriptions of 27 habitats, and assessors were asked to allocate codes to each. The forms included some that had been originally assessed, and those filled in both by experienced surveyors (in once case a former member of the MNCR team) and new Seasearch surveyors. Two of the forms were from the same site and completed by different surveyors.

A table of the results of this assessment is attached as Annex 3. This shows the allocations made by the 6 assessors together with comments. The level of agreement is shown by colour coding with 100% agreement shown as dark green >70% agreement in light green, 50-70% agreement as pink and <50% agreement as red. It is clear that the level of consistency was unacceptably low, even at biotope complex level (level 4).

Some of the main issues to be addressed are:

Survey Data

- some of the forms were difficult to assess because of the lack of information on algae and 'turf' species on which many biotopes are based,
- some recorders had identified habitats that contained more than one biotope, whilst marine recorder allows for more than one biotope to be allocated to one survey sample assessors differed in their approach to this,
- Forms do not include exposure and tidal stream information making energy level assessments problematic.

Biotope key

- Whilst the key started well it was not easy to use at the biotope complex/detailed biotope level and involved time consuming trawls through a long list of biotopes. The key approach was not carried far enough,
- A number of assessors found it much more straightforward to use the JNCC website and expandable hierarchy and gave up using the biotope key at an early stage.

The suite of biotopes

- Assessors had considerable problems with the assessment of energy regimes with the overlap between high and moderate energy producing the most problems,

though in one case different assessors identified the same habitat as high, moderate and low energy! This is a critical issue and is the main reason for the poor level of consistency at Level 3, and thus prevents identification of biotope complexes (level 4),
- There was confusion between coarse sediment (SCS) and mixed sediment (SMx) as it seems that both can also include a wide range of cobbles, pebbles, gravel and sands. Again this leads to divergence at a very early stage (level 3),
- There was also confusion between infralittoral and circalittoral sediments as in the absence of seaweeds it is unclear how you distinguish the two, except by depth,
- Many of the Seasearch habitats contain wrecks. Some assessors did not find the 'fouling communities' complexes and when they did they seem to be generalised.

Under the circumstances it was considered unwise to continue to assign biotopes without further consideration, guidance and training and that little confidence could be placed in the results if the programme of allocating biotopes to over 500 forms as originally envisaged was to be continued. For this reason no further forms have had biotopes assigned and none of those already assigned have been entered into Marine Recorder.

2.4 Biotope Key (Phase 2)

In order to address the issues that had arisen, it was decided that the biotope key should be re-visited. The existing draft was too lengthy and involved much overlap with what is already available on the JNCC website. Because it was intended to be used as a Word/PDF document it was not easy to use simultaneously with the JNCC website unless the assessor had access to two computers. The following broad changes were therefore proposed to the draft document:

- Production as a paper document, allowing assessors to use both it and the JNCC website at the same time,
- Retention of all of the introductory material,
- Preparation of keys to the Infralittoral Rock, Circalittoral Rock and Sublittoral Sediment main habitats,
- Removal of all of the detailed habitat pages, relying on assessors to check these on the JNCC website once they have gone as far as they can with the Key approach.

The resulting key was produced in November 2007 as a 45 page printed document which concentrates on a key approach to three relevant broad habitats, Infralittoral Rock, Circalittoral Rock and Sublittoral Sediment.

2.5 Amendments to Seasearch Survey Form

The Seasearch Survey Form has been reviewed to identify how it could be improved to ease the process of biotope assignment. A draft revised form is attached as Annex 4. The main changes are:

Page1 inclusion of tick boxes covering wave exposure and tidal streams (not previously on the form at all,

Page 2 inclusion of tick boxes covering seabed type and main communities for each habitat (previously only provided for the site as a whole),

Page 4 structured species list to ease assessment of communities.
inclusion of Superabundant in the abundance categories

recording where photographs of species exist

It is considered that these changes would not significantly increase the level of information surveyors need to provide, but would ensure that the data needed for biotope allocation is more consistently provided and organised. The revised form was presented to the Steering Group in October and to the Annual Seasearch Workshop in November and comments were sought. No adverse comments have been received and the revised form will be used for 2008 surveys onwards.

2.6 Quality Assurance Check (Phase 2)

A second consistency check was undertaken in November/December using 10 Survey Forms containing 33 habitat descriptions. Eight different assessors used the revised Biotope Key, the JNCC website and their existing experience to assign biotopes to the forms supplied. The forms were designed to cover a range of geographical locations and habitats, and included those completed by experienced marine biologists and recorders as well as by relatively inexperienced volunteers. Three of the forms were also included in the Phase 1 quality check so that the results of using the different types of guidance could be assessed.

The assessors were also varied – two of them had been closely involved with the MNCR and biotope coding (Drs Rohan Holt and Keith Hiscock), three were experienced in interpreting and entering Seasearch data into Marine Recorder (Dr Claire Goodwin, Suzanne Mitchell and Chris Wood), two are Seasearch coordinators and Surveyors (Sally Sharrock and Dr Elisabeth Morris) and our JNCC liaison officer Paolo Pizzolla.

In addition to the quality check, the comments of the assessors were sought on the revised Biotope Key, mistakes in the latter, use of the key with the JNCC website, what was missing from the forms and problems with the biotopes themselves.

The results of the quality check are shown in Annex 5. Regrettably these do not show a significantly improved level of consistency over the first exercise. At biotope complex level (level 4), which is the stage at which this process might provide better data than the existing Seasearch seabed types and seabed cover types already allocated, total agreement is limited to 27% of the habitats assessed. If the acceptable level of agreement is reduced to 70% then there is still only 51% consistency. At biotope level (level 5) 100% agreement is reduced to 6% which is clearly unacceptable.

There are four elements, any or all of which could contribute to the lack of consistency:

- Quality of the data received
- Assessor variability
- Guidance available to assessors
- The Biotopes themselves

These are assessed in the conclusions below.

The views of the assessors in response to the questionnaire were as follows:

Revised Biotope key – all but one assessor found it useful and better than the previous version. The other (experienced) assessor felt it was of no value as it still was based at an early stage on exposure and energy levels. It needed to give equal emphasis to species and physical parameters and therefore you need a variety of entry points – he used the website and prior knowledge and not the key.
The other experienced assessor adopted the following approach:

1. are there characterising species? if so do a search on the website and see what comes out,
2. if no characterising species use the key,
3. once you have reached possible biotopes see if they have already been recorded from the area,
4. ignore seasonal or variable species such as *Corymorpha* (note that at least one biotope is characterised by *Neopentadactyla mixta* which is a seasonal species!)

Errors in the key – a numbers of errors and omissions were identified and have been amended in the final version (Annex 8).

Using the key and JNCC website – all of those who used both found this satisfactory

Problems with survey form data –

- a number of forms mixed habitats (e.g. horizontal kelp and vertical rock below or boulders and sediment),
- there is a need to improve recognition of turfs (hydroid/bryozoan etc) even if individual species not known.
- Should have **S**uperabundant on the abundance scale
- Soft sediments not always well recognised and identified
- Infaunal based biotopes will never be well recorded
- Seaweed ID needs to be improved
- Wave exposure and tidal stream information + other suggested changes will help

Problems with the suite of biotopes – most assessors found difficulties

- Not comprehensive, there are distinctive habitats and species assemblages not covered and no mechanism for identifying new ones
- Boulders amongst cobble/pebble/mixed ground not catered for
- Mixed ground with red algae not covered
- At extremes the energy level concept works but most are in the middle where it is much more complex
- There are differences in the level of detail – e.g. many kelp biotopes but few wreck ones
- Difficult to subdivide mixed areas, and they can be found in both Infralittoral Rock and Sublittoral Sediment
- Wreck biotopes are inadequate – some examples of distinct wreck habitats are:
    - Vertical faces with *Metridium*, *Sagartia elegans* and/or *Alcyonium digitatum*
    - Flat plates with sparse algae
    - Flat plates with pink sea fan forest

Can we assess biotopes with confidence after improvements suggested? – most assessors remained uncertain and felt that more training of surveyors (including a refresher for

existing surveyors) and/or more training of assessors was required. The hierarchy does not lend itself to having confidence at the higher levels as differences frequently occur at level 3 – 'main habitats' (where the energy differences kick in). One assessor felt you needed a number of forms from an area to iron our surveyor bias and provide a wider species list. There was also concern about the time that would be taken to assign biotopes and if the task loading was becoming too high for volunteers and coordinators/data entry personnel.

In order to assess the potential benefits of training for assessors we compared the results of the biotopes allocated by the two experienced ex MNCR personnel (Drs Rohan Holt and Keith Hiscock). This is shown in Annex 6. There are significant disagreements between the two though the level of agreement at biotope complex level is 69% which may be considered acceptable, and compares with 27% for the whole group of 8. Whilst the number in the larger group is likely to provide more room for disagreement, the comparison does suggest that experience in allocating biotopes leads to greater consistency. On the other hand the agreement between the two experienced assessors at biotope level is only 41% which is below the level of acceptability.

We also assessed the results between the first and second assessments for the 3 forms that were common to both. This is shown in Annex 7. In only one case was there complete agreement at biotope level 5 between the two assessments, elsewhere there were variations, in particular between coarse and mixed sediments (level 3) and between high and moderate energy infralittoral rock (level 3). This casts further doubt on the robustness of the results being achieved.

3. Conclusions

The aim of this work was to assess JNCC biotopes to Seasearch data. At the outset both parties hoped this would be a reasonably straightforward process and a significant amount of Seasearch survey data would have biotopes assigned, entered into Marine Recorder and thus made available for JNCC and other parties.

In the event the process has proved much more complex and the focus has changed to assessing whether Seasearch data can be used consistently for biotope allocation. This has involved quality assurance checks which were not originally envisaged and these continue to show significant discrepancies which cast doubt on the value of biotopes which could assigned. The assignment process has not been continued and currently 2007 data is being entered into Marine Recorder using the simplified Seasearch seabed cover types.

The four main variables which need to be considered are:

- The quality of the data received
- Assessor variability
- The guidance available to assessors
- The biotopes themselves

3.1 The quality of the Seasearch data

The data received comes from volunteers with a range of backgrounds, ranging from marine biologists to non specialist recorders who have gone through a training programme.

The forms at present do not ask questions which are important for biotope allocation and volunteers receive limited training in the identification and recording of separate habitats. These problems can be alleviated by the following actions:

- Improving the survey form by:
    - Adding exposure and tidal stream data questions
    - Adding seabed type and seabed cover type to the information collected for each habitat rather than for the site as a whole
    - Adding an animal turf box for each habitat
    - Adding Superabundant to the abundance scale
    - Adding a record of photographs available
- Improving the training and advice available to volunteer recorders by:
    - Revising the Guidance notes that accompany the Survey Form
    - Revising the Seasearch Surveyor Training Course to put greater emphasis on the data needed for biotope assignment and explain how it will be used
    - Contacting all existing volunteer surveyors sending them copies of the revised Survey Form and Guidance Notes
    - Offering a one-day surveyor refresher course covering habitat and community identification and recording
- Improving the guidance available to survey coordinators and data entry personnel by
    - Circulating the revised Biotope Key
    - Offering the opportunity to attend one or more training days

3.2 Assessor variability

The quality assurance assessments have shown an unacceptable divergence of outcomes. Some of this can be put down to variability in the experience of assessors as the experienced assessors reached a higher level of agreement than the group as a whole. Even then it was not acceptable beyond biotope complex level. In a few cases errors can be identified but generally the differences come down to fine decisions, often on energy regimes or type of sediment, which are unlikely to be made much easier by the improvements to the forms and training described above.

Even if it were shown to significantly improve results by having experienced ex MNCR assessors code the forms this would be impractical because of the limited number of individuals with this experience and the limitations on funding to achieve it.

3.3 Guidance available to assessors

The second version of the Biotope Key was welcomed and thought to be useful by all but one of the assessors. However it did not result in a significantly improved level of agreement between them with the first and second assessments producing similarly diverse outcomes. Both of the experienced assessors preferred to start with characterising species and work backwards. If that is the best way to approach the assignment of biotopes then a key approach, such as we have adopted, cannot be devised as the hierarchy is seen by the experienced assessors, as unhelpful. The essential of a key is a hierarchical approach and it will not work if the hierarchy is invalid.

A number of errors in the key, mostly minor, have been identified and corrected in the final version attached as Appendix 8. It is difficult to see how this approach can be taken further.

The other form of guidance to assessors would be in the form of training days as suggested above. However this cannot be achieved internally within Seasearch and would need support in terms of expertise from JNCC staff. We would also benefit from advice from those using the biotope data.

3.4 The JNCC biotopes

We believe there are significant issues around the structure of the JNCC biotopes which make their assignment to Seasearch data problematic or unfeasible.

The major problem is with **energy regimes**. In both the Infralittoral and Circaittoral rock main habitats these come in at the second level. At the extremes, such as sea lochs on the one hand and offshore islands like St Kilda on the other, they are straightforward. However, for most sites the energy levels are somewhere in the middle and there are wide overlaps between the definitions. This is the main factor which produces a low level of agreement between assessors since if the wrong energy level is selected you are taken down differing paths to different biotopes, even where the fundamental biotope is apparent. For example **kelp forest** is frequently identified in Seasearch surveys and is straightforward and easily appreciated by volunteers. It is however extremely difficult to assess a biotope as kelp forests are found in high, medium and low energy infralittoral rock regimes as well as on some sediments. If the biotope hierarchy included such easily identified communities at a higher level then the levels of agreement between assessors would significantly increase.

In the Sublittoral sediment main habitat there is confusion in assessors' minds between **coarse sediment and mixed sediment.** Again this is an early level of distinction in the hierarchy and a divergence here leads to quite different biotopes being assigned.

Mixed ground appears commonly on Seasearch forms and commonly involves boulders lying on sediments such as cobbles and pebbles, coarse sediments or sand. The species composition between the boulders and sediment is quite different but as they are mixed volunteers will normally include them as a single habitat. Whilst we can tell volunteers to separate out such habitats into two for biotoping purposes, it might be more realistic in the long term to accept that there are habitats covering both rock and sediment and allow for them. At present, unless the assessor splits the information provided he/she has to take a decision on whether to go down the rock or sediment route at the first stage.

Vertical and overhanging faces may create problems in deciding if they are in the Infralittoral or Circalittoral zones because of the lack of algae in the sample. Whilst in some cases they can be compared to less steep faces at the same depth to come to a decision, in others this comparison is not available and the assessor needs a good knowledge of the area to know if the given depth is infralittoral or circalittoral.

A similar problem arises with **infralittoral and circalittoral sediments**. Again these may not contain algae and many Seasearch dives take place between 10-20m depth which is the area of overlap between the two. Again only good local knowledge can distinguish the two, but we question the value of the differentiation where similar sediments and species mixes can occur.

Wreck habitats are poorly covered in the suite of biotopes. They are a habitat often covered in volunteer surveys and in some areas can be biologically significant (particularly where they provide the only hard surfaces in an area). At present very diverse habitats have to be shoehorned into the limited range of biotopes available.

3.5 Comparing the value of Seasearch seabed cover types and JNCC biotopes

The decision not to attempt to allocate JNCC biotopes to Seasearch data was originally taken because of the perceived difficulties of the process and to make Seasearch data collection more user-friendly to non specialists. This decision has been vindicated both by the increasing amount of data collected by Seasearch volunteers and the huge difficulties in reaching consistency over biotopes identified in this exercise.

The Seasearch seabed cover types are very coarse covering kelp forest, kelp park, mixed seaweeds, short and tall animal turf, animal beds, sediment with life apparent and barren sediment. There is clearly the possibility of refining these by using them as the starting point for a hierarchical structure (for instance identifying different types of kelp forest by species, and understory flora/fauna), but this would not aid biotope allocation as it would not resolve the problems around energy regime or type of sediment. We have not suggested this approach as it would not make the data more useable by JNCC, however other users looking for a less coarse approach which does not involve the full details of the JNCC biotope system might find it valuable.

3.6 Overall Conclusion

We do not believe that we have yet reached a stage where JNCC biotopes can be consistently assigned to Seasearch survey data. We have suggested and will implement improvements to the Survey Form and training of volunteer surveyors, but are not confident that this will resolve the problems in inconsistency since they are, to a great extent, the result of the way the hierarchy of biotopes has been devised.

We will therefore implement the improvements to forms and training, circulate the revised biotope manual but not commence the process of allocating biotopes to 2007, or earlier data, until we can be more confident of a consistent outcome.

ANNEX 1 – Biotopes Assigned by Sea-Scope

Seasearch Survey forms for Biotope tagging by RI

Forms sent by Calum Duncan

U = Uncertain match
C = Certain match
W = Whole record
P = Part record

	Form No.	Date	Site/Location	Name of Recorder	Biotope 1		Biotope 2		Biotope 3		Biotope 4	
1	SC6/075	29/07/2006	Carr Rocks (South) Fife Ness	Emma Whinfield	IR.MIR.KR.LhypVt IR.HIR.KFaR.LhypRVt	U/W U/W	CR.HCR.XFa.FluCoAs	C/W				
2	SC6/068	30/07/2006	Carr Rocks (North)	Calum Duncan	IR.HIR.KFaR.FoR.Dic	C/W	CR.HCR.XFa.FluCoAs.SmAs	C/W				
3	SC6/073	15/06/2006	South St Andrews Bay	Marion Perutz	IR.MIR.KR.Lhyp.Pk	C/W	SS.SCS	C/W				
4	SC6/132	23/09/2006	?East of Helmsdale	Russell Pursey	IR.HIR.KFaR.LhypFa	C/W						
5	SC6/133	23/09/2006	?2km offshore, nr. Helmsdale	Marion Perutz	SS.SMX.CMx	C/W						
6	SC6/134	23/09/2006	?SW from Bernedale	Stephan Honig	IR.MIR.KR.LhypTX.Pk	U/W	SS.SCS.ICS	U/W				
7	SC6/139	24/09/2006	Brora	Marion Perutz	CR.MCR.EcCr	U/W	CR.MCR.EcCr.AdigVt	C/W				
8	SC6/138	24/09/2006	Reef east of Brora	Russell Pursey	CR.MCR.EcCr.AdigVt	C/W						
9	SC6/140	24/09/2006	Off Helmsdale	Marion Perutz	IR.MIR.KR.LhypTX.Pk	C/W	CR.MCR.EcCr.AdigVt	C/W				
10	SC6/141	24/09/2006	Reef east of Helmsdale	Russell Pursey	Same as above (140)							
11	SC6/149	23/09/2006	?Dive 1	Stephan Honig	IR.MIR.KR.LhypTX.Pk	U/W	CR.MCR.Ecr.FaAlCr.Pom	U/W				
12	SC6/150	24/09/2006	?Dive 3	Stephan Honig	CR.MCR.EcCr.FaAlCr.Adig	C/W	IR.MIR.KR.Lhyp.GzPk CR.MCR.EcCr.AdigVt	C/P C/P				
13	SC6/151	24/09/2006	?Dive 4	Stephan Honig	CR.MCR.EcCr.AFaAlCr.Bri CR.MCR.EcCr.FaAlCr.Adig	C/P C/P	IR.MIR.KR.Lhyp.GzPk	C/W				
14	SC05/155	22/03/2005	Staxigoe Harbour	Jonie Guest	IR.LIR.K.LhypLsac	U/P						
15	SC05/156	08/05/2005	Sclaites Geo	Richard Guest	IR.FIR.SG.CrSp	C/W	IR.FIR.SG.FoSwCC	C/W	IR.FIR.SG.CC.Mo	C/W		
16	SC05/157	20/11/2005	Wreck of St Nicholas, Wick	Richard Guest	IR.MIR.KR.LhypVt	C/W	IR.MIR.KR.Lhyp.Pk	C/W				
17	SC05/158	27/12/2005	Dunnet Head, West Side	Richard Guest	IR.MIR.KR.Lhyp.GzPk	C/W	CR.MCR.EcCr.AdigVt	C/W				
18	SC05/159	14/05/2005	Geo of Sclaites	George Brown	IR.FIR.SG.DenCcor IR.FIR.SG.CC.Mo	C/P C/P	IR.HIR.KFaR.LhypRVt CR.HCR.XFa.SpAnVt IR.FIR.SG.CC.Mo	C/P C/P C/P				
19	SC05/160	14/05/2005	Cliff-face NW of Little Skerry	George Brown	IR.HIR.KFaR.LhypFa	C/W						
20	SC05/161	15/05/2005	Duncansby Head Lighthouse cave	George Brown	IR.FIR.SG.FoSwCC	C/W	IR.FIR.SG.CrSpAsAn	C/W				
21	SC05/162	15/05/2005	Sandy Riddle	George Brown	SS.SCS.CCS	C/W						
22	SC05/163	14/05/2005	Sclaites Geo	Richard Guest	IR.MIR.KR.LhypVt	U/P						
23	SC05/164	14/05/2005	Pentland Skerries	Marion Perutz	IR.HIR.KFaR.FoR	U/W	IR.MIR.KR.Lhyp.Ft	U/W	IR.MIR.KR.Lhyp.Pk	U/W		
24	SC05/170	15/05/2005	Muckle Skerry, Pentland	Jonie Guest	IR.MIR.KR.Lhyp.Ft	U/W	IR.FIR.IFou	C/W				
25	SC05/171	15/05/2005	Duncansby Head	Marion Perutz	IR.FIR.SG.DenCcor	C/W	IR.FIR.SG.CrSpAsDenB	U/W	IR.FIR.SG.DenCcor	U/W	IR.HIR.KFaR.LhypRVt	C/W

ANNEX 2: RESPONSES TO QUESTIONNAIRE

Seasearch Biotope key
Draft June 2007

1. How many Seasearch Survey Forms have you coded?
   (Please list the form numbers at the foot of this questionnaire)

120

2. How many habitats have you coded at each level?

	Category	Code example	Number coded
level 1	'environment'	Marine	3 1.2%
level 2	'broad habitats'	CR	1 0.4%
level 3	'main habitats'	CR.HCR	17 6.8%
level 4	'biotope complexes'	CR.HCR.XFa	55 22.1%
level 5	'biotopes'	CR.HCR.XFa.ByErSp	117 47.0%
level 6	'sub-biotopes'	CR.HCR.XFa.ByErSp.DysAct	56 22.5%

3. Assess your confidence level with each allocated habitat:

	number of habitats	percentage
high confidence – good match to level 5 or 6	81	32.7
reasonably confident – reasonable match at level 5 or 6 but some discrepancies of species etc.	86	34.7
could not match at level 5 or 6 but confident assessment at level 4	47	19.0
uncertain match at level 4	18	7.2
only able to allocate to level 3	16	6.4

4. What information was lacking on the Survey forms to enable you to assess biotopes with confidence? (expand text box if necessary)

Where no survey summary – tidal streams and exposure, both critical.
Difficult to assess whether high or moderate energy site though it is helpful if you know the sites yourself – ie they are 'on your patch'
Some forms lacking an algal id – a main component of some biotopes
Habitat info – many surveyors had difficulty determining sediment composition – especially muddysand/sandy mud
Species info sometimes inadequate
Many recorders use common names and jumbled lists – works better assessing after species entered into MR

5. How did you find the structure and layout of the Draft Biotope Key – how could it be improved?

- Found that the key was only useful to get you up to a level 3 allocation - after that it was a process of working through the descriptions one by one to see if they fitted - I did not think that the key was any more useful than working through the online version of the manual itself. There was no real help with deciding what the habitats could be (e.g. if there is kelp park go to 3, if kelp forest go to 4) so apart from a lot of cut and pasting the key does not seem to have involved much original work.
- Feel it is too complex to be a key but falls short of being a manual – falls between the stools and satisfies neither. Would prefer to have a much more straightforward key, to be used in conjunction with JNCC material on website for detail. The key elements start off but then stop and you end up scrolling through many options which you could as easily (and sometimes more easily) do on the JNCC site.
- First part is much the most useful. Scrolling through detailed biotope pages is frustrating and slow
- Many links, esp. at biotope level don't work (commented on by all)
- Put in links to go back to the layer above in the key – at the middle stages too.
- P23 – SS.Ssa link goes to SS.SCS on p 25, other links don't work well either. SS.SCS link goes to the chart on p24 which is much better place to work from.
- Would have preferred hard copy. You need to be able to look at it overall to see what the range of options is. Sometimes I thought I had a match but later on came across something that fitted as well if not better!
- It is much easier to use the JNCC website version of the full code at least for the hierarchy page that you can expand and contract – particularly when deciding about options for the biotopes within complexes – part of the issue is that links within the key don't work, but it is very nice to have a list just in front of you so you know all the options before you go through each separate page for the biotopes. A list in the key stage of the biotope options would be good.
- The structure of the key was clear and where habitats clearly fell into one of the habitat types there were few problems in following it and usually biotopes or sub-biotopes could be allocated.
- I felt that allocation of exposure was quite subjective and it was hard to determine if current or wave exposure was more important – although some guidance was given on this it could be expanded (possibly with examples?), particularly as it is so important for classification of rock biotopes..
- I felt it hard to distinguish between SS.SCS and SS.SMx and felt that some more definition of sediment terms earlier in the key would have been helpful. There is a mistake in the sediment decrisption for SMx on page 27 – it is a repetition of the SMu description.
- The incorporation of some sample forms with biotopes allocated and the process for determining these would be a useful addition to the key.
- I felt that the allocation of biotopes was quite complex and to have any confidence in my allocations some sort of assessed training would be necessary. I seem to have allocated large numbers of forms to the same biotopes and am not sure if this is because I am overlooking other, similar biotopes. Although I have allocated a high number of forms to the "high confidence" category this is more because there did not seem to be any species discrepancies rather than because I am completely confident they are the correct biotope.
- Circalittoral fine sand has been left out of the key.
- Maerl beds are found by divers doing Seasearch in Scotland – they should be included in the key
- A list of characterising species and habitats where they are typically found would be useful – and points to consider when they are dominant/prominent features in several biotopes.

- Would be very helpful to have a key to help decide which biotopes to consider for specific features… eg: if you have ripples in sand, or eg: silted infralittoral rock which are the potential options for biotopes. At the moment these kind of things are not part of the key – the quick find at the back is a start but should be incorporated more into the key which at present has few key like issues and is not much of an improvement to the full JNCC biotopes available on the web, which can be easily worked through and have the advantage of the expandable hierarchy so you can see at once what all the options are in a list without having to read through lots of pages.

6. Which habitats did you have difficulty categorizing and why? Please attach photocopies with a note on each of the problems encountered.

(some of the specific problems will be included in the sample forms for everybody to have a go at – comments below limited to general issues)

- Mixed boulder/cobble/sand habitats which were difficult to even identify to broad habitat level.
- Many biotopes have very prescriptive species lists – if your species list doesn't fit the detail, you have to decide if it is close enough or go up another level. Many of the habitats looked at do not fit any of the suite of biotopes if you are strict about species composition.
- Wreck habitats very poorly covered by biotope codes.
- It was also difficult to allocate biotopes in some cases where energy regimes were intermediate between two categories (e.g high or moderate energy sites) – in some cases habitats fitted the description of several biotopes that lay on the borderline between categories.
- Several habitats took a long time largely as species lists were not very strong on the algae species that habitats are defined by.
- I also had difficulty deciding between high exposure and moderate exposure sites – since many of these east coast sites are exposed to high wave action over winter and I don't have the relevant charts available to determine tidal streams etc. Usually no information is given on the form regarding wave exposure. Some recorders did mention wave/tidal surge which meant surge gullies were relatively quick biotopes to determine!
- Many of the species on the key seem to be ones that are either not easily recognized and recorded or just not there – in other words you are pretty sure that

7. How long did it take to assess each habitat? (enter maximum time and minimum tine taken)

1 – 50 mins!

ANNEX 3: REVISED SURVEY FORM

SEASEARCH SURVEY FORM

Form No (leave blank)

- If anything is unclear please refer to the **Guidance Notes**.
- Each pair of divers should complete a form between them.
- Please complete all parts of the form. Where there is a * only fill in the information if you know it.

seasearch www.seasearch.org.uk

Validated by	Date	Entered by	Date	MR Ref

Recorder leave blank – for Seasearch use

Your details

Name	Tel No: hm/wk
Address	Email:
	Buddy's Name
	Name of group or survey
Postcode	

Dive/Site details

Site name					Date of dive: dd / mm / yy
General location					Start of dive: : (24hr)
					Dive duration: (mins)
					U/W visibility: m
					Sea temperature: ^{0}c
Position	Latitude		Longitude		W or E
Centre of site	0	.	0	.	
For drift dives From	0	.	0	.	
To	0	.	0	.	

Drift dive? yes / no

Night dive? yes / no

Did you or your buddy take any of the following?

- photographs yes / no
- video footage yes / no
- specimens yes / no
- seaweeds for pressing yes / no

Or OS Grid Reference

Position derived from: (circle) GPS Admiralty chart OS map other

GPS Datum (circle) WGS84 OSGB36

Exposure of site: extremely exposed ☐ v exposed ☐ exposed ☐ mod exposed ☐ sheltered ☐ v sheltered ☐ ext sheltered ☐

Max tidal stream: >6kt ☐ 3-6kt ☐ 1-3kt ☐ <1kt ☐ v. weak ☐

For the area surveyed, what was

the shallowest depth? (m) bsl bcd

the deepest depth? (m) bsl bcd

Tidal correction to chart datum m*

Seabed summary

Summarise: a. the main features of the seabed, b. any unusual features or species, c. any human activities or impacts at the site.

Habitat descriptions

*Complete a box below for each **habitat** you found on your dive. Normally the shallowest habitat is No. 1 even if you have done the dive deepest first. Each written description should tally with the information entered in the columns and diagrams on the next page. If you found more than 3 habitats, continue your descriptions on another form. Tick boxes where shown, and insert percentages (they must add up to 100%) or assign a score from 1-5 as appropriate. If you are uncertain leave the box blank. The biotope code will be assigned later from your description.*

1. DESCRIPTION (PHYSICAL + COMMUNITY)

Seabed type: rock ☐ boulders ☐ cobbles ☐ pebbles ☐ gravel ☐ sand ☐ mud ☐ wreckage ☐ other ☐

Communities: kelp forest ☐ kelp park ☐ red seaweeds ☐ enc pink algae ☐ animal turf ☐

animal bed ☐ sediment with life ☐ barren sediment ☐ BIOTOPE CODE ☐

2. DESCRIPTION (PHYSICAL + COMMUNITY)

Seabed type: rock ☐ boulders ☐ cobbles ☐ pebbles ☐ gravel ☐ sand ☐ mud ☐ wreckage ☐ other ☐

Communities: kelp forest ☐ kelp park ☐ red seaweeds ☐ enc pink algae ☐ animal turf ☐

animal bed ☐ sediment with life ☐ barren sediment ☐ BIOTOPE CODE ☐

3. DESCRIPTION (PHYSICAL + COMMUNITY)

Seabed type: rock ☐ boulders ☐ cobbles ☐ pebbles ☐ gravel ☐ sand ☐ mud ☐ wreckage ☐ other ☐

Communities: kelp forest ☐ kelp park ☐ red seaweeds ☐ enc pink algae ☐ animal turf ☐

animal bed ☐ sediment with life ☐ barren sediment ☐ BIOTOPE CODE ☐

1	2	3	
m			**DEPTH LIMITS**
			Upper (from sea level) (i.e. minimum)
			Lower (from sea level) (i.e. maximum)
			Upper (from chart datum) *
			Lower (from chart datum) *

%			**SUBSTRATUM**
			Bedrock type?:
			Boulders - very large > 1.0 m
			- large 0.5 - 1.0 m
			- small 0.25 - 0.5 m
			Cobbles (fist - head size)
			Pebbles (50p - fist size)
			Gravel - stone
			- shell fragments
			Sand - coarse
			- medium
			- fine
			Mud
			Shells (empty - or as large pieces)
			Shells (living - eg mussels, limpets)
			Artificial - metal
			- concrete
			- wood
			Other (state)
100	100	100	**Total**

1	2	3	
1-5			**FEATURES - ROCK (all categories)**
			Relief of habitat (even - rugged)
			Texture (smooth - pitted)
			Stability (stable - mobile)
			Scour (none - scoured)
			Silt (none - silted)
			Fissures > 10 mm (none - many)
			Crevices < 10 mm (none - many)
			Boulder/cobble/pebble shape (rounded - angular)
			Sediment on rock? (tick if present)

✓			**FEATURES – SEDIMENT (1)**
			Mounds / casts
			Burrows / holes
			Waves (>10 cm high)
			Ripples (< 10 cm high)
			Subsurface coarse layer?
			Subsurface anoxic (black) layer?

1-5			**FEATURES – SEDIMENT (2)**
			Firmness (firm - soft)
			Stability (stable - mobile)
			Sorting (well - poor)

Sketches and plans

*Draw a **profile and/or plan** of the sea bed you encountered on your dive in the space below. Mark (& number) the different habitats, corresponding to the written descriptions on p.2. Indicate conspicuous and/or characteristic species. Make sure you include **depth(s)** (vertical axis) and a **distance** scale (horizontal axis) for a profile and scale and north point for a plan. Indicate the direction of the profile or plan and the direction of any current.*

Species List

*Score the abundance of each group of animals and plants **in each habitat** alongside the name. In the blank spaces list the seaweeds & animals which you were able to identify **positively** from the different habitats. Use latin names if possible, but if you don't know them, common or descriptive names are acceptable. If you are not 100% sure about any, add a question mark. Do not enter names as guesses - it's better to exclude them than to include incorrect identifications. Give abundances in the columns: **S**uper abundant, **A**bundant, **C**ommon, **F**requent, **O**ccasional & **R**are. If you did not note abundances, simply enter a **P** for Present. Continue on a separate sheet, if necessary. If you have a photograph of the species tick the **ph** column.*

	ph	1	2	3		ph	1	2	3
sponges					echinoderms				
cnidarians: hydroids, anemones, corals,					sea squirts				
					fishes				
worms									
crustaceans					seaweeds				
molluscs									
					other or continuations				
bryozoans									
					Continue on a separate sheet if you need to				

Once completed, return the form to the Dive Organiser or to: Seasearch, Marine Conservation Society, Unit 3, Wolf Business Park, Alton Road, Ross on Wye, HR9 5NB.

Your contact details will be included on the Seasearch database and those of partner organisations and will be used to send you information about Seasearch and associated projects. They will not be passed to third parties without your consent. The location, dive details, habitats and species information and the name of the recorder will be entered into a database and made available to the participating organisations and the general public through the Seasearch and NBN websites. If you do not agree with this use of the data do not submit the form.

ANNEX 3: SEASEARCH BIOTOPE CODING CONSISTENCY ASSESSMENT - August 2007

Form No	Hab No	Orig assessment		Assessor 1		Assessor2		Assessor 3		Assessor 4	
1	1			CR.HCR.XFa (FluCoAs or SpMemAdia???)	P/U	CR.MCR.EcCr	-	CR.MCR	W/C	CR.MCR.EcCr.FaAlCr	
	2			IR.HIR.KFaR.Pk	W/C	IR.MIR.KR.LhypTX	-	IR.MIR.KR.Lhyp.Pk	W/C	IR.MIR.KR.LhypT	
	3			SS.SMx.CMx (FluHyd??)	W/U	SS.SCS.CCS	-	SS.SCS.ICS	-	SS.SMx.CMx.FluHyd	
2	1	SS.SMx.CMx.FluHyd	-	SS.SMx.CMx (FluHyd??)	W/U	SS.SCS.CCS	-	SS.SCS.SMx.FluHyd	W/C	SS.SCS.CCS	
	2	SS.SCS.ICS	-	SS.SMx.Imx	W/U	SS.SCS.ICS	-	SS.SCS.ICS	W/C	SS.SCS.CCS	
	3	SS.SSa.IfSa.IMoSa	-	SS.SSa.IfiSa.IMoSa	W/U	SS.SCS.ICS.SSh	-	SS.SSa.IFiSa.IMoSa	-	SS.SCS.CCS	
3	1	-	-	IR.MIR.KR or IR.HIR.KFaR.LhypFa	WU	IR.MIR.KR	-	IR.MIR.KR.LHypT.Ft	W/C	IR.HIR.KFaR.LhypR.Ft	
	2	-	-	CR.HCR.XFa (SpAnVt)	WU	CR.FCR.Cv	-	CR.FCR.Cv.SpCup	W/U	CR.HCR.Xfa	
	3	-	-	CR.HCR.XFa.ByErSp	W/U	CR.HCR.XFaByErSp	-	CR.MCR	W/C	CR.HCR.XFa.FluCoAs	
	4	-	-	-	-	SS.Ssa.IFiSa.IMoSa	-	SS.Ssa.IFiSa.IMoSa	W/C	-	
4	1	-	-	CR.HCR.XFa (ByErSp)	W/U	CR.HCR.XFa	-	CR.HCR.XFa.ByErSp	W/U	CR.HCR.XFa.ByErSp	
5	1	-	-	CR.MCR.EcCr????	W/U	IR	-	CR.FCR.FouFa	W/C	?	
	2	-	-	IR.HCR.XFa.Pk	P/U	IR.HIRKFaR.LhypRVt	-	CR.MCR.EcCrAdigVt	W/C	not a single biotope	
	3	-	-	CR.HCR.XFa IR.HCR.XFa.Pk	P/U P/U	IR.HIR.KFaR.LhypRVt		CR.MCR	W/C	not a single biotope	
				CR.HCR.XFa (SpAnVt???)	P/U						
6	1	CR.HCR.XFa	W/U	CR.HCR.XFa (SpAnVt??)	W/U	CR.HCR.Xfa.ByErSp	-	CR.MCR	W/C	CR.HCR.Xfa	
	2	CR.HCR.XFa.SpAnVt	W/C	CR.HCR.XFa		CR.FCR.Cv	-	CR.FCR.Cv	W/C	CR.FCR.Cv.SpCup	
	3	CR.HCR.XFa.ByErSp. Eun	P/C	CR.HCR.XFa.SpNemAdi a (Eun)	W/U			CR.HCR.XFa.ByErSp.Eun	P/U	CR.HCR.XFa.ByErSp.Eun	U
		SS.SCS.CCS	P/C			SS.SCS	-	SS.SCS.CCS	P/U		
7	1	IR.MIR.KR. (Lhyp?)	W/U	IR.MIR.KR.LHypT? or IR.HIR.KFaR.LhypFa	W/U	IR.MIR.KR.LhypT	-	IR.MIR.KR.Lhyp.Pk	P/U	IR.HIR.KFaR.LhypR.Pk	
								CR.HCR.Xfa.SpAnVt	P/U		
	2	SS.SCS.CCS (PomB?)	W/U	SS.SMx.Imx	W/U	SS.SMx.Imx	-	SS.SCS.ICS	W/C	SS.SMx.CMx	
8	1	-	-	IR.HIR.KFaR,LhypR.Loch .Pk	W/U	IR.HIR.KFaR,LhypR.Pk	-	IR.MIR.KR.LhypFt	W/U	IR.HIR.KFaR.LhypR.Loch	
	2	-	-	CR.HCR.XFa.SpAnVt.Eu n	W/U	CR.HCR.XFa.CvirCri	-	CR.HCR.XFa.SpAnVt	W/U	CR.HCR.XFa.ByErSp	
	3	-	-	CR.HCR.XFa (SpNemAdia???)	W/U	CR.HCR.XFa.ByErSp	-	not considered sep habitat - part of 2	-	CR.HCR.XFa.ByErSp	
9	1	none allocated - too uncertair		SS.SMx.IMx	W/U	SS.SMp.KSwSS.LsacR (CbPb?)	-	IR.MIR.KR.Lhyp.Pk	W/U	IR.LIR.K.LhypLoch	
	2	IR.HIR.KFa.LhypR.Loch	W/C	IR.HIR.KFaR.LhypR (Loch.CvirTub???)	W/U	IR.HIR.KFaR.LhypRLoch	-	IR.MIR.KR.Lhyp.TX.Pk or IR.HIR.KFaR.LhypR.Loch	W/U	IR.LIR.K.LhypLoch	
10	1	-	-	IR.HIR.KFaR.LhypR	W/U	IR.HIR.Fat.BalTub	-	IR.MIR.KR.LHypT.Ft	W/C	IR.HIR.KFaR	
	2	-	-	CR.HCR.FatCtubAdig (Flu.Sag.Msen???)	W/U	CR	-	CR.HCR.FatCtub.Adig	W/U	CR.HCR.XFa.SpAnVt	
	3	-	-	CR.HCR	W/U	CR	-	CR.FCR.FouFa	W/C	?	

Assessor 5		Assessor 6		level 2	level 3	level 4	level 5	
CR.MCR.EcCr	W/U	CR.MCR.EcCr.FaAlCr	w/u	100%	83%	67%	33%	
IR.MIR.KR.Lhyp.Pk	W/C	IR.HIR.Ksed	w/u	100%	50%	50%	33%	algae list inadequate on form
SS.SCS.CCS	W/C	SS.SMx.CMx.FluHyd	w/c	100%	50%	50%	50%	confusion between coarse and mixed sediment prevents agreement at level 3. More an issue of definition than failure of the recorder
SS.SMx.CMx(FluHyd?)	W/U	SS.SMx.CMx	w/u	100%	57%	57%	43%	same confusion as above
SS.SCS.CCS	W/C	SS.SBR.Smus.ModT	w/u	100%	71%	43%		confusion between infralittoral and circalittoral coarse sediment at L4, is it depth alone?
SS.SCS.ICS	W/C	SS.SCS.CCS	w/u	100%	57%	43%	43%	confusion between coarse sand and coarse sediment at level 3,. Assesor error?
IR.HIR.KFaR.LhypFa.Ft	W/U	IR.HIR.KFaR.LhypFa	w/u	100%	57%	57%	43%	confusion between High and Moderate energy at Level 3, once past this agreement would have been higher
CR.HCR.Xfa.BrErSp	W/U	IR.FIR.SG.DenCcor	w/u	83%	50%	50%	0%	confusion whether HCR or FCR at level 3 and no agreement at level 5
CR.HCR.Xfa.BrErSp	W/U	CR.HCR.Xfa.ByErSp	w/c	100%	83%	83%	67%	Once past HCR or MCR high level of agreement
-		SS.Ssa.	w/c	100%	100%	67%	67%	only 3 assessors tried to assign this one
CR.HCR.Xfa.BrErSp (DysAct?)	W/U	CR.HCR.Xfa.CvirCri or??? CR.HCR.Xfa.ByErSp.DysAct	w/u	100%	100%	100%	71%	best yet!
IR.HIR.Ifou	W/C	CR.FCR.FouFa	w/c	60%	40%	40%		most assesors have not found the FCR category. However many wrecks sit on sediments and there is no fouling faunal communities category in SS which his ought to be. Lack of appropriate options the problem here?
CR.HCR.Xfa.SpAnVt	W/U	IR.HIR.KFaR.LhypRVt	p/u					more than one biotope here as some assessors recognise. As there is both IR and CR in the same habitat and assessors have varied between high and mod energy there is almost no agreement
		CR.MCR.EcCr.AdigVt	p/u					
CR.HCR.Xfa.SpAnVt	P/U	IR.HIR.KFaR.LhypRVt	p/c					again two biotopes combined but recognised by most assessors. However very little agreement and much confusion between high and mod energy
IR.HIR.KFar.LhypFa	P/U	IR.FIR.SG.CrSpAsAn or CR.HIR.Xfa.SpAnVt	p/u					
CR.HCR.Xfa.BrErSp	W/U	CR.MCR.EcCr.FaAlCr.Adig	w/u	100%	71%	71%	29%	confusion between high and mod energy at Level 3
CR.FCR.Cv.SpCup	W/U	CR.FCR.Cv.SpCup	w/c	100%	71%	71%	43%	confusion between HCR and FCR at Level 3, once past that much better agreement
CR.HCR.XFa.ByErSp.Eun	W/U	CR.HCR.Xfa.ByErSp	p/u	100%	100%	100%	71%	most assessors split this into two biotopes the rock biotope was consistently assigned
		SS.SMX.CMX	p/c	100%	75%	50%		the sediment biotope was less consistent with confusion between coarse and mixed sediment at Level 3
IR.HIR.KFaR.LHypR.Pk	P/U	IR.HIR.KFaR.LhypRVt	w/c	100%	50%			50-50 split between high and mod energy at Level 3. Once past that disagreement continues as to whether tide swept or park
CR.HCR.Xfa.ByErSp	P/U			100%	100%	100%		2 assesors split Form7Hab1 with a separate biotope for the vertical faces which they agree on up to Level 4
SS.SCS.CCS	W/C	SS.SMx.CMx	w/c	100%	57%	29%		again confusion between coarse and mixed sediment at Level 3 and between infralettoral and circalittoral at Level 4
IR.HIR.KFaR.LhypR.Loch	W/U	IR.HIR.KFaR.LHypR.Loch	w/c	100%	83%	83%	83%	High agreement beyond level 5 for all but one.
CR.HCR.Xfa.ByErSp.Eun	W/U	CR.HCR.Xfa.SpAnVt	p/u	100%	100%	100%	50%	complete agreement at Level 4 but a split between SpAnVT and ByErSp at level 5
		CR.HCR.Xfa	p/u					only 1 assessor identified a separate biotope
CR.HCR.XFa.ByErSp	W/U	CR.HCR.Xfa.SubCrTf	w/u	100%	100%	100%	50%	1 assessor considered this to be the same as H1
IR.HIR.KFaR.LhypR.Loch	W/U	IR.HIR.KFaR.LHypR.Loch	p/u	67%				complete disagreement here. The original assessor was too uncertain to make any decision and energy covered both high, mod and low!
IR.HIR.KFaR.LhypR.Loch	?P/U	IR.HIR.KFaR.LHypR.Loch	w/c	100%	75%	75%	63%	confusion between high, moderate and low energy at level 3 (surprisingly) once past that high agreement to level 5 and beyond
IR.HIR.KFaR.LhypFa	W/U	IR.HIR.KFaR.LhypRVt	w/c	100%	83%	67%		confusion between high and mod energy at Level 3, and no agreement beyond level 4
CR.HCR.XFa.SpAnVt	W/U	CR.HCR.Xfa.SpAnVt	w/c	100%	83%	50%	50%	this is the same as Form5Hab2 and/or 3 but more agreement this time. However confusion at Level 4 between very tide swept and mixed faunal communities
CR.FCR	W/C	CR.FCR.FouFa	w/c	83%	50%	33%		this is the same as Form5Hab1 but more agreement this time because recorder has placed wreckage on boulders rather than sand/gravel. Recorder variation!
		level of agreement 100%		78%	22%	19%	0%	
		70-100%		85%	56%	37%	11%	

ANNEX 4: SEASEARCH BIOTOPE CODING CONSISTENCY ASSESSMENT - December 2007

Form No	Hab No	Assessor 1		Assessor 2		Assessor 3		Assessor 4		Assessor 5	
1	1	CR.HCR.FaT	W/U	IR.FIR.SG.CC.BalPom	W/C	IR.FIR.SG.CC.BalPom	W/U	IR.FIR.SG.CC.BalPom	W/C	CR.HCR.FaT.BalTub	U
	2	IR.HIR.KFaR.LhypR.Pk	W/U	IR.MIR.KR.Lhyp.Pk	W/C	IR.MIR.KR.Lhyp.Pk	W/C	IR.MIR.KR.LhypT.Pk	W/C	IR.MIR.KR.LhypTX.Pk	U
	3	CR.MCR.EcCr.FaAlCr.Sec	W/U	CR.MCR.EcCr.FaAlCr.(Flu)	W/U	CR.MCR.ByH.Flu.Flu	W/C	CR.MCR.EcCr.FaAlCr.Flu	W/U	CR.HCR.XFa	C
2	1	IR.HIR.KFaR.LhypRVt	W/U	IR.FIR.SG.CrSpAsAn	W/C	IR.HIR.KFaR.LhypVt	W/C	CR.HCR.XFa.CvirCri	P/U	CR.HCR.XFa.CVirCri	U
	2	IR.HIR.KFaR.FoR.Dic	W/U	IR.HIR.KfaR.LhypRVt	W/C	IR.HIR.KFaR.LhypVt	W/C	CR.HCR.XFa.CvirCri	W/U	IR.HIR.KFaR.FoR	C
	3	CR.MCR.EcCr.CarSwi.LgAs	W/C	CR.MCR.EcCr.CarSwi.LgAs	W/C	CR.HCR.XFa.Sw.LgAs	W/C	CR.HCR.XFa.SwiLgAs	W/U	CR.MCR.EcCr.CarSwi.LgAs	C
	4	-		-		SS.SMu	W/C	-			
3	1	SS.SMxlmx	P/U	SS.SMp.KSwSS.LsacR.Mu	P/U	SS.SMx.lmx	W/C	SS.SMp.KSwSS.LsacR	W/U		
		IR.LIR.KVS	P/U	LR.LLR.F.Fserr.X	P/U	IR.LIR.K.LSac.Pk	P/C			IR.LIR.KVS	C
						IR.LIR.K.LSac.Ft	P/C				
	2	CR.LCR.BrAs.NeoPro	P/U	CR.LCR.BrAs.AmenCio.Ant	W/C	CR.LCR.BrAs.NeoPro.FS	W/C	CR.LCR.BrAs.AntAsH	W/U	CR.LCR.BrAs	C
	3	CR.LCR.BrAs.NeoPro	W/C	CR.LCR.BrAs.NeoPro.(FS)	W/C	CR.LCR.BrAs.NeoPro.FS	W/C	CR.LCR.BrAs.NeoPro	W/C	CR. LCR.BrAs	C
4	1	SS.SMx.CMx	P/U	SS.SMX.CMx.FluHyd	W/U	SS.SCS.CCS	W/U	SS.SCS.ICS	W/C	SS.SCS.CCS	C
	2	SS.SMp.KSwSS.LsacR.Gv	W/U	SS.SMx.CMX	W/U	SS.SCS	W/C	SS.SMp ?	?/U	SS.SCS.CCS	C
	3	SS.SCS.ICS	W/U	SS.SSa	W/U	SS.SSa.IFiSa.IMoSa	W/C	SS.SCS.ICS	W/U	SS.SCS.CCS	C
5	1	IR.MIR.KR.LhypFt	W/U	IR.MIR.KR.Lhyp.Ft	W/C	IR.HIR.KFaR	W/C	IR.MIR.KR.LhypT.Ft	W/C	IR.HIR.KFaR	C
	2	CR.HCR.XFa.SpAnVt	W/U	IR.FIR.SG.(CrSpAsAn)	W/U	IR.FIR.SG	W/U	CR.FCR.Cv	W/C	CR.FCR.Cv.SpCup	C
	3	CR.HCR.XFa.ByErSp	W/C	CR.HCR.XFa.ByErSp	W/C	CR.HCR.XFa.FluCoAs	W/C	CR.HCR.XFa.ByErSp	W/C	CR.HCR.XFa	C
	4	SS.SSa	W/C	SS.SSa	W/C	SS.SSa	W/C	SS.SSa	W/U	SS	C
6	1	CR.HCR.XFa	W/C	CR.HCR.XFa.ByErSp	W/C	CR.HCR.XFa.ByErSp	W/C	CR.HCR.XFa.ByErSp	W/U	CR.HCR.XFa.ByErSp	U
	2	SS.SCS.CCS.Nmix	W/U	SS.SCS.CCS.Nmix	W/C	SS.SCS.CCS.Nmix	W/U	SS.SCS.CCS.Nmix	W/C	SS.SMx.CMx	C
7	1	CR.FCR.FouFa.AdigMetsen	W/U	CR.FCR.FouFa.AdigMetsen	W/C	IR.FIR.IFou	W/C	CR.FCR.FouFa.AdigMetsen	W/C	CR.FCR.FouFa.AdigMetsen	C
	2	CR.FCR.FouFa	P/U	CR.FCR.FouFa	W/C	IR.FIR.IFou	W/C			CR.FCR.FouFaAdigMetsen	C
		SS.SMx	P/C					SS.SCS.ICS	P/U		
	3	SS.SSa	W/C	SS.SSa	W/U	SS.SSa.IFiSa.IMoSa	W/C	SS.SSa.IFiSa.IMoSa	W/C	SS.SSa	C
8	1	IR.HIR.KFaR.LhypFa	P/U	IR.HIR.KfaR or Lhyp.Ft	P/U	IR.HIR.KFaR	P/C			IR.HIR	P/U
		CR.HCR.XFa.SpAnVt	P/U	IR.FIR.SG.CRspAsAn	P/U	CR.HCR.XFa.SpAnVt	P/C	CR.HCR.XFa.CvirCri	P/C	CR.HCR.XFa.CVirCri	P/U
	2	CR.HCR.Xfa.ByErSp.Eun	W/C	CR.HCR.Xfa.ByErSp.Eun	W/C	CR.HCR.XFa.BrErSp.Eun	W/C	CR.HCR.XFa.ByErSp.Eun	W/C	CR.HCR.XFsByErSpEun	C
	3	CR.HCR.Xfa.ByErSp.Eun	P/U	CR.HCR.Xfa.ByErSp.Eun	P/C	CR.HCR.XFa.BrErSp.Eun	W/C	CR.HCR.XFa.ByErSp.Eun	P/U		
		SS.SMx.CMx	P/C	SS.SSa	P/U			Also sediment?		SS.SCS	C
9	1	IR.HIR.KFaR.LhypR.Ft	P/U	IR.HIR.Kfar.LhypFa or	P/U	IR.HIR.KFaR.LhypFa	W/C	IR.HIR.KFaR.LhypR.Ft	W/C	IR.HIR.KFaRLHypR.Ft	U
		IR.HIR.KFaR.LhypVt	P/U	IR.FIR.SG.CRspAsAn	P/U						
	2	IR.HIR.KFaR.LhypR.Pk	W/C	IR.HIR.KfaR.LhypR.Pk	W/C	IR.HIR.KFaR.LHypR.Ft	W/C	IR.HIR.KFaR.LhypR.Pk	W/U	IR.HIR.KFaR.LhypRVt	U
	3	IR.HIR.KFaR.LhypRVt	W/U	CR.HCR.Xfa.CvirCri	W/U	CR.HCR.XFa.CviCri	W/C	CR.HCR.XFa.CvirCri	W/U	CR.HCR.XFa.CVirCri	C
10	1	SS.SMp.KSwSS.LsacR.CbPb	W/U	IR.HIR.KSed	W/U	IR.LIR.K.LhypLoch	W/C	SS.SMp.KSwSS.LsacR.CbPb	W/U	IR.HIR.KFaR.LhypR.Loch	C
	2	IR.HIR.KSed	W/U	IR.MIR.KR.LhypT.Ft	W/C	IR.MIR	W/U	IR.LIR.K.LhypLoch	W/C	IR.HIR.KFaR.LhypR.Loch	C

	Assessor 7		Assessor 8		level 2	level 3	level 4	level 5	Comments
W/C	no idea!		IR.FIR.SG.CC.BalPom	W/U	71%	71%	71%	71%	Although no seaweeds recorded this was clearly infralittoral as there was kelp below. The two assessors recording CR were (rightly) uncertain
W/C	IR.MIR.KR.LhypPk (or LypT.Pk)	W/C	IR.HIR.KFar.LhypR.Pk	W/C	100%	75%	75%	38%	Divergence at level 3 between high and moderate energy. Divergence at level 5 but within a narrow band of 3 options
W/C	CR.HCR.XFa.FluCoAs	W/C	CR.MCR.EcCr.FaAlCr.Flu	W/U	100%	63%	50%	50%	Divergence at level 3 between high and moderate energy. Good level of agreement after that.
W/C	CR.HCR.XFa.SpAnVt	W/U	IR.FIR.SG.CrSpAsAn	W/U	63%	38%	38%	38%	Divergence between IR and CR at level 2 - no algae present but depth puts in in the IR zone and lack of algae is due to orientation. Divergence between HIR and FIR at level 3. Experienced recorder - suggests assessor variability
W/C	IR.HIR.KFaR.FoR	W/U	IR.HIR.KFar.LhypR.Pk	W/C	88%	88%	88%	63%	I assessor identified as CR - error as kelps shown on drawings/sp list. Otherwise good level of agreement
W/C	CR.HCR.Xfa.SwiLgAs	W/C	CR.MCR.EcCr.CorSwi.LgAs	W/C	100%	50%	50%	50%	Divergence at level 3 between HCR and MCR otherwise complete agreement to level 5
	SS.SMx.CMx	W/C	-		100%	50%			Most assessors did not notice this habitat on the form
	SS.SMx.SMxVS	P/U			100%	60%	40%		Most assessors split this habitat. The sediment biotope at level 3 produced split between those assessing it as SMx (mixed sediment) and those assessng it as SMp (macrophyte) - as algae were described as being on the boulders SMx likely to be more accurate for the sediment
W/C	IR.LIR.K.Lsac.Pk	P/U	IR.LIR.K.Far.Lsac.Ft	W/C	85%	85%	43%		1 assessor (not using the key) put this into Littoral rock -but at CD depth of 4-9m this seems unlikely. At level 4 equal split between KVS (kelp in variable salinity) and K (kelp). Salinity not recorded on Survey Forms so deciding between these biotope complexes will often be a problem.
									Only 1 assessor split the rock part into separate biotopes for kelp forest and kelp park - as only kelp park noted on form forest is wrong
W/C	CR.LCR.BrAs	W/C	CR.LCR.BrAs.NeoPro.	W/C	100%	100%	100%	25%	Complete agreement at biotope complex (level 4) but 2 assessors did not go further and the 6 that did came up with 3 different biotopes at level 5
W/C	CR.LCR.BrAs.NeoPro	P/C	CR.LCR.BrAs.NeoPro.	W/C	100%	100%	100%	88%	Complete agreement at biotope complex (level 4) 1 assessor did not go further but the 7 that did were in complete agreement at level 5
	CR.LCR.BrAs	P/C							1 assessor split this habitat but both assessments in the same area
W/U	SS.SCS.CCS	W/C	CR.HCR.XFa.SpNem.Adig	W/U	88%	50%	38%		1 (experienced) assessor took a completely different approach at level 2 (CR as opposed to SS). Almost compete split between SCS (coarse sediment) and SMx (mixed sediment) at level 3.
W/U	SS.SCS.CCS	W/C	SS.SMp.KSwSS.LsacR.CbPb	W/U	100%	50%	38%		Wide split between 3 options a level 3 SCS (coarse sediment), SMx (mixed sediment) and SMp (macrophyes on sediment)
W/C	SS.SCS.CCS	W/C	SS.SCS.ICS	W/U	100%	75%	50%		Split at level 3 between SCS (coarse sediment) and SSa (sand). Further split between infralittoral and circalittoral at level 4
W/C	IR.MIR.KR.Lhyp.Ft	W/C	IR.MIR.KR.Lhyp.Ft	W/C	100%	63%	63%	50%	almost equal split between HIR and MIR at level 3. Would have been much higher level of agreement over kelp forest which occurs in both HIR and MIR
W/C	CR.FCR.Cv	W/U	CR.FCR.Cv.SpCup	W/C	75%	50%	50%	25%	divergence between IR and CR at level 2 - no algae present in this habitat or H3 which is a similar depth so likely to be CR. Divergence between HCR and FCR at level 3 but would have been high level of agreement beyond that.
W/C	CR.HCR.XFa.ByErSp	W/C	CR.HCR.XFa.ByErSp.DysAct		100%	100%	100%	75%	
	SS.SSa.IFiSa.IMoSa	W/U	SS.SSa.CFiSa	W/U	100%	85%			most assessors stopped at level 3
W/C	CR.HCR.XFa.ByErSp	W/C	CR.HCR.XFa.FluCoAs	W/U	100%	100%	100%	75%	
W/C	SS.SCS.CCS.Nmix	W/C	SS.SCS.CCS.Nmix	W/C	100%	88%	88%	88%	
W/C	CR.FCR.FouFa	W/C	CR.FCR.FouFa.AdigMsen	W/U	75%	75%	75%	63%	
P/C	CR.FCR.FouFa	W/C	CR.MCR.EcCr.FaAlCr.Flu	W/U	63%	50%	50%		
									2 assessors identified a separate sediment habitat but did not agree on what it should be!
W/C	SS.SSa.IFiSa.IMoSa	W/C	Not known		100%	100%	100%	100%	not all assessors went as far a level 5 but all that did were in agreement
P/C	IR.HIR.KFaR	P/U			100%	100%	100%		most assessors split this habitat. The shallow kelp biotope was consistently assessed to biotope complex (level 4) but most did not go further due to the lack of detail on the form
P/C	CR.HCR.XFa.SpAnVt	P/U	CR.HCR.XFa.SpAnVt	P/U	88%	88%	88%	63%	Agreement to level 4 except for one experienced assessor who came to a very different conclusion
			CR.HCR.Xfa.EcCr.CorSp	P/U					1 assessor further divided the habitat
W/C	CR.HCR.XFa.ByErSp.Eun	W/C	CR.HCR.XFa.ByErSp.Eun	P/U	100%	100%	100%	100%	complete agreement throughout
P/C	CR.HCR.XFa.ByErSp.Eun	P/C	CR.MCR.EcCr.UrtScr	W/C	100%	100%	85%	85%	most assessors split this habitat. The one who identified a biotope for the whole sample came to a different conclusion from those who had split it
P/C	SS.SCS.CCS	P/C			100%	60%	50%		The sediment part of the habitat was split at level 3 between coarse sediment (3 assessors), mixed sediment (1) and sand (1)
W/C	IR.HIR.KFaR.LhypR.Ft	W/C	IR.HIR.KFar.LhypR	P/U	100%	100%	100%	88%	also 75% agreement at level 6 (sub-biotope)
									2 assessors identified a separate biotope but did not agree on what it should be!
W/C	IR.HIR.KFaR.LhypR.Pk	W/C	IR.HIR.KFaR.LhypR	P/U	100%	100%	100%	50%	at level 5 differences between kelp park (4 assessors), kelp on vertical rock (2 assessors) & kelp forest (1). I did not go beyond the biotope complex
P/C	CR.HCR.XFa.CvirCri	W/C	CR.FCR.Cv.SpCup	W/C	88%	75%	75%	75%	I assessor identified as IR at level 2. Otherwise good level of agreement
W/C	SS.SCS.ICS.SSh	W/C	IR.HIR.KSed.LsacSac	W/U	63%	50%	25%	25%	divergence at level 2 between IR and SS - habitat of cobble.pebble,sand could fall in either. Wide variation at levels 4&5
W/U	IR.HIR.KFaR.LhypR	W/U	IR.MIR.KR.LhypTx.Pk	W/U	100%	50%	38%	25%	divergence at level 3 between HIR & MIR
			level of agreement 100%		**67%**	**30%**	**27%**	**6%**	
			70-100%		**88%**	**64%**	**51%**	**30%**	

SEASEARCH BIOTOPE CODING CONSISTENCY ASSESSMENT - December 2007 **ANNEX 6**

Results from experienced assessors

Form No	Hab No	Assessor 2		Assessor 8		
1	1	IR.FIR.SG.CC.BalPom	W/C	IR.FIR.SG.CC.BalPom	W/U	
	2	IR.MIR.KR.Lhyp.Pk	W/C	IR.HIR.KFar.LhypR.Pk	W/C	Disagree at energy level 3
	3	CR.MCR.EcCr.FaAlCr.(Flu)	W/U	CR.MCR.EcCr.FaAlCr.Flu	W/U	
2	1	IR.FIR.SG.CrSpAsAn	W/C	IR.FIR.SG.CrSpAsAn	W/U	
	2	IR.HIR.KfaR.LhypRVt	W/C	IR.HIR.KFar.LhypR.Pk	W/C	agree to biotope complex level
	3	CR.MCR.EcCr.CarSwi.LgAs	W/C	CR.MCR.EcCr.CorSwi.LgAs	W/C	
	4	-		-		
3	1	SS.SMp.KSwSS.LsacR.Mu	P/U			
		LR.LLR.F.Fserr.X	P/U	IR.LIR.K.Far.Lsac.Ft	W/C	no agreement even at broad habitat level 2
	2	CR.LCR.BrAs.AmenCio.Ant	W/C	CR.LCR.BrAs.NeoPro.	W/C	agree to biotope complex level
	3	CR.LCR.BrAs.NeoPro.(FS)	W/C	CR.LCR.BrAs.NeoPro.	W/C	
4	1	SS.SMX.CMx.FluHyd	W/U	CR.HCR.XFa.SpNem.Adig	W/U	no agreement even at broad habitat level 2
	2	SS.SMx.CMX	W/U	SS.SMp.KSwSS.LsacR.CbPb	W/U	disagree at main habitat level 3
	3	SS.SSa	W/U	SS.SCS.ICS	W/U	disagree at main habitat level 3
5	1	IR.MIR.KR.Lhyp.Ft	W/C	IR.MIR.KR.Lhyp.Ft	W/C	
	2	IR.FIR.SG.(CrSpAsAn)	W/U	CR.FCR.Cv.SpCup	W/C	no agreement even at broad habitat level 2
	3	CR.HCR.XFa.ByErSp	W/C	CR.HCR.XFa.ByErSp.DysAct		
	4	SS.SSa	W/C	SS.SSa.CFiSa	W/U	
6	1	CR.HCR.XFa.ByErSp	W/C	CR.HCR.XFa.FluCoAs	W/U	agree to biotope complex level
	2	SS.SCS.CCS.Nmix	W/C	SS.SCS.CCS.Nmix	W/C	
7	1	CR.FCR.FouFa.AdigMetsen	W/C	CR.FCR.FouFa.AdigMsen	W/U	
	2	CR.FCR.FouFa	W/C	CR.MCR.EcCr.FaAlCr.Flu	W/U	Disagree at energy level 3
	3	SS.SSa	W/U	Not known		
8	1	IR.HIR.KfaR or Lhyp.Ft	P/U	CR.HCR.XFa.SpAnVt	P/U	no agreement even at broad habitat level 2
		IR.FIR.SG.CRspAsAn	P/U	CR.HCR.Xfa.EcCr.CorSp	P/U	
	2	CR.HCR.Xfa.ByErSp.Eun	W/C	CR.HCR.XFa.ByErSp.Eun	P/U	
	3	CR.HCR.Xfa.ByErSp.Eun	P/C	CR.MCR.EcCr.UrtScr	W/C	Disagree at energy level 3
		SS.SSa	P/U			
9	1	IR.HIR.Kfar.LhypFa or LhypR.Ft	P/U	IR.HIR.KFar.LhypR	P/U	agree to biotope complex level
		IR.FIR.SG.CRspAsAn	P/U			
	2	IR.HIR.KfaR.LhypR.Pk	W/C	IR.HIR.KFaR.LhypR	P/U	agree to biotope complex level
	3	CR.HCR.Xfa.CvirCri	W/U	CR.FCR.Cv.SpCup	W/C	disagree at level 3
10	1	IR.HIR.KSed	W/U	IR.HIR.KSed.LsacSac	W/U	
	2	IR.MIR.KR.LhypT.Ft	W/C	IR.MIR.KR.LhypTx.Pk	W/U	agree to biotope complex level
				level of agreement	**100%**	41%
					level 3	69%

ANNEX 7

SEASEARCH BIOTOPE CODING CONSISTENCY ASSESSMENT - December 2007

Comparison of two assessments for the same form

	level2	level 3	level 4	level 5	level2	level 3	level 4	level 5
Little Skerrie, Portrush, Northern Ireland								
	First Assessment				Second assessment			
1	SS	SMx	CMx	FlyHyd	SS	SCS	CCS	
2	SS	SCS	ICS		SS	SMp	KSwSS	LSacR
3	SS	SCS			SS	SCS	ICS	
White Arch, Anglesey								
	First Assessment				Second assessment			
1	IR	HIR	KFaR	LhypFa	IR	MIR	KR	Lhyp.FT
2	CR	HCR	XFa		CR	FCR	CV	SpCup
3	CR	HCR	XFa	ByErSp	CR	HCR	XFa	ByErSp
4	SS	SSa	IFiSa	IMoSa	SS	SSa		
St Esquere Bay, Alderney								
1	IR				IR	HIR		
2	IR	HIR	KFaR	LHypRLoch	IR	MIR	KR	LhypTX

ANNEX 8 – THE SEASEARCH BIOTOPE KEY

The revised version of the Biotope Key incorporating comments received during the consultation process is produced as a separate document.