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Volunteer participation in marine surveys

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Summary

This report is divided into two main parts. The first part examines existing marine volunteer recording schemes together with their parent organisations, whilst the second part looks at the range of UK Biodiversity Action Plans (BAPs) which lie within the marine sphere.

Volunteers offer a cost-effective means of obtaining valuable marine nature conservation data. Together, they form an unpaid workforce, willing to give of their time, knowledge and enthusiasm in return for supporting a worthwhile cause, a chance to expand their horizons, and the satisfaction that their efforts will be for the common good. This report has found that, through a questionnaire distributed to over 20 voluntary organisations involved in volunteer marine recording, feedback is important. Volunteers value the fact that their efforts are appreciated and they are likely to remain committed to a project if they can see it is being well run and that the data they have helped to acquire is being put to good use.

Examples of existing volunteer projects which record habitat and species information from the intertidal zone include the Sealife Survey project (WWF/MarLIN), the Recording Scheme (Porcupine Marine Natural History Society) and the Shore Watch project (run by the British Marine Life Study Society). Habitats and species in the near-shore subtidal zone are targeted by the Seasearch project (run by the Marine Conservation Society). There are also a number of other recording schemes looking at cetacean species, basking sharks and turtles. The training of individuals participating in these projects is regarded as being of paramount importance if accurate records (especially of species identification) are to be produced.

The report assesses English Nature's role in the various volunteer recording schemes. It is considered appropriate that EN funding be targeted at certain aspects of these schemes and their parent organisations, particularly in the fields of training (of volunteers and staff members); the supply of educational materials; the provision of computer hardware/software and the training of staff in its use; ensuring co-ordination exists between the different voluntary organisations, especially where there is mutual interest in a particular species or habitat; and assistance with feedback and the dissemination of information.

It is appreciated that little is known about the extent and distribution of many BAP habitats and of the distribution and population dynamics of many BAP species. Of the 33 marine BAPs, there are 28 considered by the author of this report to be applicable to volunteer participation at some level. These 28 have been divided into those where volunteers would need to act as observers on board a boat or from cliffs; those where volunteers undertaken survey work on the shore; and those which require volunteers to be fully trained SCUBA divers. Within these 28 BAPs, there are six where the species and/or habitats are considered to be too fragile (e.g. the starlet sea anemone *Nematostella vectensis*, or the saline lagoon habitat) or too dangerous (e.g. mudflats or tidal rapids) for full volunteer participation.

Provisional cost estimates for different levels of English Nature involvement in these volunteer recording schemes are given.

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Chris Wood, Seasearch Co-ordinator, Marine Conservation Society

Contents

Appendices

Part 1. Marine volunteer recording schemes

1. Introduction

1.1 The background to this scoping study

Conserving and enhancing biodiversity is recognised as being a local, national and global responsibility. The United Kingdom was one of 159 countries that signed the Convention on Biological Diversity after the Rio Earth Summit in 1992. This required each country to produce a national Biodiversity Action Plan to spell out how it intends to conserve and protect its biological resources for the future.

The UK Biodiversity Action Plan was published in January 1994 in response to Article 6A of the Convention on Biological Diversity. The Action Plan reviewed the UK biotic resource, described current activity and developed strategies with 59 broad targets for action. It was followed by the UK Biodiversity Steering Group Report (December 1995) which proposed a detailed programme to conserve and, where practicable, enhance biological diversity within the United Kingdom. As part of implementing the recommendations from that report, costed action plans have been prepared for 291 species and 45 habitats in the UK. Of these, there are 19 maritime habitat plans and 19 maritime species action plans (see Table 5.2).

One of the major obstacles to the implementation of the maritime habitat and species action plans is the lack of basic knowledge and understanding about the extent of these habitats, and the distribution and population dynamics of these species. For most of the plans it is not possible to measure progress towards the targets (or even to quantify the targets) until more is known about the resource. This problem is not unique to marine habitats and species but it is a severe hindrance to progress.

Whilst this study looks at various volunteer recording schemes in the whole marine sphere (i.e. both on the shore – *littoral* – and under water – *sublittoral*), its main focus concentrates on sublittoral habitats and species. By the completion of the Marine Nature Conservation Review (MNCR)[1] in 1998, some 60% of Britain's shoreline and inshore waters had been surveyed by in-house marine ecologists and specialist contractors. Since 1998, some of the most accessible information on the distribution of sublittoral habitats and species has been that collected by volunteer marine surveys such as Seasearch (see also section 3.7.2.1) (*pers. comm.*, Dr Angela Moffat, English Nature). This was highlighted in 2001/2 when, as part of the development of the Marine Wildlife Conservation Bill ('the Randall Bill'), the Royal Society for the Protection of Birds (RSPB) sought to identify the sites that might be designated as the proposed Marine Sites of Special Interest (HMSO, 2002). In the areas where there was good Seasearch coverage, the RSPB was able to identify a more comprehensive range of potential sites.

Up until the present time, the geographical coverage provided by volunteer groups carrying out marine surveys has not been uniform and the information available from such groups has been variable in quality. However, these projects have the potential to deliver some of the information that is lacking on the extent and distribution of marine habitats and species

[1] The MNCR came into being in 1987 as part of the Nature Conservancy Council's Marine Science Branch. After the Environmental Protection Act 1990, the MNCR was undertaken by the Joint Nature Conservation Committee (JNCC) on behalf of the Countryside Council for Wales (CCW), English Nature (EN) and Scottish Natural Heritage (SNH) (Hiscock, 1996).

(especially those included under Biodiversity Action Plans), and feed this information to Local Environmental Records Centres as part of the National Biodiversity Network (NBN).

This report seeks to investigate the potential of volunteer marine recording schemes to deliver quality data on BAP habitats and species for use by English Nature, the other country nature conservation agencies and others working to deliver BAP targets.

1.2 Marine habitats and species recording – a brief history

The recording of species on the shores of this country has been a pastime for naturalists since the early nineteenth century, especially those who lived near the coast or who ventured out from the cities to the countryside in order to partake of the 'bracing sea air'. Whilst originating as a fascination for the wondrous creatures which were to be found on the shore (and in rockpools in particular), the Victorian passion for collecting may have depleted seashore habitats of many of their 'choicest' species (Hiscock, 1996). This is what is thought may have happened to the red alga *Anotrichium barbatum*, a BAP species which disappeared from the few sites where it was found along the south coast soon after the turn of the turn of the 20th century (see also section 5.5.1).

The first major milestone in the widespread utilisation of volunteer divers in sublittoral recording schemes in the UK was arguably Underwater Conservation Year, which took place in 1977. A number of projects had taken place before this (e.g. the study by Bellamy & Whittick (1968) of kelp distribution) which had shown that amateur divers could make useful contributions to marine biological research programmes (Sheppard, 1978). During 1977, a number of diving projects of varying degrees of difficulty were undertaken, ranging from direct observation schemes, such as the Species Recording Scheme (Earll & Erwin, 1978), to experimental work and the use of apparatus and instrumentation under water (Nichols, 1980). Other habitat and species recording projects within the programme included the distribution of the common sea urchin *Echinus esculentus* in British waters (Nichols, 1979); a survey of sublittoral habitats and species in the region of Padstow, Cornwall (Hiscock, 1978); and the mapping of sublittoral habitats around Lundy (Nash, 1978).

The success of Underwater Conservation Year led to the continuation of several of the projects as part of the Underwater Conservation Programme in 1978 and 1979, stimulating sufficient interest to prompt the formation of the Underwater Conservation Society in 1979 (renamed the Marine Conservation Society in 1983), under the guidance and enthusiasm of Dr Bob Earll. During the early 1980s, the Society continued to run a number of projects which amateur divers could contribute to, including the Species Recording Scheme and the *Echinus* project. During this period, the Nature Conservancy Council (primarily through its marine scientist Dr Roger Mitchell) provided considerable encouragement and funding to the Underwater Conservation Society (and later MCS) to help promote volunteer marine recording schemes. Indeed, these two individuals were responsible for developing the Seasearch project in the mid-1980s, which became the 'Phase 1' sublittoral habitat recording project of NCC's Marine Nature Conservation review (Eno, 1991).

Seasearch remains the main recording methodology by which sublittoral habitats can be surveyed using a 'Phase 1' level of detail[2]. As will be seen in section 3.6.2.1, the project has now been re-launched nationally (in June 2003), backed by a comprehensive training scheme, a full-time National Co-ordinator and re-vamped recording forms, data from which can be directly input into JNCC's Marine Recorder database.

1.3 The experience of terrestrial volunteer recording schemes

Amateur naturalists have played an important part in our understanding of terrestrial ecology and conservation for centuries. In recent times, the publication of The Atlas of Breeding Birds of Britain and Ireland (Sharrock, 1976) stemmed directly from the considerable efforts of amateur ornithologists, and proved to be an invaluable reference work on how amateur projects can be organised. Today there are any number of schemes which ask for the participation of amateur recorders. For example, surveys which require very little knowledge of their subject matter include a survey during May 2003 of bluebells by PlantLife, and the recording of garden butterflies by Butterfly Conservation (launched in 2002 and continued into 2003).

Many terrestrial recording schemes have been running for a long time. For the purposes of this study, one needs to ask if there are any lessons which can be learnt from their collective experience? Or have subtidal marine recording schemes already progressed beyond the stage of being assisted by the experience of these terrestrial schemes? I think probably the latter is true. A sufficient number of recording schemes involving divers have now taken place for the generalised pitfalls and the beneficial outcomes to have become apparent. Besides, the incorporation of diving into a volunteer recording scheme requires a completely different approach to undertaking terrestrial fieldwork, even if the methods of analysing the acquired data are similar.

2. Using volunteers to collect marine data

This is the situation: the funding for marine conservation work in the UK is limited – some cynics might say extremely limited. There is also a limited number of professional marine biologists in the UK. Added to these statements is the fact that there still remains a vast amount to be learned about marine habitats and species. If we remain ignorant of the resource then we are likely to lose it, little by little, with the diversity of marine habitats and species gradually diminishing as time passes. The more we know, the greater our understanding of the requirements of individual species, their geographical extent and their vulnerability, particularly to human activities.

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[2] A phased approach to surveys, based on terrestrial survey techniques (outlined in Felton & Keymer, 1993), incorporates various levels of detail to suit differing end requirements of surveys:

Phase 1 surveys are broad habitat surveys aimed at identifying the range of habitats in an area, and may give an indication of their extent and distribution. This information can also be used to target the selection of sites for more detailed Phase 2 surveys.

Phase 2 surveys describe the communities and their variation within habitats, thus providing information for assessing the natural heritage importance of sites.

Phase 3 surveys focus on individual species or groups of species within a site, providing detail on demographic performance, abundance and distribution. This information provides details on population and community structure pertinent to site management. [Taken from Hiscock (1996)].

Volunteers offer a cost-effective means of obtaining valuable marine nature conservation data. Together, they form an unpaid workforce, willing to give of their time, knowledge and enthusiasm in return for supporting a worthwhile cause, a chance to expand their horizons, and the satisfaction that their efforts will be for the common good.

2.1 Why volunteer?

There are several reasons why people may wish to take part in recording schemes of one sort or another as volunteers. The most obvious is that of personal motivation. Such motivation may be of an altruistic nature (i.e. I know this will be of benefit to others, but I'm not seeking any benefit to myself), a desire for involvement in a worthwhile activity, or an opportunity to meet like-minded individuals (Phillips, 1982). Increasingly, though, there is a realisation that people are being motivated by self-interest or a desire to better themselves in some way. This in turn is being recognised by the organisations which seek such volunteer participation, a greater emphasis being placed in their programme promotion in terms of how they may help volunteers, as well as through the more traditional benefits to society or to the environment. The act of volunteering can also be seen as being a response to the organisation's image (Hampton, 2002), particularly when there are a number of organisations offering similar participatory schemes. Table 2.1 (overleaf) lists various motivations which have been suggested by a number of authors.

Volunteer ecotourism has grown and developed considerably over the past 20 years. It is based on the premise that participants (from first world countries) will pay to take part in voluntary programmes, often based in remote parts of the world and often in third world countries. Many of the British groups offering overseas trips are described as non-profit organisations or charities (for example Coral Cay Conservation, Frontier, Operation Wallacea, Raleigh International etc.). While the activities and outcomes of these groups are primarily focussed on scientific field research that will include an element of education for the participants, they may also include character development exercises such as adventure activities, and community involvement and training (Wearing, 2001). These additional activities may well provide encouragement for an individual to sign up to a particular volunteer programme in the first place.

The remit of this report does not include studying volunteer ecotourism in any depth, though there are lessons which can be learned from the actual field recording programmes which the various ecotourism organisations run (see also section 3.3.1).

Table 2.1 Suggested motivations involved with volunteering (after Hampton, 2002).

Extrinsic (outer-directed) motivations	Intrinsic (inner-directed) motivations
Henderson (1981; 1984)	
Be of service to others/altruism	Feel needed
Use time constructively	Learn/develop new interests and skills
Receive recognition	Be with particular people
	Meet people
	Have fun
	Be refreshed
	Relax
	Testing/challenge skills
McClelland & Atkinson (cited in Wilson, 1976)	
Power	Achievement
	Affiliation

Extrinsic (outer-directed) motivations	Intrinsic (inner-directed) motivations
Grese *et al*. (2000, cited in Ryan *et al*., 2001) Fascination with nature	 Chance to reflect
Powell (1997) Enjoyment/interest in conservation Gaining experience for a job	 New direction/way of life
Hazelworth & Wilson (1990) Social well-being	 Self-satisfaction Personal well-being
Wearing (2001) Interpersonal awareness/learning Being needed The programme/activity Cultural exchange	 Being cared for by the organisation Travel Adventure Personal growth Self-confidence Spiritual growth

2.2 Who volunteers?

A study of National Trust, the Wildlife Trusts and the British Trust for Conservation Volunteers (Powell, 1997) found that the majority of individuals who take part in volunteer environmental projects are under 30 years old. This is to be expected: young adults have energy, physical ability, enthusiasm and the ideals to make them 'get up and go'. Those who are willing to participate often appreciate a challenge and believe that their contribution, however small, may actually help to make a positive difference.

Of course, although the majority may be under 30 years old, there are also many volunteers, particularly those in the diving fraternity who are interested in marine conservation, who are older than this. Diving is an expensive leisure activity. Not only is there the equipment to purchase, there are also annual costs such as the servicing of equipment, boat fees, air fills and dive club membership (although membership of a dive club or a diving organisation is only necessary when undergoing qualification/training). All this costs money and for many young people, this money is not available.

The older diving volunteers may well have developed a belief in a particular project (if the publicity which accompanies the project has 'done its stuff') or a trust in the organisation running the project. They may well have a greater amount of leisure time on their hands, and would consider themselves to be participating in a worthwhile cause. That said though, they still need to be fit. Most diving organisations now operate a 'self-certification' for medical fitness, which relies on the integrity of the individual to confirm their fitness to dive. An annual diving medical undertaken by a doctor is no longer required.

These 'mature' divers would typically have a reasonable amount of diving experience 'under their belts'. This is useful as it means only a minimal amount of time needs to be spent by those organising the project on diver training (see also section 2.6.4). Instead, training can concentrate on understanding the project itself, instructing the participants in the methodology and the identification of certain marine plants or animals. However, a long-term project involving volunteers should allow for those individuals with little diving experience to be introduced to the project bit by bit, asking them to do only so much as their diving experience allows.

As indicated, volunteers need not be inexperienced participants – although the majority are likely to be. The term 'volunteer' (as used throughout this report) simply means 'unpaid yet willing'! The vast majority will be 'amateur' divers, who have learnt to dive as a recreational sport and who chose to take part in this sport at their leisure and in their free time. It should be noted however, that in many of these projects, professional diving marine biologists may be willing to take part in the project during their free time, and to impart some of their experience and expertise to less experienced individuals (see BOX 1).

Box 1: Menai Sub-Aqua Club

The Menai Sub-Aqua Club, based in North Wales was established in 1995 by a group of divers who wanted to get more out of their diving (hence the club's motto 'diving with a purpose'). The group included professional marine biologists, underwater photographers, marine archaeologists and interested amateurs. As the club has evolved, the focus has become directed towards marine conservation and biological survey work, with a definite tendency to avoid wreck diving, unlike many of the other local clubs! Many of the more active members at the present time are professional marine biologists who work for the Countryside Council for Wales. Perhaps inevitably, they find it impossible to leave behind their recording slates and underwater cameras on the club dives. But this has been to the great advantage of many of the non-marine biologists who have joined the club. The marine life knowledge of these latter individuals has increased markedly with having experts on hand to answer their questions immediately. The group has undertaken a number of Seasearch surveys around Anglesey and the Lleyn peninsula, producing a full report of their findings (Ramsay, 2000) and a number of brief summary reports (e.g. CCW, 2003). The group has also investigated the biology and distribution of a population of rare mantis shrimps in Tremadog Bay (Ramsay & Holt, 2001).

[Information verified by Dr Kirsten Ramsay, Menai Sub-Aqua Club]

2.3 Maintaining an on-going commitment to/from volunteers

Clearly it is of benefit to the organisation running a particular project that commitment to the project by volunteer participants is important. The participants are likely to have built up their own expertise and knowledge within the parameters of the project, and 'old hands' can also be of assistance in training new volunteers. Maintaining this on-going commitment is dependent upon a number of factors. For some there is the prospect of enhancing their job or career experience. Linked to this is the simple fact that participation will look good on a CV, a situation especially relevant to those volunteers seeking their first job or a change in their career. It is also important to maintain an individual's interest – volunteers with a high level of knowledge and expertise often need to be stimulated in order to continue their participation (Ryan *et al*., 2001). Other factors contributing to commitment include social affiliation and friendships, and project organisation. Ryan *et al* (2001) found a positive relationship between the frequency of volunteering and levels of satisfaction, thus suggesting that if an organisation is disorganised, or its activities are sporadic, volunteers may be discouraged from continuing their efforts.

2.3.1 Feedback

Feedback has been found to be of crucial importance to many recording schemes. If volunteers give up their time and are willing to utilise their diving skills and knowledge free of charge, they are entitled to expect something in return (see Irving, 1999). This feedback might be in the form of regular newsletters which acknowledge the assistance of volunteers – some local newsletters may be quite personal and mention volunteers by name, while others, especially those which have a country-wide readership, are likely to be less personal. Examples of such newsletters include those produced for Seaquest, Seasearch Wales, Sussex Seasearch and the Porcupine Marine Natural History Society. The next step up from a

newsletter might be the provision of a free summary report about the project (full reports are usually too large to provide free of charge). Other ideas include free posters (perhaps aimed primarily at schools, as was the case with the Sussex Seasearch project's *Undersea Sussex* poster) and other 'publicity' material.

Another means of providing feedback is through pages on a web site which keep all participants (and others interested in the project) up-to-date with what's going on (provided they have access to the internet). Web sites can also provide access to full survey reports which can be made available as downloadable Acrobat files. The British Marine Life Study Society has gone one step further and produces a regular electronic newsletter *Torpedo* which is e-mailed out to interested parties. In a similar way, information about the MCS Members Dives programme can be e-mailed out to over 200 interested parties by simply clicking on the 'send' button (*pers. comm*., Chris Wood, National Seasearch Co-ordinator).

If organisers of projects are keen to keep their voluntary 'workforce' on board, then the volunteers themselves need to know that their efforts are appreciated, and many are interested in finding out what the data they collected has been used for. For these people, feedback is clearly important. Others may find that the development of their own diving or ID skills is sufficient reward for their continued participation in the project.

3. Existing volunteer marine recording schemes

The collection of biological data by volunteers is well established and organised for terrestrial habitats and species. Organisations such as the Royal Society for the Protection of Birds (RSPB), the British Trust for Ornithology (BTO), local Environmental Records Centres and the Wildlife Trusts have been collecting the recordings, observations and notes on terrestrial wildlife and habitats made by volunteers for decades. However, the collection of marine data is technically more complex – for intertidal areas it involves ensuring surveys are undertaken during periods of low water (often to coincide with spring tides); and for subtidal surveys, surveyors need to be trained divers. Nevertheless, there are a number of voluntary schemes that exist to collect marine biological data. The main ones are summarised below in section 3.2 (see also contact details for these various organisations listed in Appendix 2).

3.1 Marine ecological survey organisations based in the UK

It is surprising how many volunteer-based organisations with an interest in the marine environment exist within the UK. Whilst there are obvious distinctions between some, there is also considerable overlap between others. Some are very much on the fringes of what this study is concerned with (e.g. the long-running National Trust campaign *Operation Neptune* – an appeal to raise money in order to purchase sections of the coast in England and Wales). Some are involved with obtaining raw field data through organising specific surveys (e.g. the Marine Conservation Society); whilst others act as repositories of field observations, relying on individuals to send in their records (e.g. the Porcupine Society of Marine Natural History, the British Marine Life Study Society, or Earthdive).

Table 3.1 summarises the various organisations which are involved in marine survey work using volunteers, either in Great Britain or overseas. This list is reproduced in Appendix 2 in full, with details of contacts etc.

Table 3.1 Organisations involved in marine survey work using volunteers, either in Great Britain or overseas.

Operating in British waters	Operating in overseas waters
British Marine Life Study Society	Coral Cay Conservation
Hebridean Whale and Dolphin Trust	Earthwatch
Marine Conservation Society	Frontier
Marine Life Information Network (*MarLIN*)	Greenforce
Porcupine Marine Natural History Society	Operation Wallacea
The Seahorse Trust	Raleigh International
National Marine Aquarium (fish recording)	Earthdive
Sea Watch Foundation	
The Shark Trust	
Whale and Dolphin Conservation Society	
The Wildlife Trusts (Seaquest)	
Worldwide Fund for Nature UK (ORCA)	
Others?	

3.2 Volunteer marine recording schemes

Listed below are nine volunteer recording schemes operating within UK waters and run by the organisations listed in Table 3.1. The merits of those involving recording by SCUBA divers are discussed in greater detail in sections 3.3 and 3.4.

Basking Shark Watch

Marine Conservation Society http://www.mcsuk.org/baskingsharks.html

Basking Shark Watch is a volunteer recording project to gather information on sightings of basking sharks in UK waters. The project was launched in 1987 and since then information on more than 17,000 basking sharks has been compiled. members of the public and other organisations can report details of sightings including location, numbers, size, markings and behaviour on printed report cards, via Internet or phone. The data gathered has helped to increase our knowledge of the distribution and behaviour of these magnificent creatures. Sightings of basking sharks are most common between April and October along the west coast of Britain and around Ireland. The data gathered by MCS was instrumental in gaining protection of the basking shark in the UK in1998 under the Wildlife and Countryside Act. A factsheet / poster and report cards are available from the Marine Conservation Society. Sightings can be submitted via the Internet.

Seasearch

Marine Conservation Society http://www.seasearch.org.uk

Seasearch is a volunteer underwater survey project for recreational divers to record observations of marine habitats and the life they support. The information gathered is used to increase our knowledge of the marine environment and contribute towards its conservation. Seasearch is co-ordinated nationally by a Steering Group led by the Marine Conservation Society and including representatives from statutory conservation bodies (Countryside Council for Wales, English Nature and Scottish Natural Heritage), the Environment Agency, the Wildlife Trusts, the Marine Biological Association (MarLIN), diver training organisations (PADI, SAA and SSAC), Nautical Archaeology Society and independent marine life experts. Divers can participate in Seasearch training days with an introduction to marine habitat and species identification and survey methods. Seasearch survey expeditions are organised during

the summer. Visit http://www.seasearch.org.uk for more information.

Turtle Watch

Marine Conservation Society http://www.mcsuk.org

Five species of turtle occur in UK waters including the largest and most common to our waters, the leatherback. The Marine Conservation Society, supported by Cheltenham and Gloucester plc and in collaboration with other organisations is working to promote the protection of turtles in the UK and abroad. The UK Turtle Watch scheme aims to encourage fishermen, divers and other sea users to report their sightings of turtles and increase our understanding of the distribution and threats to turtles in UK waters. Turtles are sometimes found entangled in fishing gear and marine litter which can result in death, but prompt and expert action can result in the safe release of entangled turtles. A UK Turtle Code and Advisory Note has been produced which provides details on species identification and action to be taken in response to a sighting or entanglement. This, together with UK Turtle Watch cards to report live and dead sightings, are available from the Marine Conservation Society.

Shore Watch

British Marine Life Study Society http://www.glaucus.co.uk

The British Marine Life Study Society is responsible for producing the journal *Glaucus*, which is the first publication exploring the marine life of the seas surrounding the British Isles available to the general public. The object of Shore Watch is to record wildlife on the seashore around the British Isles. The results will be published in the marine wildlife journal *Glaucus* and in a computer database accessible by contributors and the public. The aims of the project are to:

1) stimulate interest in the seashore as a valuable wildlife habitat;
2) educate the public in the sciences and art of the intertidal zone;
3) give naturalists the opportunity to contribute their knowledge and observations;
4) identify and record any marine wildlife trends;
5) give a common-sense supplement to proper scientific surveys, and
6) publish the merits of British seashore life to the uninitiated and foreign students.

Sea Watch

Sea Watch Foundation http://www.seawatchfoundation.org.uk

Sea Watch Foundation aims to achieve better conservation of whales and dolphins in the seas around Britain and Ireland, by involving the public in scientific monitoring of populations and the threats they face, and by the regular production of material to educate, inform and lobby for better environmental protection.

Sea Watch holds the Joint Cetacean Database – sighting records from the Joint Nature Conservation Committee, Sea Mammal Research Unit and Sea Watch Foundation - on computer, making it probably the largest in the world. The database currently receives 2-3000 sighting records per year. Each record has to be checked for accuracy then transcribed onto the computer database, along with environmental data.

Sea Watch has a number of major projects in coastal areas particularly rich in marine animals or holding important populations of certain species.

Conchological Society Marine Recording Scheme

Conchological Society http://www.conchsoc.org

The Conchological Society of Gt. Britain & Ireland exists to promote the study of Mollusca in its widest aspects and has been at the forefront of biological recording for 120 years. Marine records span some 50 years, and a computerised database holds much of the more recent archive. Information comes from members of the Society via individual enterprise and a programme of field meetings. Professional malacologists, University departments (through undergraduate and postgraduate work and independent contracts) and general biologists, ecologists, divers and naturalists with a particular interest in molluscs, can all play a valuable part in providing records from their field work. These sources combined with input from the Agencies and commercial organisations could provide a comprehensive archive of distributional information upon which, for example, future conservation strategies may be based.

To find out more about the Society and how you can contribute observations and mollusc records visit the Society's Web site

Seaquest

Cornwall & Devon Wildlife Trusts http://www.wildlifetrust.org.uk/cornwall/seaquest.htm

Seaquest South-West is a marine recording and public participation project run jointly by the Cornwall and Devon Wildlife Trusts. Through Seaquest the Wildlife Trusts effectively harness the knowledge of expert conservationists to the enthusiastic efforts of casual or committed sea watchers – people like you. The Seaquest network is made up of ordinary people doing ordinary things – walking on the beach, fishing, sailing, surfing etc. The records are examined by our own experts and shared with other organisations to help conserve our marine life for the future.

Porcupine Marine Natural History Society Recording Scheme

Porcupine Marine Natural History Society http://www.pmnhs.co.uk

The Porcupine Marine Natural History Society is a UK based society with particular interests in marine biogeography and species ecology. The Society co-ordinates a marine species recording scheme for its members and any other interested parties. The scheme was established because the current distribution of many marine species in UK waters is not well known, particularly those species which are uncommon in the UK; and because many valuable records are collected informally and are not normally collated nationally. The primary aim of the scheme is therefore to collect and collate interesting species distribution records that might otherwise be lost or forgotten. The scheme has already collected records of species in areas from which they had not previously been recorded. Records sent to the scheme are held in a computer database and are made available to anyone with interests in those species. Regular articles on recent records are published in the Society's newsletter. For more information on the Society and the recording scheme visit the website.

UK Marine Fish Recording Scheme

National Marine Aquarium http://www.national-aquarium.co.uk/fishreports

The UK Marine Fish Recording Scheme is a project to collect and make available information on the distribution and occurrence of marine and estuarine fish around the British Isles.

These reports are being put into a database, which will become generally accessible through the Internet. A few reports will need to remain confidential for conservation or other reasons.

This scheme, which is managed by the National Marine Aquarium and backed by the Marine Biological Association of the United Kingdom and the National Federation of Sea Anglers, will help scientists assess the present status of British marine fish and detect changes that may occur through human impacts or climatic factors. Historical records will be especially useful.

Every diver, angler, fisherman and even walker on the cliff top or beach can help by reporting any unusual fish they see to this scheme. Have you seen a red sea bream or angel shark? Or are these species disappearing? Are Sunfish going to be as common this year as last? After the European barracuda what is going to be the next new species for the British Isles? Reports can be submitted by e-mail, fax, telephone or post.

3.3 Strengths and weaknesses of the schemes

3.3.1 What makes a successful volunteer programme?

The apparent success or failure of a recording project is a subjective matter. In retrospect, it is often difficult to pinpoint why a particular scheme may have been successful or why it proved a failure. And in whose eyes should it be judged a success or a failure - the project's organisers, the sponsors or the volunteers? Each will be looking for different signs and outcomes. Some suggestions of what these might be are given in Table 3.2 below.

Table 3.2 The different ways of viewing success and failure of a project from the perspectives of project organisers, volunteers and sponsors.

	Project Organisers	**Volunteers**	**Sponsors**
SUCCESS	Large no. of participants	Had good fun	Positive publicity generated
	Good quality data	Met like-minded people	Worthwhile project with which to be associated.
	Large amount of data	Learned more about marine life	Name associated with responsible organisation
	Data entered onto database	Learned more about marine conservation issues	Good co-operation amongst fellow sponsors
	Well organised	Faultless organisation	
	Good quality reports and other 'outputs' produced	Got to hear about other projects	
	Information on web site regularly updated		
	Positive feedback from sponsors		
	Funding needs met		
FAILURE	Small no. of participants	Did not enjoy the experience	No publicity, or even negative publicity, generated
	Poor quality data produced	Little new learned, if anything	Tainted good name of organisation/company
	Small amount of data	No help or advice to hand when needed	
	Data left as record sheets	No indication as to whether my contribution was of use or not	
	Poorly organised / confused objectives / too ambitious	Frustrated by poor organisation	
	No reports or newsletters produced	Frustrated by lack of feedback	
	Information on web site soon out of date		
	Negative feedback from sponsors		
	Under-funded		

As indicated in Table 3.2, the 'success rating' of a data-gathering project may be measured in a number of ways, depending on the viewpoint taken. Primarily, these are:

(a) the quantity and quality of data acquired;

(b) the positive publicity and feedback generated by the project; and

(c) the increase in environmental awareness (or the marine biological/conservation knowledge) of the participating volunteers.

The first of these [a] is usually the main aim of the project's managers (and perhaps the sponsors), the second [b] is the wish of the sponsors (and probably the managers), whilst the third [c] is perhaps the hope of the volunteers themselves. Understandably, few (if any) organisations or their individual staff members are happy to pass on details to 'outsiders' of any particular project or scheme that has not succeeded as originally planned (see BOX 2).

Box 2: NCC's CoastwatcH project

The Marine Science Branch (and later the Marine Nature Conservation Review Team) of the Nature Conservancy Council (NCC) ran its Coastwatch project from 1985 until 1992. The main aims of the project were to map coastal and intertidal habitats throughout England, Scotland and Wales, to measure the extent of each habitat and to note human impacts and activities on the coast. It relied on volunteers walking short stretches of the coast for a couple of hours either side of low water, colouring maps and writing notes on a recording form as they went. A full-time Project Co-ordinator was in post in Peterborough throughout the project's life, and an assistant co-ordinator for approximately 80% of that time. For remote parts of the country, especially sparsely populated areas with long coastlines such as the west coast of Scotland, Orkney and Shetland, dedicated volunteer survey teams with paid leaders were appointed. Some expeditions to areas with particularly long coastlines (the west & north-east coasts of Scotland and the north and south coasts of Devon and Cornwall) involved Earthwatch volunteers from the USA and Canada taking part.

It took six years for the project to be completed. One definitive outcome was an accurate figure for the length of the British coastline at High Water Mark. What was not so definitive were the various figures given for the total area of intertidal sand, rocky shore and pebbles etc. When a single four 1 km^2 'tetrad' was completed by two different volunteer pairs, the results in certain categories were shown to vary by up to 40%. Comparisons were done on other tetrads and similar variations were revealed. These inaccuracies could not be hidden and consequently the results of the whole project were shelved, never to see the light of day.

The moral of this sad tale is to ensure that the data obtained by volunteers are verified by an experienced surveyor wherever possible. Regular checks need to be done to ensure that volunteers know how to ascribe a particular observation to the correct category on the recording form. And that test-runs need to be undertaken before survey results are entered onto a database to ensure that the standard expected of volunteers is being maintained.

[Information taken from Eno (1991) and the author's own knowledge].

A number of overseas volunteer marine recording programmes have been operating from the UK for a number of years. Their areas of interest tend to be in third world countries which often possess outstanding natural resources (e.g. near-pristine coral reefs, seagrass beds, mangrove swamps etc.) but may lack the trained manpower, organisational ability and know-how as how best to conserve these areas. Each programme has its own slant as to what they ask their volunteers to do and how they get local people involved with the programme too. Typically, volunteers are asked to help gather ecological data in order to assess the resource in terms of its species and habitats. Baseline habitat maps can then be drawn up with the help of satellite imagery, allowing for different habitats to be prioritised in terms of their sensitivity to various potentially damaging operations, and for the provision of management recommendations.

These ecotourism programmes do much more than just gather baseline ecological data. Several have evolved into multi-faceted social programmes, working closely with local communities and with national government departments too (see BOX 3). This has come about through building on a successful recording methodology, gaining the trust of the local populace and by valuing the effort made by the participating volunteers.

Box 3: Coral Cay Conservation

Coral Cay Conservation (CCC) is a not-for-profit organisation created in 1986 when a team of British students visited the world's second largest barrier reef in Belize to examine the interaction between fishing and tourism. Besides Belize, the organisation now sends teams of volunteers to survey some of the world's most endangered coral reefs and tropical forests in the Philippines, Indonesia, Malaysia, Honduras and Fiji. Their mission is to protect these crucial environments by working closely with the local communities who depend of them for food and livelihood.

CCC's list of achievements is impressive. Here are just a few:

- Creation of a marine research centre in Belize.
- 1992. Winner of the first CMAS Marine Environment Award.
- 1993. Winner of British Airways Tourism for Tomorrow Global Award.
- 1996. The Belize Barrier Reef is declared a World Heritage Site.
- 1997. Winner of the Worldaware Business Award for effective communication.
- 2002+. Invited to help the Tobago Cays (St Vincent & the Grenadines) become a World Heritage Site.

CCC donates all of its profits to the CCC Charitable Trust. The Trust has:

- Funded conservation diving scholarships for local people.
- Produced education resources for schools in the UK and overseas.
- Raised awareness of conservation issues through events and displays.
- Supported alternative livelihood schemes and other local community projects.

Involving local people has been a cornerstone of CCC's on-going success. Their conservation diving scholarships have been taken up by hundreds of locals, including fishermen, marine biology graduates and teachers. Scholars are given courses in diving marine biology and survey techniques, essential skills for monitoring the long-term health of their coral reefs.

[Information taken from CCC's website: http://www.coralcay.org]

3.4 Data quantity and quality

Usually, the most cost-effective way of ensuring a sufficient quantity of data is gleaned from a project is to encourage as many people as possible to take part in it. However, the situation is rarely as straightforward as this. Too many participants can often create as many problems as too few; and it is also vital to ensure that, no matter how many people take part, the recorded data are passed back to the organisers from the participants at the end of a survey. All too often the promise of "I'll send the survey form to you in the post tomorrow" is made by a departing volunteer at the end of a fieldwork session, but rarely is the promise kept.

One of the most crucial aspects of ensuring that a marine habitat or species recording scheme is successful is that the data acquired through the scheme are accurate. Clearly, there is no point in acquiring data if they are found to be inaccurate. However, there is not always a clear distinction between these two positions. An acceptable 'margin of error' may need to be agreed upon by project managers as part of the development of the project. Precisely what an acceptable 'margin of error' is will vary from project to project – it may be that species identification with 100% certainty is not necessary for some projects (the individual organism in question could be included within a genus or family), yet for others, say in surveying populations of the sunset cup coral *Leptopsammia pruvoti*, it would be crucial to ensure that the surveyor was looking at *Leptopsammia pruvoti* and not some other cup coral. Wherever

possible, it should be pointed out to volunteers that the quality of their recording is essential – if they are not certain about the identification of a species, it should be recorded with a question mark, e.g. *Bugula ?plumosa*, or simply as an unknown species of a particular genus, e.g. *Bugula* sp.

For a number of small-scale species recording schemes, the reputation of the person submitting the record may be sufficient to believe its accuracy (or not, as the case may be). However, if the individual is not known to the project organiser, doubt may be immediately raised in the mind of the organiser and/or data validator, especially if the record is unusual in some way or other. An underwater photograph or video footage is a good way of being able to back up a record. Another is to make sure one's buddy under water sees the same thing and can provide a description of it later on too. Of course, this sort of checking procedure has been incorporated into bird-watching circles for many years: a sighting of a rarity needs to be backed up by a good photograph (if possible) or a sketch, detailed notes, and then it is submitted to a panel of experts who will either accept or reject its validity.

Thorough training of participants is a good way of ensuring that errors in species identification are kept to a minimum. Another is to ensure that participants are not being asked to do too much or being asked to record at a level which is too detailed for them. It is always a good idea to have a person with good marine biological knowledge (and is familiar with the recording project too) on hand after a dive to help with the completion of recording forms and to provide answers to questions immediately.

3.4.1 Data collection

Before divers are put into the water to undertake a recording project, it is important that they understand what they are being asked to record and that they are familiar with the recording methodology. Again, pre-survey training is important here, together with a dive briefing immediately before the dive takes place. Usually, habitat descriptions and records of species seen (and their abundances) are written directly onto a plastic slate whilst under water. Other projects may ask for other data to be recorded, such as MCS's sea fan survey (Wood, 2001) where recorders were required to measure the height and width of individual *Eunicella verrucosa* sea fans, to record their overall condition (on a scale of 1-5) and to note the presence of other, cryptic species on sea fans.

It should not be forgotten that data may also be recorded by means of photographs and video recordings. In circumstances where the underwater visibility is good, such records can be taken by a volunteer inexperienced in marine species recognition, yet be analysed after the dive by a trained marine biologist. A good example of this was during a recent Joint Services expedition to the Pacific (*pers. comm*., Kate Northen, Sea-Scope). The group of volunteer divers had very limited knowledge of fish groups, but several of them had housed digital cameras. Immediately after each dive, images from the cameras were downloaded onto a laptop computer, allowing the 'experts' to identify a number of fish species which otherwise would not have been recorded. Another advantage of having a species identified immediately after a dive was that volunteers could then confidently recognise those species on subsequent dives and gradually build up a personal repertoire of species they could recognise.

During its pilot year in 2002, the re-vamped Seasearch project found that records of GPS positions and site names were sometimes overlooked on survey forms (probably accidentally), in preference to completing the habitat and species section of the recording

form. The training programme is now emphasising the importance of these fields – clearly, if it is not known where the dive took place, the other data are of little use.

3.4.2 Data validation[3]

A number of studies have been undertaken to check the validity and the verification of recording of species by both volunteers and by professional marine biologists. Most of these have been carried out with volunteer divers in tropical waters (e.g. Mumby *et al*., 1995; Darwall & Dulvy, 1996), though there have also been some studies carried out in British waters (e.g. Earll & Erwin, 1978 – see BOX 4). This present scoping study has not come across any recent studies checking the recording abilities of volunteer divers, though numerous trials have been undertaken by professional diving marine biologists as part of the design of monitoring studies for Special Areas of Conservation (SACs), e.g. Hiscock, 1998; Moore *et al*. 1999; Worsfold & Dyer, 1999; Howson & Davison, 2000; and Sanderson *et al*., 2000.

Box 4 An early data verification study

During the Species Recording Scheme in 1977 (Earll & Erwin, 1978), a duplicate diving study was carried out at one site (off the Isle of Cumbrae in SW Scotland) in order to assess the "reliability and repeatability of the scheme". Seven different groups of divers were asked to complete the species recording card (featuring 69 species) at the same site. All the divers had been shown photographic slides of 28 of the 'key' species. Serious mis-identifications occurred in four cases and the error rate for the 28 species was 2%. This was considered acceptable. The results suggested that records from single dives are likely to record prominent and abundant species accurately, but that occasional or rare species are more likely to be overlooked (or simply be unfamiliar to the recorder and therefore shunned). Interestingly, approximately 40% of the 70 people who took part in the Scheme were professional scientists or biology graduates who dived for pleasure.

Typically, trials involve volunteers inspecting and recording from the same area of seabed (often following the line of a transect) from which experienced staff have also recorded. Comparative studies have also looked at the trend of reduced surveyor performance in deeper water in terms of physical, physiological and psychological phenomena (e.g. Mumby *et al*., 1995). The Coral Cay Conservation study (Mumby *et al*., 1995) found that substrate composition and biological cover were recorded with an accuracy exceeding 90% in seagrass habitats and 70-90% in reef sites. Lower figures of 52-70% accuracy were obtained for surveys of corals, including the proportion of species correctly identified, the frequency of erroneous species recordings and the variation of abundance ratings. The Frontier study (Darwall & Dulvy, 1996) looked at the improvement in volunteers' ability to record 56 fish species (in 30 genera) accurately, after 11 dives. They found the 'loss of precision' of volunteers, when compared to an experienced 'control' diver, was reduced from 13% to 0.6%. This confirms the fact that initial returns from volunteer recorders during a project are likely to include more errors than later returns, reflecting an individual's ability to learn as they carry out more survey dives. Clearly, it is important to retain the services of 'trained-up'

[3] There may be some confusion as to the difference in meaning of the terms 'validate' and 'verify'. In their uses here, to **validate** means to ensure that a recording form has been completed correctly; the dictionary states it means "to make something valid or legally acceptable". To **verify** means to establish the accuracy of the actual recording that has taken place; the dictionary states it means "to establish the truth or correctness (of an event) by examination or demonstration. (Oxford Reference Dictionary, 1986). It would appear that the term 'validate' is often used incorrectly to mean checking the accuracy of an individual's ability to record what they see under water.

volunteers wherever possible, particularly where these individuals have demonstrated a good understanding of the project and a willingness to learn.

3.4.3 Data entry

Up until the early 1980s, marine biological survey data were either held in notebooks or on recording cards and their analysis was a time-consuming and thankless task. These days, databases have taken the drudgery out of much of the data analysis. It should not be forgotten, though, that data entry is a skill which is best undertaken by someone who is actually trained in data entry. Volunteers who may be asked to help with data entry should not be expected to be able to undertake this task without training.

Data entry is also the stage when data validation is likely to take place. Forms need to be checked, with queries or omissions which come to light referred back to the individual recorder. It is also helpful for the person undertaking the data entry to have a reasonable knowledge of marine species. Thus when a species has been recorded by means of a common name which does not automatically translate into a latin name, the record must be entered at a higher taxon level. So the record of a 'small spider crab' should be entered onto the database as [family] 'Majidae', a grouping which includes (amongst others) the spiny spider crab *Maja squinado*, the spider crab *Hyas araneus*, Leach's spider crab *Inachus phalangium* and the slender spider crab *Macropodia tenuirostris*. A forthcoming handbook listing scientific and common names of over 600 subtidal species will come in useful here (Irving & Holt, *in prep*.)

All Seasearch records are to be entered onto JNCC's Marine Recorder database. This is likely to be the main database onto which all marine species and habitat information will be entered. To help with this process, CCW commissioned a set of Guidance Notes to be written (Northen, 2003), which should minimise misunderstandings of protocols and of errors creeping in. It is envisaged that a number of entry points will be agreed, including certain Environmental/Biological Records Centres, coastal Wildlife Trusts and established Seasearch groups. Obviously, specific training of volunteer 'inputters' with the whole process of data entry will be of benefit here.

3.4.4 Data dissemination

Data dissemination includes feedback to volunteer recorders and others (see section 2.3.1), the production of reports and other 'end products' of a project, and the use of data by English Nature and its fellow nature conservation agencies for management purposes.

Once collected and entered onto a database, survey data have value. Not only is the information of value for marine nature conservation purposes, it may also be sought by consultancies for incorporation into Environmental Impact Assessments in the near-shore zone, for shoreline management plans and for a whole range of activities which may impinge upon surveyed sites shown to be of interest. If the information is regarded as being in the public domain (which for a project such as Seasearch it is), then there should be no charge for its use. However, the normal practice in such circumstances is to charge for the time that it may take to extract the information from the database and to present it in an easy-to-understand format.

Once entered onto Marine Recorder, data should become accessible by all (i.e. project managers, sponsoring organisations and the volunteer data gatherers themselves) through the NBN Gateway website (http://www.nbn.org.uk) - see also section 4.2.1.

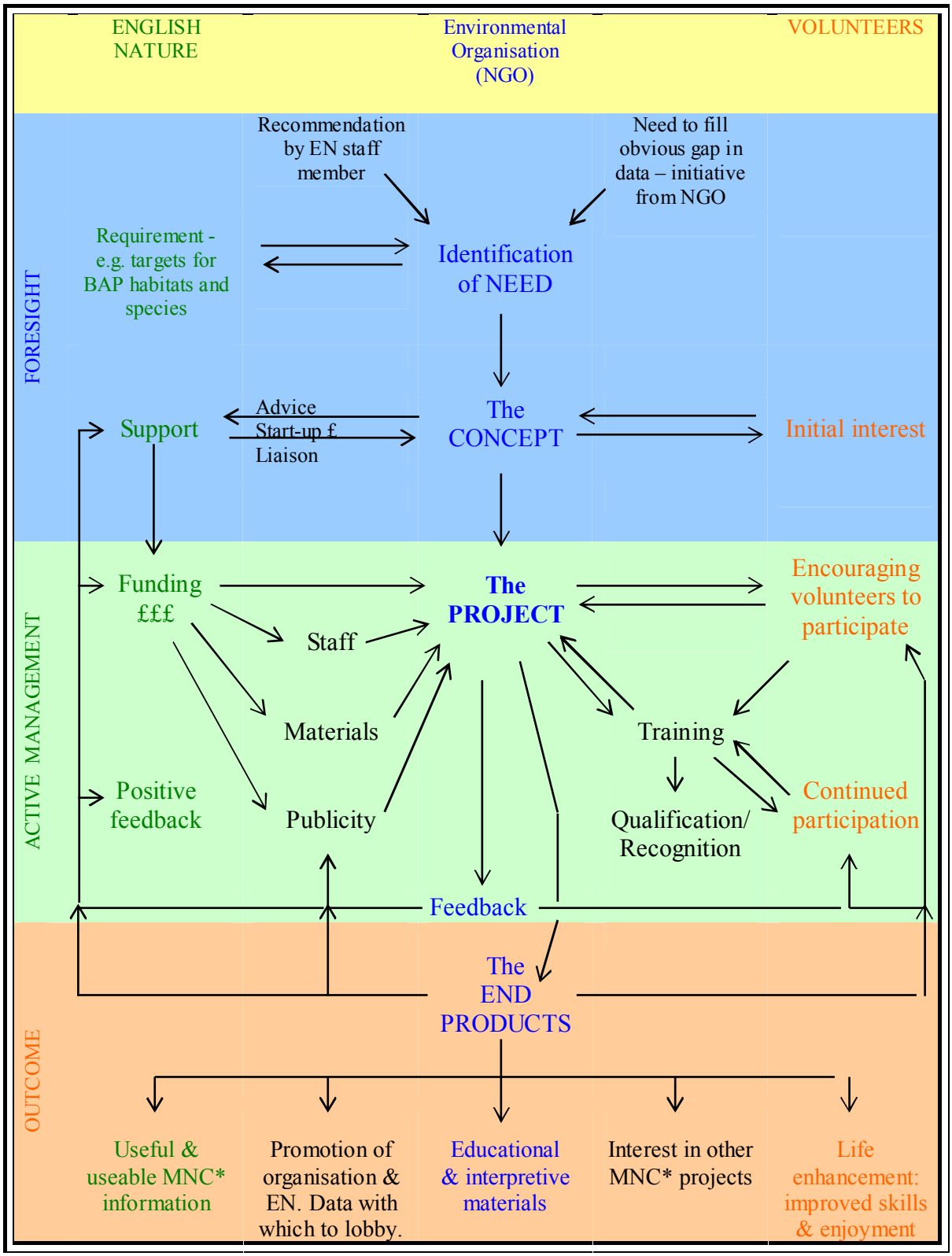
3.5 Project management – getting it right from the start

Clearly it is important to have thought through a project right from the start, before announcing it to the public and seeking volunteers to participate in it. A number of questions need to be addressed in order to provide the project's skeleton. Some suggestions as to what these might be are given below:

- Why are we interested in these data?
- What data are being sought?
- What is known about the area/species already?
- What is the most effective way of getting the data?
- Are any other surveys (perhaps remote surveys using side-scan sonar or acoustic tracking) worth considering before using volunteer divers?
- What level of expertise is expected from volunteers?
- Will volunteers require special training?
- Is there time for this?
- How many volunteers are needed?
- Are there enough 'staff' to supervise the project, both in the field and back in the office?
- What format will the data be in?
- If data are recorded onto paper/recording cards, are there staff members (or volunteers) to enter the data onto a database?
- How will the results be fed back to the project sponsors and the volunteers?
- What are the 'end products' likely to be?

Usually projects require funding of some sort and for many charitable organisations this must come from outside their immediate membership income, although there may be some provision within their budgets to allow for a project to get started whilst looking for funding elsewhere. The nature conservation agencies are an obvious starting point, though this will depend on the nature of the project envisaged and the funding already received by that organisation from the nature conservation agency concerned. Other possible funding bodies include other government bodies, other societies/organisations, grant-awarding charitable trusts, national lottery funding and private sponsorship.

The process of developing a marine survey scheme involving volunteers needs to be thought through carefully (see Fig. 3.1 overleaf). Such planning will reap its own rewards in time.



* MNC = Marine Nature Conservation

Figure 3.1 Diagrammatic representation of the process of developing a marine survey scheme involving volunteers.

3.6 Utilising SCUBA divers in volunteer recording schemes

3.6.1 The impact of divers on the underwater environment

Research has revealed that SCUBA diving causes an impact on the natural environment (e.g. Davis & Tisdell, 1995; Jensen, 2000), though as far as the author is aware, no research has been undertaken on this matter in British waters. This may, to a large part, be due to the poor underwater visibility which affects much of the near-shore areas around the British coastline, thereby making an observational study of this sort almost impossible to carry out. Harriott *et al*. (1997) believed there to be a significant relationship between general diver education and physical impact, but Jensen (2000) purports that diver experience has little correlation: the divers who inflicted most damage in his study were photographers, who generally have high levels of experience.

It is certainly the case that impacts on marine life do occur in British waters as a result of divers. In the author's own experience, he has witnessed an experienced volunteer (100+ dives) who was over-weighted and unable to control his buoyancy, slide down a steeply-sloping underwater rock platform on one of the richest sites within England's only Marine Nature Reserve, destroying much of the attached fauna in his wake! One hopes that such occurrences are rare, but it should be remembered that divers may remain incompetent even after they have been diving for a number of years. Other situations where a lack of control becomes evident are where strong currents prevail. If caught in such circumstances, a diver would be best simply to 'go with the flow'. But often there is a good reason for trying to stay put – usually it is to maintain visual contact with one's buddy – which comes under the category of 'safety'. In order to stay put, one tends to try to cling on to a rock that is not going to move, but this action may involve 'disturbing' the marine life attached to the said rock, albeit inadvertently.

Other damage to marine life can be caused by a diver's fins (either by direct contact with an organism or by wafting up sediment which then settles on an organism), by inappropriate buoyancy control (landing heavily on the seabed at the start of a dive), by a diver's bubbles being caught on the roof of a cave, or by dragging trailing bits of equipment along the seabed. None of these harmful actions are done purposefully, but they all have an effect, which may be accumulative especially in areas which are popular dive sites (see BOX 5).

BOX 5: Underwater nature trails – a good or a bad idea?

The waters around the island of Lundy in the Bristol Channel became Britain's first voluntary marine nature reserve in 1971 (Irving & Gilliland, 1997). The first marine warden to the reserve was appointed in 1978, though only for a six month period (as a pilot project to assess what a marine warden might be expected to do). One of the projects the warden undertook was to establish an underwater nature trail. The site chosen, the Knoll Pins off the island's east coast, consists of three pinnacles lying close to each other, the range of scenic and biological interest ranging from 0 – 24 m depth. This also happens to be an area where many species of nature conservation interest are concentrated. The nature trail (in the form of a rope marked with tags placed at intervals along its length) was laid around two of the pinnacles. Ironically, the popularity of the trail was also its downfall: after just a few weeks, it was found that noticeable damage was being done to a number of attached species in the immediate vicinity of the trail and the decision was made to remove it. The dilemma in such situations is how to balance the educational benefits to divers of such a trail with the potential damage which may be caused to the marine life by its presence

[Information from Dr Nigel Thomas (*pers. comm.*) and from the author's own experience.

3.6.2 Existing volunteer recording schemes for SCUBA divers

A number of recording schemes already exist whereby volunteers can utilise their skills and put them to good effect. The main ones are elaborated upon below.

3.6.2.1 Seasearch

The Seasearch project has been operating since 1987. It was preceded by a programme of diving projects which the Marine Conservation Society (and, prior to 1983, the Underwater Conservation Society) organised for its members (see section 1.2). The Seasearch concept was devised by Dr Bob Earll of the Marine Conservation Society and Dr Roger Mitchell of the Nature Conservancy Council. It was developed as being a sublittoral Phase 1 volunteer project which would contribute to the NCC's Marine Nature Conservation Review (MNCR). Initially, Seasearch was run as one-off expeditions to remote parts of the UK (particularly NW Scotland – e.g. Gubbay & Nunn, 1988), where baseline information could be obtained on the sublittoral habitats for potential follow-up Phase 2 surveys by the MNCR survey team.

After an initial period of enthusiasm, the project 'drifted' rather during the late 1980s and early 1990s, as the Marine Conservation Society went through a cash crisis when little time or resources could be put into the project. In 1992 a local project was set up in West Sussex with funding from the local English Nature team, the Environment Agency and the West Sussex County Council. Starting off with the aim of surveying the seabed around Selsey Bill (from Chichester Harbour to Littlehampton) within two years, the project extended to the whole of the Sussex coast (over 140 km) and is still running! Much of the success of this initiative has been put down to the fact that a co-ordinator was employed on a part-time basis (averaging at 3 days a week during the summer and 1½ days a week during the winter) to run the project. Another separate Seasearch project was established in Dorset in 1995, and a number of other area-centred projects have been established since.

Arguably, the most successful of these has been the Sussex Seasearch Project (as it became known after 1993) which has now involved over 300 volunteer divers and has records from over 750 dives (from over 600 dive sites). The data gathered have been entered onto the MNCR database and, more recently, onto its successor the Marine Recorder database. The outputs from the project have included a species identification fieldguide, a colour poster for schools, a comprehensive 7-year report of the project's findings, a regional Habitat Manual and the identification of 24 marine Sites of Nature Conservation Importance (marine SNCIs). These marine SNCIs include features of geological, archaeological as well as marine biological interest, and they include a relatively small area of seabed (as for a shipwreck) or they may be extensive and cover several hectares (as for a sandstone reef). The sites are recognised by all the relevant statutory authorities and must be taken into account when environmental assessment studies are undertaken.

In recent years, the national development of the Seasearch project has taken a great leap forward, after a scoping study highlighted the potential of its effectiveness as a volunteer project for divers (Irving, 1999). A National Steering Group has been regularly meeting since 1999, with representatives of all of the country conservation agencies, the Environment Agency, all national diving organisations, the Wildlife Trusts and others present. At the start of 2003 a National Co-ordinator was appointed to help promote the project, and it is envisaged there will be an increased take-up of the project by diving clubs over the next few years. A carefully thought-out training programme has been designed and piloted, there are

videos to promote the project and to act as 'virtual' dives in the classroom, and there are now Guidance Notes for inputting the data onto Marine Recorder (Northen, 2003).

3.6.2.2 The Marine Life Information Network (MarLIN)

MarLIN was established by the Marine Biological Association of the UK (MBA) in collaboration with the Joint Nature Conservation Committee (JNCC) and major holders and users of marine biological data and information in Britain and Ireland. *MarLIN*'s aims are:

- to provide a structure for linking available data on marine life around Britain and Ireland.
- to improve the access, display and interpretation of information in support of environmental management, protection and education.
- to be the most comprehensive and easily used source of information about marine habitats, communities and species around Britain and Ireland and their sensitivity to natural events and human activities.

Under its banner of 'Sealife Heritage', *MarLIN* has three programmes which are all to do with recording marine species information. These are:

- Sealife Signpost – a guide to sea life recording in the UK, giving directions to schemes that you can join, and on where to send your sightings of marine species.
- Sealife Survey – information on underwater and seashore species, both online and as waterproof Identification Guides (see below).
- Recording – online recording and feedback, and links to the National Biodiversity Network. The aim is to establish a baseline of 'what is where' for this decade in Britain and Ireland.

MarLIN and Seasearch have recently (May 2003) launched a joint initiative under *MarLIN*'s 'Sealife Surveys' programme. Entitled an *Identification Guide for Selected Underwater Species* (*MarLIN*, 2003), this is a waterproof, A5-size ID guide featuring photographs and concise information on 45 underwater species. The Guide for Selected Seashore Species was launched in August 2003 to encourage volunteer recording of intertidal species. The species in both guides are easily identifiable and are indicators of climate change, key to the make up of a community, non-native or have their own UK Biodiversity Action Plan – see BOX 6.

MarLIN developed recording projects with WWF-UK and PADI Project Aware. The schemes have continued to develop and now receive funding from the Environmental Action Fund of Defra. Through Sealife Surveys volunteer recorders can enter their records on-line using the *MarLIN* Web site. The online recording form features 200 taxa and there are species information pages on over 150 species [(some are listed as distinct species, while others are within a common grouping, e.g. goby) – see BOX 6]. *MarLIN* maintains strong links with other recording schemes and offers to pass records on to relevant schemes, e.g. cetacean records to Seawatch and Seaquest.

Box 6: *MarLIN* / WWF Sealife Survey's groupings of species

Keystone species may influence the make-up of a community by preying on other species (for instance, grazing by sea urchins) or mediating competition between prey species (for instance, by eating sea urchins). They may determine community composition and structure by providing a distinctive habitat or dominating a habitat. The loss of keystone species would lead to the disappearance or replacement of the associated community. As with the 'key stone' of a building, loss of a keystone species leads to rapid, cascading changes in the structure they support. Loss or decline of keystone species, for whatever reason, really matters. In this category, are included 'flagship' species – ones that especially relate to indicating the health of our seas. [13 species of which 6 are BAP species].

Sensitive species. Species that may be killed or damaged by an external factor (whether or not through human activity) and are unlikely to recover rapidly are designated as 'sensitive'. They may be fragile (for instance, have a brittle external skeleton or delicate attachment to the seabed) and easily damaged by physical disturbance or may be susceptible to chemical contamination or extreme environmental conditions. The sensitivity of a species matters most when it is long-lived and slow growing or recruits only sporadically. In such cases, recovery will be extremely slow (perhaps taking more than 25 years) or may not happen. The abundance and continued presence at a location of sensitive species are useful indicators of the health of our oceans and of sustainable use. [24 species of which 12 are BAP species].

Climate change species. Occurrence and distribution of species is ultimately determined by seawater temperatures with many species reaching their northern or southern geographical limits in Britain and Ireland. Other factors that are important in determining species distributions include the direction of prevailing currents northwards along the west coast and the 'quality' of water on the west coast of Scotland and Ireland which seems to favour survival of some species usually associated with the south-west of the British Isles. The most recent predictions suggest that, by 2100, average air temperatures may be between 2 and 4°C higher than at present and seawater temperatures may be as more than 2°C higher than in 2000. Obtaining records of occurrence and abundance of climate change species from as many locations as possible will help to track change in distribution including new arrivals and losses in Britain and Ireland. [45 species of which 8 are BAP species].

Non-native species. A non-native species is one that has been introduced directly or indirectly by human agency (deliberate or otherwise), to an area where it has not occurred in recent times (about 5,000 years BP) and which is separate from and lies outside the area where natural range extension could be expected. The species has become established in the wild and has self-maintaining populations. There are about 65 established non-native species in Britain. Their impact can be substantial in the case, for instance, of the slipper limpet and wireweed (japweed) but often they do not displace native fauna. Despite some attempts to prevent introductions, the 'door' is wide open and, one day, a species that has a severe impact on our native fauna may be introduced. Obtaining records of occurrence and abundance of non-native species from as many locations as possible will help to track change in distribution including new arrivals in Britain and Ireland. [Only 1 species photograph is featured on the website at present – 'japweed'].

Biodiversity Action Plan (BAP) species are part of a UK initiative to take action to maintain and enhance biodiversity. They are usually rare or scarce or may be key species. The more information that we can obtain about BAP species, the more we will know how to protect them.

[Information taken from MarLIN's website – http://www.marlin.ac.uk]

3.6.2.3 Porcupine MNHS Recording Scheme

The Porcupine Marine Natural History Society runs a marine species recording scheme for its members and other interested parties. The primary aims of the scheme are to collate important species distribution records which might otherwise be lost or forgotten, and to collect other interesting information about species ecology, behaviour etc. Some members of the Society are divers, though the majority are non-divers. It may be possible for English Nature to encourage the membership (through the 'carrot' of possible funding) to report on

BAP species and habitats in particular. However, as far as the author is aware, the Society in the past has not run targeted projects.

3.6.2.4 Conchological Society's Marine Census

The Conchological Society's Marine Census scheme was started some 50 years ago and has operated continuously since its inception. The scheme covers UK waters and sea areas, including coasts from France to Norway. The scheme is co-ordinated by a national Marine Recorder (a volunteer), and there is a network of area representatives, some more active than others. Mollusc records are submitted as informal written records, though it is planned to have an on-line recording form on the Society's website soon. Some recent records have been computerised (onto a 'Recordit' database), though most remain on recording cards. Records are vetted as and when submitted, according to knowledge of the skill of the individual recorders.

3.6.3 What can 'amateur' divers be expected to record?

Some 'amateur' divers are considerably more knowledgeable about the marine life they are seeing under water than some 'professionals'! In other words, there is a considerable range of knowledge and skills presented by volunteer divers, and it is often a matter of trying to match up tasks with appropriate individuals which can yield the best results, especially in terms of the accuracy of the records obtained. Thus the person offering little species identification skills but lots of energy can be sent to investigate new areas of seabed for conspicuous or easy-to-recognise species, whilst the person with greater identification and observational skills can be asked to record carefully from a relatively small area of seabed.

It is through getting to know participants taking part in a project that the co-ordinator or organiser can assess their skills level and their recording capability. Longer term projects, say over a minimum period of two years, are likely to lead to a greater consistency of results from volunteer recorders and a greater accuracy in the data they produce.

Good observational skills are often required for BAP recording projects, and training programmes for volunteers should be directed at enhancing these.

3.6.4 The distinction between the professional and the amateur diver – HSE matters

This subject can only be touched on here as it falls outside the true remit of this scoping study. However, for many years there has been a grey area between professional surveyors (who are paid for their work) and volunteer surveyors (who are not paid for their work but may well have their expenses paid). There is often no clear dividing line which distinguishes the two in what they undertake, yet there are very large implications as far as Health and Safety issues are concerned. The 're-vamped' Seasearch project's National Steering Group has looked into this in some detail and representatives have had discussions with personnel at the Health and Safety Executive. If further details of these discussions are required, it is suggested contact be made with Chris Wood, the Seasearch National Co-ordinator.

4. English Nature's role in volunteer recording schemes

Clearly, as one of the key organisations charged with the conservation of our marine wildlife heritage, English Nature plays an important role in utilising the skills and enthusiasm of volunteers in recording England's marine habitats and species. English Nature's existing grant schemes already allow for many different projects to apply for English Nature funding. However, there have been occasions in the past when English Nature has not supported projects which, to others, appear to have been very worthwhile – an example is MCS's Basking Shark Watch. One criticism which the author has come across from the various organisations he has contacted whilst preparing this report is the lack of foresight (particularly with regard to commitment to volunteer-based projects) which appears to plague all of the country nature conservation agencies. The reason for this in the past has been the problem of year-on-year funding, with each department within an agency being unable to plan projects more than a year ahead. It would make sense if a number of longer term funding commitments could be entered into, particularly with those conservation charities which run projects producing data which will be of benefit to English Nature.

That aside, the primary question which needs addressing by English Nature is whether it is felt the available funding money is being targeted in the right way – to the right projects, to the right people and to the right geographical areas. To address the last part of this question first: the most active geographical areas where volunteer recording schemes are undertaken are often those centred around a core of enthusiasts, or where particular species of interest are likely to be found. Examples include the distribution of Marine Conservation Society local groups throughout the country; the active Seaquest project in Cornwall and Devon; or the British Marine Life Study Society, which has flourished largely through the tenacity and enthusiasm of one person. So there should be no geographical restrictions on where funding is directed. Each particular project should be judged on its merits, wherever it is located.

4.1 What are the options for English Nature's involvement?

There are a number of options as to how English Nature may best increase its involvement in volunteer recording schemes. These are set out in the following sections. Essentially these centre on the two main resources which English Nature can provide: funding and skilled staff. It also needs to be decided which projects are funded from English Nature regional teams and which are funded from English Nature headquarters in Peterborough.

The response the author has received from a number of conservation organisations has indicated that they consider it extremely useful if a personal relationship can be established between their directors/project managers and the funding officer(s) for English Nature. It makes it so much easier if a representative of a volunteer organisation can be told if a particular project has got a chance of funding and, if so, what the value of any grant might be. Likewise, English Nature funding officers are likely to benefit from personal contact with a volunteer organisation, and by so doing they can assess the planning, thoroughness and dedication such an organisation are likely to put into a project.

4.1.1 Funding ID Training Courses

Training courses are essential if high standards of recording are to be maintained within the volunteer recording programmes mentioned in section 3.2. This would not only include the training of volunteers but also of tutors and survey organisers. Funding could be made available to various organisations which run recording schemes, ring-fenced especially for the development and running of training courses. It could cover the travel and subsistence costs of tutors (i.e. those running the courses), the costs of hiring a venue/classroom, the purchase of equipment related to training courses (e.g. multimedia projectors, video/DVD players and monitors), and the costs of course materials. The topics covered by such training may extend beyond species and habitat/biotope recognition and could include training in the use of certain types of software (e.g. GIS, Access or Marine Recorder) for volunteer data 'inputters' (see section 4.1.4).

The Seasearch programme has instigated two training courses (a one-day course for the Observer level and a two-day course for the Surveyor level), both of which have an 'interactive' assessment part to them and which are signed up in a qualification booklet. Before being awarded the qualification, the volunteer must have submitted a specified number of completed recording forms which are assessed by an accredited Seasearch tutor.

Training courses/workshops for survey organisers, this time actually run by English Nature staff or consultants brought in by English Nature, would help to ensure that high standards in volunteer marine biological recording are maintained. This sort of event, if run annually, would also help to foster co-operation between various organisations (see section 4.1.5).

4.1.2 Assistance with obtaining data from other sources

In the coastal zone and the near-shore environment, marine data are generated from a wide variety of surveys and for a wide variety of reasons. For a number of years, environmental impact assessments (EIAs) have been legally required to be undertaken prior to developments anywhere within the 200 nm limit. However, in the absence of a Freedom of Information Act (or some such equivalent), if the survey has been carried out by a private company there is no obligation to share this information with the national nature conservation agencies (or other statutory bodies such as Defra or Sea Fisheries Committees). It would seem sensible to introduce a requirement that all EIAs undertaken off the coast are copied to the relevant nature conservation agency, making the data freely available. It would also be helpful if the results of projects undertaken by different government departments (or agencies) could be shared and publicised more widely. Both of these moves would help to target voluntary survey efforts considerably. It may be possible for the NBN to provide the wherewithal to do this.

Additionally, English Nature should consider commissioning more remote surveys of areas where key habitats and/or species are thought to be. Appropriate examples would include satellite imagery, acoustic tracking or side-scan sonar. Again, this would help to target voluntary survey efforts.

4.1.3 Funding educational materials

There are many different educational materials which English Nature could assist with producing. These might include new species ID guides for helping volunteers to identify what

they are seeing, perhaps stressing the importance of BAP species, 'key' community species, non-native species or those which are indicators of climate change. These guides might be in book form (by far the preferred choice of most volunteers) or in CD-ROM format. A recent example of a very well received publication produced by English Nature has been *The Scuba Diver's Guide to Lundy Marine Nature Reserve* (Kay, 2001). Other educational materials might be directed at schools, such as the excellent and innovative interactive CD-ROM recently produced by the Helford Voluntary Marine Conservation Area (Williams, 2002), of which English Nature was a joint-funder.

Marine life posters, videos, even interactive marine life games which can be played via a television screen, are all possible educational materials which English Nature might consider funding.

4.1.4 Provision of software packages and training in their use

One of the main resources which many of the smaller conservation charities lack is in-house expertise for the use of advanced software packages such as Geographical Information Systems (GIS). These have become an essential tool for many terrestrial conservation organisations and they have been shown to be extremely useful in the marine environment as activities, designations, habitats and various other 'layers' can be added or removed from maps. As an example, English Nature's Marine Natural Area profiles are underpinned by GIS maps that can be relatively easily updated as new information becomes available.

4.1.5 Ensuring co-ordination between different volunteer groups

English Nature could enhance its role as a facilitator of communication and co-ordination amongst the various conservation organisations, particularly in situations where projects may overlap (see also BOX 7, overleaf). Already English Nature help to organise a number of conferences and workshops, but perhaps more could be done within this area, particularly at a regional or local level. This does seem to be happening already in some areas, as indicated by the recent one-day seminar organised by the SE Wildlife Trusts at the Southampton Oceanography Centre entitled *Marine and coastal projects seminar*, which was co-sponsored by English Nature.

4.1.6 Assistance with the feedback of information

In a similar way to how English Nature might help with funding the provision of educational materials emanating from various recording schemes, funding could also be ear-marked for assisting with the feedback of information. As mentioned in section 2.3.1, feedback is vitally important for the continuing success of a project, whether it be by means of a regular Newsletter, e-mailed updates, summary reports or through web sites.

English Nature is currently managing the production of a Biodiversity Action Reporting System (BARS) that will be able to hold project information for projects delivering biodiversity targets. It will eventually be web-based and be available to Lead BAP Partners and with the identification of Local Biodiversity Action Plans in particular.

4.2 The dissemination of information

4.2.1 Technical considerations for the dissemination of collected data

It is the understanding of the author that, wherever possible, marine species, habitat and biotope information should be entered onto the Marine Recorder database. Output reports can be generated from the database by means of exporting the data into MS Access. It is likely that satellite copies of Marine Recorder will be utilised by coastal Wildlife Trusts and Biological/Environmental Records Centres, as well as marine conservation organisations. It is planned to enter Seasearch data into Marine Recorder. However, these intentions require the necessary computer hardware and software in order to make them happen. The organisations concerned would also, I am sure, appreciate appropriate technical back-up (i.e. some form of 'support hotline') from Information Technology (IT) staff at JNCC who are familiar with the workings of Marine Recorder. This may be 'pie-in-the-sky' thinking, having some appreciation of the existing demands on the few IT staff there are at JNCC, but there is no point in producing a new product designed for widespread use unless a certain amount of technical back-up is provided too.

BOX 7: The growing interest in the basking shark

Basking Shark Watch is a volunteer sightings scheme initiated by the Marine Conservation Society in 1987. The aims of the scheme (now) are to:

- maintain the national database of information on numbers, geographical and size distribution, behaviour and movements of basking sharks in UK waters.
- collect and analyse sightings data to improve our knowledge of basking shark ecology, population dynamics and behaviour.
- provide information to the UK Basking Shark Species Action Plan.
- raise public awareness of the basking shark and its protected status amongst the public and sea users; and
- emphasize the importance of increasing our understanding of the species and sharks as a whole.

When the project started, the basking shark was still being hunted within UK waters (albeit at a fairly small scale by one fisherman in the Clyde Sea). One of the early aims of the project was to afford legal protection to the shark which would prevent this fishery from operating. After 10 years of campaigning, the basking shark was afforded full protection within British territorial waters in 1998 under Schedule 5 of the Wildlife and Countryside Act 1981. It also has its own Species Action Plan.

There are now several other sightings schemes and research projects which will contribute to our understanding of basking shark behaviour and distribution within UK waters. These include:

- The Seaquest Basking Shark Project (administered by the Devon & Cornwall Wildlife Trusts)
- Solway Shark Watch and Sea Mammal Survey (initiated in 2001)
- The Shark Trust / National Marine Aquarium, Plymouth – photo ID scheme
- Defra, CEFAS and the MBA – a 3 year project utilising satellite tags
- Isle of Man Basking Shark Project – run by the Basking Shark Trust

Whilst most of the groups would recognise the importance of sharing information with each other, the development of interest in basking sharks over the past 15 years has happened in a rather haphazard way, which has led to unnecessary duplication of effort and possible confusion amongst recorders and the general public.

[Information taken from the report of MCS's Basking Shark Watch, 1987-2001. *In prep*.]

One of *MarLIN*'s aims is to act as 'the marine node' to the National Biodiversity Network (NBN), working within the NBN to link with and develop recording centres "which will agree and use compatible data entry methods to optimise the utility of the information resource" (taken from *MarLIN*'s website – http://www.marlin.ac.uk/summary.htm). A key objective of *MarLIN*'s Sealife Heritage project is to develop a national marine recording network using the Internet to provide information to recorders and allow on-line recording and feedback. Validated records will then be forwarded to the NBN.

Individual recording schemes may well wish to publicise the data they have collected through their own web sites.

4.2.2 Promotion of schemes with the general public

Promotion of recording schemes in order to encourage more volunteers to take part is best done, in the first instance, through the membership of the societies and organisations interested in the species concerned – e.g. the Whale and Dolphin Conservation Society, the Shark Trust, the Porcupine Marine Natural History Society or the Marine Conservation Society. It will probably be through these organisations, once they have something to publicise about a particular recording scheme, that promotion of the scheme to the wider public will be best undertaken.

Certainly, it will be essential to ensure that support of a particular project lasts more than just a year. If funding allows for a new staff member to be appointed to oversee the project, that person needs to be in post for longer than 12 months in order to build on the foundations which he or she has put in place.

On the species side of things, it is unfortunate that not all BAP species are as appealing as the bottlenose dolphin to the general public. Several of the marine BAP species are not particularly 'charismatic' (I'm thinking here of the fan shell *Atrina fragilis* amongst others) and it may prove quite difficult to persuade the person on the street why this mollusc "needs to be saved"! Other species could be made to seem more appealing by their attractiveness (e.g. the sunset cup coral *Leptopsammia pruvoti*), their restricted distribution (e.g. the pink sea fan *Eunicella verrucosa*), or their threatened habitat (e.g. the starlet sea anemone *Nematostella vectensis*).

4.3 Cost estimates for different levels of involvement by English Nature

In the next section of this report, Biodiversity Action Plans for the complete range of marine BAP habitats and species are looked at in detail, with an assessment being made of which are most suitable for inclusion in volunteer recording schemes (see Section 5.6). It is extremely difficult to estimate the costs which might be incurred by English Nature at different levels of involvement in promoting the recording of these Action Plan species within England. However, an attempt has been made in Table 4.1 to do this, though it should be stressed that the suggested figures are gross approximations and are open to discussion.

Table 4.1 Cost estimates for English Nature involvement in various volunteer recording schemes involving BAP species and habitats.

	Organisation	Recording Scheme	BAP species/habitats targeted (or recorded alongside others)	Minimal input (£k/yr)	Moderate input (£k/yr)	Maximum input (£k/yr)	Notes
1.	Marine Conservation Society	Seasearch (Levels 1 & 2) (These are primarily habitat-recording, with characteristic species being recorded)	Sublittoral chalk Sheltered muddy gravels Sublittoral sands and gravels All benthic invertebrate BAP species	15	20-25	35-35	Primarily for support of two full-time posts, plus data entry
		Seasearch (Level 3) projects (These may be projects aimed at a single species or habitat)	*Atrina fragilis* *Ostrea edulis* *Amphianthus dorhnii* *Eunicella verrucosa* *Leptopsammia pruvoti* *Modiolus modiolus* beds Seagrass beds Maerl beds Serpulid reefs Mud habitats in deep water	5	10	15	
		Basking Shark Watch	*Cetorhinus maximus*	5-8	10-15	20-25	
		Turtle Watch	Marine turtles	5	10	15	
2.	*MarLIN*	Seashore surveys Sealife surveys	Could be all benthic invertebrate BAP species, together with fish records. BAP habitats not really targeted *per se*.				Funding could be targeted at record validation, intertidal surveys & NBN links
3.	British Marine Life Study Society	Shore Watch	*Ascophyllum nodosum* ecad *mackaii* Littoral chalk *Sabellaria alveolata* reefs	2	4	6	Not really geared to organised surveys
4.	Porcupine Marine Natural History Society	Marine Species Recording Scheme	All benthic invertebrate species All littoral habitats All sublittoral habitats	4	8	12	
5.	Conchological Society	'Marine Census' recording scheme	*Atrina fragilis* *Ostrea edulis* *Modiolus modiolus* beds	4	8	12	

	Organisation	Recording Scheme	BAP species/habitats targeted (or recorded alongside others)	Minimal input (£k/yr)	Moderate input (£k/yr)	Maximum input (£k/yr)	Notes
6.	Sea Watch Foundation	Sea Watch	Harbour porpoise Baleen whales Toothed whales Small dolphins	5-8	10-15	20-25	
7.	Whale & Dolphin Conservation Society		Harbour porpoise Baleen whales Toothed whales Small dolphins	5-8	10-15	20-25	
8.	Cornwall & Devon Wildlife Trusts	Seaquest South-West	Harbour porpoise Baleen whales Toothed whales Small dolphins *Cetorhinus maximus*	5-8	10-15	20-25	High proportion of BAP species in the south-west.
9.	National Marine Aquarium	UK Marine Fish Recording Scheme	*Cetorhinus maximus*	3	5	8	
10.	The Shark Trust	Basking Shark Photo ID	*Cetorhinus maximus* Common skate *Raja batis*	8	10-15	20-25	
11.	The Seahorse Trust	British Seahorse Survey	? Seagrass beds	3	5	8	
	?	Projects yet to be devised	Any BAP species or habitat	(10)	(15)	(25)	
			Totals (max.)	**91**	**165**	**261**	

Notes:

* The term 'EN involvement' includes all aspects of potential EN funding as discussed in section 4.1.

Part II. Marine Biodiversity Action Plans

5. The information required to deliver marine BAPs

5.1 BAPs – what are they all about?

The UK national Biodiversity Action Plan was published in 1994 as one of the main requirements of the Convention on Biological Diversity, which the UK signed up to after the Rio Earth Summit in 1992. The Action Plan reviewed the UK biotic resource, described current activity and set out a number of targets for the conservation, enhancement and expansion of the country's biodiversity. The UK Biodiversity Action Plan is being delivered in part, through Habitat Action Plans (of which there are 45 nationally), Species Action Plans (of which there are 391) and Local Biodiversity Action Plans.

Each Action Plan is structured in the same way under a number of headings. These are listed in Table 5.1.

Table 5.1 The structure of Biodiversity Action Plans.

Habitat Action Plans	Species Action Plans
1. Current status	1. Current status
Physical and biological status	
Links with other action plans	
2. Current factors affecting the habitat	2. Current factors causing loss or decline
3. Current action	3. Current action
Legal status	
Management, research and guidance	
4. Action Plan objectives and proposed targets	4. Action Plan objectives and targets
5. Proposed action with lead agencies	5. Proposed action with lead agencies
Policy and legislation	Policy and legislation
Site safeguard and management	Site safeguard and management
International	Species management and protection
Advisory	Advisory
Monitoring and research	Future research and monitoring
Communications and publicity	Communications and publicity
	Links with other action plans
6. Costings	

A total of 38 maritime (i.e. coastal and marine) Species and Habitat BAPs are included within the UK Biodiversity Action Plan. The Action Plans have been published as Volume 5 of Tranche 2 Action Plans (UK Biodiversity Group, 1999). The 38 maritime BAPs are listed in Table 5.2.

5.2 Which marine BAPs are relevant to this study?

Of the 33 marine BAPs, there are 28 considered by the author of this report to be applicable to volunteer participation at some level. These 28 have been divided into those where volunteers would need to act as observers on board a boat (indicated in blue); those where volunteers undertaken survey work on the shore (indicated in green); and those which require volunteers to be fully trained SCUBA divers (indicated in red). Within these 28 BAPs, there are six where the species and/or habitats are considered to be too fragile (e.g. the starlet sea

anemone *Nematostella vectensis*, or the saline lagoon habitat) or too dangerous (e.g. mudflats or tidal rapids) for full volunteer participation (see Notes section below Table 5.2).

Table 5.2 Maritime Biodiversity Action Plans.

GROUPED SPECIES ACTION PLANS
Harbour porpoise
Baleen whales
Toothed whales
Small dolphins
Marine turtles
Commercial fish [1]
Deep-water fish [2]

SPECIES ACTION PLANS
Cetorhinus maximus – basking shark
Raja batis – common skate [3]
Thyasira gouldi – northern hatchet shell [4]
Atrina fragilis – a fan shell
Ostrea edulis – native oyster
Amphianthus dorhnii – sea fan anemone
Edwardsia ivelli – Ivell's sea anemone [A]
Nematostella vectensis – starlet sea anemone [B]
Eunicella verrucosa – pink sea fan
Leptopsammia pruvoti – sunset cup coral
Anotrichium barbatum – a red alga
Ascophyllum nodosum ecad *mackaii* – a brown alga

HABITAT ACTION PLANS
Littoral and sublittoral chalk
Sabellaria alveolata reefs
Mudflats [C]
Sheltered muddy gravels
Sabellaria spinulosa reefs
Tidal rapids [D]
Modiolus modiolus beds
Seagrass beds
Maerl beds
Saline lagoons [E]
Sublittoral sands and gravels
Serpulid reefs
Mud habitats in deep water [F]
Lophelia pertusa reefs [5]
COASTAL
Maritime cliff and slopes [6]
Coastal sand dunes [7]
Machair [8]
Coastal vegetated shingle [9]
Coastal saltmarsh [10]

Key:

Purple BAP species & habitats not covered by this report (but summarised in Table 5.3).
Blue BAP species appropriate for surveying by volunteers on board boats at sea.
Green BAP species & habitats suitable for surveying by non-divers.
Red BAP species & habitats suitable for surveying by SCUBA divers.

Notes:

1. It is considered that the surveying of habitats which appear above in both green and red colours can be undertaken by both shore workers and by divers.
2. Superscript numbers refer to action plans which are not discussed in this report but which are summarised in Table 5.3.

[A] *Edwardsia ivelli* has only been recorded from one site in the world: Widewater lagoon near Lancing, West Sussex. It was last recorded here in 1983 and is now thought to be extinct at this site (Irving, 1997). The anemone is very small (only 20 mm long and 1.25 mm in diameter when fully extended) and almost transparent. The muddy sediment of the saline lagoon is sensitive to disturbance and, should any study with volunteers be undertaken in the future, it is recommended that these volunteers be experienced surveyors whose actions would lead to minimal disturbance of the habitat.

[B] *Nematostella vectensis* is found in only a few coastal lagoons in the Isle of Wight, Sussex, Hampshire, Dorset and in East Anglia. Again, it is an extremely small anemone which may be easily overlooked, though where conditions are favourable it can occur in high densities. Lagoon habitats are susceptible to disturbance and, should any study with volunteers be undertaken in the future, it is recommended that these volunteers be experienced surveyors whose actions would lead to minimal disturbance of the habitat.

[C] Great care will need to be exercised when volunteers are surveying mudflats. Some sediments, particularly pure mud as opposed to muddy sand, may be very soft and walking over them on foot is extremely dangerous, especially in places where a tide may flood quickly. Bird counts on mudflats can successfully be undertaken by volunteers with specialist knowledge of waders and wildfowl species. Studies of the infauna, involving digging and sieving of sediment on site, will require specialist marine biological knowledge.

[D] 'Tidal rapids' cover a broad range of high energy environments, including deep tidal streams and tide-swept habitats. These habitats may be present at the entrances to certain sea lochs, between islands or between islands and the mainland. Very strong tidal flows may occur, for example Strangford Lough in Northern Ireland has tidal streams up to 8 knots. In such circumstances, only experienced diving volunteers could participate in surveys, and even then, thorough risk assessments of individual sites would need to be undertaken prior to any fieldwork being carried out.

[E] Saline lagoons are vulnerable to disturbance from snorkelling and/or diving. Most of the specialised fauna and flora living within saline lagoons are not widely known and will be unfamiliar to most volunteers. Should any study with volunteers be undertaken in the future, it is recommended that these volunteers be experienced surveyors whose actions would lead to minimal disturbance of the habitat.

[F] 'Mud habitats in deep water' typically occur in depths greater than 20-30 m, though at a few sites sheltered from wave action, their associated communities may be found as shallow as 15 m. These habitats may be present in sheltered Scottish sea lochs as well as in offshore situations, such as the northern Irish Sea. As a result of the depths where these habitats/communities are found, diving investigations can only be undertaken by experienced divers.

Table 5.3 Summaries of maritime group Species Action Plans and Habitat Action Plans not covered by this report (indicated in Table 5.2 in purple).

1	**Commercial fish** – this action plan is aimed at particular stocks rather than species as a whole. The stocks of immediate relevance are those for which ICES scientists' assessment is that they are below Safe Biological Limits. The species concerned (from the various sea regions around the UK) include cod, hake, herring, mackerel, plaice, saithe, sole, horse mackerel and whiting. The principal factor causing the decline in spawning stock biomass is summarised simply, but effectively, as 'too many boats chasing too few fish'.
2	**Deep water fish** – for this action plan, deep water fishes are considered to be those species that live at depths greater than 400 m. Species include blue ling *Molva dypterygia*, orange roughy *Hoplostethus atlanticus* and monkfish or anglerfish *Lophius* spp. Bottom-trawling for deep-water fish (particularly in areas west of Shetland) can damage reefs of the cold water coral *Lophelia pertusa* , for which there is a Habitat Action Plan.
3	***Raja batis* common skate** – the largest of the European batoid fish, growing up to 285 cm long. Present in NE Atlantic from Morocco to Iceland/Norway, though majority of fish spend their entire lives within a relatively small coastal area. Bottom-dwelling species, found down to 200 m and occasionally to 600 m. Longevity estimated at 50 years. Very scarce throughout European waters – it has probably been fished to extinction in the Irish Sea and is extremely rare in central and southern North Sea. Vulnerable to capture by many static and towed fishing gear. A 2-3 year skate/ray tagging programme run by the Shark Trust was launched at Easter 2003 in Welsh & Scottish waters, and a project looking at the conservation and management of common skate in English waters will commence in 2003 managed by Shark Trust (*pers. comm.*, Ali Hood, Shark Trust).
4.	***Thyasira gouldi* – northern hatchet shell** – this small (< 1 cm) bivalve mollusc has rounded, dull white shells and belongs to the relatively small family Lucinacea. It may be found at depths between a few to several hundred metres and lives in anoxic soft muddy sediments generally characterised by a high content of organic matter. It appears as though there may only be one or two populations remaining in the British Isles, in upper Loch Etive and upper Loch Sunart, on the west coast of Scotland. Often mis-identified as *Thyasira gouldi*. Only suitable for surveying by grab sampling or possibly by coring.

[5]	***Lophelia pertusa* reefs** – *Lophelia pertusa* is a colonial bank-forming species of ahermatypic coral found in deep, dark, cold waters. It grows in oceanic water within a temperature range of 4-12ºC, typically on the continental shelf and shelf break at depths between 200-400 m. On the UK Atlantic margin, *L. pertusa* tends to grow as small, isolated pseudo-colonies. Within these, individual coral 'thickets' may be 10-15 m across and several metres high. The reefs provide at least four main habitats, with the diversity of associated marine life being comparable to some tropical, shallow water hermatypic corals. The greatest threat to these reefs comes from demersal trawling, where gear dragged over the seabed can flatten and destroy substantial reef structures.
[6]	**Maritime cliffs and slopes** – approximately 4000 km of the UK coastline has been classified as cliff. Besides their geology, the main biological interest of cliffs and slopes lies in their vegetation (higher plants and lichens in particular), breeding seabirds, insects and snails. The main threats to this habitat include erosion, coastal protection schemes, built development, agriculture, recreational use and introduced species.
[7]	**Coastal sand dunes** – these form in relatively exposed locations and in a number of physiographic situations. There are approximately 56,000 ha of sand dune in the UK. A total of 10 BAP priority plant and insect species are associated with sand dunes. The main concerns regarding sand dunes include erosion, falling water tables, grazing, recreation, sea defences, beach management, forestry, military use and ownership.
[8]	**Machair** – a distinctive type of coastal grassland formed from windblown calcareous sand, found in the north and west of Scotland and in western Ireland. The total worldwide resource of 'machair systems' is estimated at 40,000 ha of which 30,000 ha is in Scotland, the remainder being in western Ireland. Important for its plant communities, certain rare birds and insects. Concerns include certain crafting practices, grazing, introduced species (especially mammals), coastline retreat, sand extraction and poor recreational management.
[9]	**Coastal vegetated shingle** – a globally restricted sediment type with few occurrences outside north-west Europe, Japan and New Zealand. In England and Wales it is estimated that 30% of the coastline is fringed by shingle, though most of this remains unvegetated. The vegetation communities depend on the amount of finer material mixed in with the shingle and the hydrological regime. Concerns include sediment supply, natural mobility, exploitation, access and grazing.
[10]	**Coastal saltmarsh** – comprises the upper, vegetated portions of intertidal mudflats and are usually restricted to comparatively sheltered locations. Saltmarsh vegetation consists of a number of salt tolerant (halophytic) species, adapted to regular immersion by the tides. Saltmarshes are an important resource for wading birds and wildfowl, for brackish and marine invertebrates and as nursery areas for several species of fish.

Table 5.4 Protective Legislation covering certain BAP species mentioned in this report.
(Descriptions taken, in part, from Hiscock, 1996).

Reference Name	Summary
EC Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC) (**EC Habitats Directive**)	Came into force on 21 May 1992. The central aim of the Directive is to conserve biodiversity across the area of the European Union through a coherent network of Special Areas of Conservation (SACs). Seven marine habitat types are listed in the Directive and nine of the species listed are marine or spend part of their life in the sea. Annex IV (Animal and Plant Species of Community Interest in Need of Strict Protection) includes protection for all cetaceans.
Convention on the Conservation of European Wildlife and Natural Habitats (**Bern Convention**)	Aims to "conserve wild flora and fauna and their natural habitats", to promote co-operation between countries and their conservation efforts, and to give "particular emphasis to endangered and vulnerable species, including endangered and vulnerable migratory species". Appendix I includes strictly protected plants, Appendix II strictly protected animals and Appendix III protected animals. Ratified by Britain in May 1982.
The Convention on the Conservation of Migratory Species of Wild Animals (**Bonn Convention**)	Signed in Bonn in 1979. It provides strict protection for migratory species in danger of extinction throughout their range. Appendix II covers migratory species which have an unfavourable conservation status and which require international agreement for their conservation and management. The Convention covers all species of migratory animal, including invertebrates, fish, reptiles, amphibians, mammals and birds.
Agreement on the Conservation of Small Cetaceans in the Baltic and North Seas (**ASCOBANS**)	Formulated in 1992 under Article IV of the Bonn Convention and signed by seven European countries including the UK. Provision made for the protection of specific areas, monitoring, research, information exchange, pollution control and heightening public awareness. Aimed primarily at dolphins and porpoises but also includes all toothed whales except the sperm whale.
Convention on International Trade in Endangered Species of wild fauna and flora (**CITES**)	Initiated at an IUCN General Assembly in 1963 and concluded at Washington in 1973. Ratified by the UK in 1976. The objectives of CITES are to protect endangered plant and animal species from illegal trade and over-exploitation by means of a system of import and export permits for the regulation of trade. Commercial trade in endangered species listed in Appendix I is forbidden. Controlled trade is allowed for species which, although not currently threatened with extinction, may become so unless restrictions are applied, are listed in Appendix II. Implemented within the EU under Council Regulation (EEC) No. 3626/82.
Wildlife & Countryside Act 1981 (as amended in 1985)	This Act provides the cornerstone to nature conservation in Great Britain. Major provisions relating to marine conservation are: Section 9 allows for the protection of specifically listed wild animals, including marine species (listed in Schedule 5 of the Act). Section 13 allows for the protection of wild plants, including marine species (listed in Schedule 8 of the Act). Section 14 allows for the prevention of the introduction of alien species (listed in Schedule 9 of the Act). Sections 36 and 37 allow for the establishment of marine nature reserves.

5.3 Marine BAPs appropriate for surveying by volunteers on board boats at sea

All of the species/species groups listed below will be seen on the surface (all are air-breathing with the exception of the basking shark, which is often seen feeding at the surface) and in open water, though they are likely to be some distance from the shore. Consequently, they are best observed from a boat or from a clifftop.

Table 5.5 Marine BAPs considered to be appropriate for surveying by volunteers on board boats at sea, or from cliff tops.

Name of BAP	Species included
Harbour porpoise Species Action Plan	Harbour porpoise *Phocoena phocoena*
Baleen whales Grouped Species Action Plan	Blue whale *Balaenoptera musculus* Fin whale *Balaenoptera physalus* Sei whale *Balaenoptera borealis* Minke whale *Balaenoptera acutorostrata* Humpback whale *Megaptera novaeangliae* Northern right whale *Eubalaena glacialis*
Toothed whales (other than small dolphins) Grouped Species Action Plan	Northern bottlenose whale *Hyperoodon ampullatus* Cuvier's beaked whale *Ziphius cavirostris* Sowerby's beaked whale *Mesoplodon bidens* True's beaked whlae *Mesoplodon mirus* Killer whale *Orcinus orca* Long-finned pilot whale *Globicephala melas* Sperm whale *Physeter macrocephalus*
Small dolphins Grouped Species Action Plan	Bottlenose dolphin *Tursiops truncatus* Risso's dolphin *Grampeus griseus* White-beaked dolphin *Lagenorhynchus albirostris* Atlantic white-sided dolphin *Lagenorhynchus acutus* Common dolphin *Delphinus delphis* Striped dolphin *Stenella coeruleoalba*
Marine turtles Grouped Species Action Plan	Leatherback turtle *Dermochelys coriacea* Loggerhead turtle *Caretta caretta* Kemp's ridley turtle *Lepidochelys kempii* Green turtle *Chelonia mydas* Hawksbill turtle *Eretmochelys imbricata*
Basking shark Species Action Plan	Basking shark *Cetorhinus maximus*

Each of these Action Plans is now considered in more detail, particularly with reference to their suitability for involving volunteers in survey work in the field. Note that where more than one partner is listed under 'lead partner', the partner which is underlined acts as the lead organisation.

5.3.1 Harbour porpoise

Name of plan:	**Harbour porpoise *Phocoena phocoena* Species Action Plan**
Lead partner:	Joint Nature Conservation Committee
Current status:	There is some evidence of a decline in UK harbour porpoise numbers since the 1940s, especially in the southern North Sea and English Channel. A recent estimate of the population size in the North Sea, English Channel and Celtic Sea was approx. 350,000.
Protective measures:	Listed on Appendix II of CITES, Appendix II of the Bern Convention & Annexes II & IV of the EC Habitats Directive. Also on Appendix 2 of the Bonn Convention & covered by ASCOBANS, a regional agreement under the Bonn Convention. Protected under Sch. 5 of the Wildlife and Countryside Act 1981.
Current factors causing loss or decline:	Not clear, but may include: • Incidental capture and drowning in fishing nets. • Environmental contaminants (toxic substances at sea, marine debris, disease, noise disturbance). Environmental change (effects of fishing and possibly climate change)
Action plan objectives and targets:	Maintain the current range and abundance of the harbour porpoise, with a longer term aim of ensuring that no anthropogenic factors inhibit a return to waters that previously held the harbour porpoise.
Past or present surveys:	Distribution surveys have been undertaken by JNCC since 1980. SMRU co-ordinated the international SCANS survey in 1994. By-catch was studied by SMRU and others during 1995-98. Conservation, management and research action is being undertaken and planned under ASCOBANS.
Future research & monitoring:	• Expand research on the areas frequented by harbour porpoise to identify waters which may qualify for further protection as SACs or MNRs. • Establish long-term research on population and conservation needs of all small cetaceans in UK waters, co-ordinated through ASCOBANS. • Consider monitoring of the UK population and reporting of by-catches of small cetaceans (including observers on vessels, where feasible). • Seek to minimise the by-catch of small cetaceans by promoting research into fishing gear and other possible mechanisms. • Promote research into the causes of death of the harbour porpoise within UK waters to determine the context and need for future conservation action. • Pass information gathered during survey and monitoring to JNCC or BRC in order that it can be incorporated in a national database and contribute to maintenance of an up-to-date Red List.
Suitability for surveying by volunteers:	Yes. Some sightings schemes already exist for small cetaceans, such as those run by the Seawatch Foundation, Whale & Dolphin Conservation Society, the Hebridean Whale & Dolphin Trust and Seaquest (SW England).
Additional notes:	The SAP also states: encourage fishermen to report sightings and by-catches through an awareness programme; encourage international exchange of information to reduce by-catches; and continue to publicise reporting schemes for strandings and live sightings.

5.3.2 Baleen whales

Name of plan:	Baleen whales Grouped Species Action Plan
Lead partner:	Joint Nature Conservation Committee
Current status:	**Blue whale** *Balaenoptera musculus* – deep water migratory species. Rarely seen in UK waters except along the shelf edge, though sightings data and seabed-mounted hydrophone arrays indicate their presence in waters to the west and north of the UK for most of the year. **Fin whale** *Balaenoptera physalus* – deep water migratory species. Mostly confined to the shelf edge and most frequently seen in summer. **Sei whale** *Balaenoptera borealis* - deep water migratory species. Current status uncertain though considered rare in UK waters. Easily confused with fin whales. **Minke whale** *Balaenoptera acutorostrata* – migratory species common in UK waters north of about 55º and in the Western Approaches, particularly in summer. Abundance estimated as 8,500 in North Sea and 110,000 in eastern North Atlantic in 1994/95. **Humpback whale** *Megaptera novaeangliae* – migratory species which feeds mainly in coastal areas in high latitudes. Abundance in North Atlantic estimated at 10-15,000 in 1992/93, with numbers thought to be slowly increasing in UK waters. **Northern right whale** *Eubalaena glacialis* – very rare species in the North Atlantic, believed to number no more than 300 individuals currently, with no evidence of numbers growing. Possibly extinct in eastern North Atlantic.
Protective measures:	All cetaceans are protected under Schedule 5 of the W&C Act 1981 and the Wildlife (Northern Ireland) Order 1985. All whales listed on Annex A of EU Council Regulation 338/97. Listed on Appendix 1 of CITES (thus prohibiting commercial trade), Appendix II of Bern Convention & Annex IV of EC Habitats Directive. Whaling is illegal in UK waters (Fisheries Act 1981).
Current factors causing loss or decline:	Minke whales are still hunted in the North Atlantic by Norway. Other factors not well understood. Concerns have been raised about acoustic disturbance (particularly seismic survey activity in the Atlantic Frontier) and contaminants (especially organochlorines affecting reproductive potential or causing immune suppression). Collisions with shipping thought to be significant factor impeding the recovery of the northern right whale. Global climate change may also have an effect on whales, but impacts difficult to predict.
Action plan objectives and targets:	• Short term: maintain the current range and abundance of baleen whales. • Long term (over next 20years): seek to increase baleen whale population ranges and sizes around the UK.
Past or present surveys:	Three international North Atlantic Cetacean Sightings Surveys took place in 1987, 1989 & 1995. Distribution surveys have been undertaken by JNCC since 1980. SMRU co-ordinated the international SCANS survey in 1994. Sightings surveys also conducted from seismic survey vessels.
Future research & monitoring:	• Long-term monitoring of population abundances and distributions. • By 2009 identify waters which may be particularly suitable for baleen whales which may qualify for further protection. • Research into effects of contaminants on baleen whale populations, including the development of indicators such as biomarkers. Research the effects of acoustic disturbance. • Identify marine living resources utilised by baleen whales and the environmental changes caused by fishing. Research into predicting the effects on baleen whales of climate change.
Suitability for surveying by volunteers:	Yes. Some sightings schemes already exist for baleen whales, such as those run by the Sea Watch Foundation, Whale & Dolphin Conservation Society, the Hebridean Whale & Dolphin Trust and Seaquest (SW England).
Additional notes:	In 1999, DETR produced two sets of guidelines aimed at minimising disturbance to cetaceans: *Minimising disturbance to cetaceans from whale watching operations*, and *Minimising disturbance to cetaceans from recreation at sea*.

5.3.3 Toothed whales

Name of plan:	Toothed whales (other than small dolphins) Grouped Species Action Plan
Lead partner:	Joint Nature Conservation Committee
Current status:	**Northern bottlenose whale** *Hyperoodon ampullatus* – found only in North Atlantic, mainly in deep water off the continental slope. Occurs in small numbers around the Northern Isles and the Western Isles of Scotland and in the northern North Sea. Recorded mostly between April and September. **Cuvier's beaked whale** *Ziphius cavirostris* – widely distributed, often found in warmer waters. Most records in UK waters come from the Western Approaches, western Ireland and the Western Isles of Scotland. **Sowerby's beaked whale** *Mesoplodon bidens* – only known from cold, North Atlantic waters. Recorded mainly in deep offshore waters north and west of the British Isles, although occasionally in Western Approaches. **True's beaked whale** *Mesoplodon mirus* – distribution very poorly known, though known from west of the Outer Hebrides and Ireland. **Killer whale** *Orcinus orca* – widely distributed worldwide. In the UK, most common in northern and western Scotland, rare in Irish Sea, central and southern North Sea, and English Channel. Occur in all months of the year in UK waters, but recorded near-shore mainly between May and October. Population in eastern North Atlantic between 3,500 and 12,500. **Long-finned pilot whale** *Globiocephala melas* – commonly and widely distributed in deep North Atlantic waters, but seasonally enters coastal areas such as northern Scotland and the Western Approaches. Recorded in all months of the year in UK waters, mainly occurring between November and January in the Western Approaches, but earlier in the year further north. Population in the eastern North Atlantic in the late 1980s estimated at over 700,000. **Sperm whale** *Physeter macrocephalus* – worldwide distribution, occurring along the shelf break north and west of the British Isles and Ireland. Sightings occur mainly between July and December. Occasional mass-strandings take place, whose cause is unknown. No population estimates exist for the population in the North Atlantic.
Protective measures:	All cetaceans are protected under Schedule 5 of the W&C Act 1981 and the Wildlife (Northern Ireland) Order 1985. All whales are listed on Annex A of EU Council Regulation 338/97. Listed on Appendix 1 of CITES (thus prohibiting commercial trade), Appendix II of Bern Convention & Annex IV of EC Habitats Directive. Whaling is illegal in UK waters (Fisheries Act 1981). All toothed whales (except the sperm whale) are covered by ASCOBANS.
Current factors causing loss or decline:	Present status of each species considered here is unknown. Therefore difficult to assess whether major population changes have taken place. However, concerns have been raised about contaminants, acoustic disturbance and interactions with fisheries.
Action plan objectives and targets:	• Short term: maintain range and numbers of toothed whales. • Long term: increase abundance by seeking to optimise conditions enabling their populations to increase.
Past or present surveys:	Three international North Atlantic Cetacean Sightings Surveys took place in 1987, 1989 & 1995. Distribution surveys have been undertaken by JNCC since 1980. SMRU co-ordinated the international SCANS survey in 1994. Sightings surveys also conducted from seismic survey vessels. The Sea Watch Foundation collects distributional information from a broad range of individuals and organisations.
Future research & monitoring:	• Long-term monitoring of population abundances and distributions via dedicated surveys and 'platforms of opportunity'. • Use research into population structure and habitat use to identify waters which may be particularly suitable for toothed whales which may qualify for further protection. • Research into effects of contaminants on toothed whale populations, including the development of indicators such as biomarkers. • Continue to research the effects of acoustic disturbance. • Identify marine living resources utilised by toothed whales and the environmental changes caused by fishing. • Research into predicting the effects on toothed whales of climate change.
Suitability for surveying by volunteers:	Yes. Some sightings schemes already exist for toothed whales, such as those run by the Sea Watch Foundation, Whale & Dolphin Conservation Society, the Hebridean Whale & Dolphin Trust and Seaquest (SW England).
Additional notes:	In 1999, DETR produced two sets of guidelines aimed at minimising disturbance to cetaceans: *Minimising disturbance to cetaceans from whale watching operations*, and *Minimising disturbance to cetaceans from recreation at sea*.

5.3.4 Small dolphins

Name of plan:	Small dolphins Grouped Species Action Plan
Lead partner:	Joint Nature Conservation Committee
Current status:	**Bottlenose dolphin** *Tursiops truncatus* – locally frequent in near-shore areas off north-east Scotland, in the Irish Sea and the English Channel. Discrete populations exists in the Moray Firth and in Cardigan Bay. Numbers at most UK sites greatest between July & October (with a secondary peak in some localities in March-April**).** **Risso's dolphin** *Grampus griseus* – present in UK waters throughout the year, though numbers greatest between May and September. Major UK populations occur around the Hebrides and the Northern Isles, and in the Irish Sea (Particularly around Bardsey Island). **White-beaked dolphin** *Lagenorhynchus albiorostris* – common in UK and Irish waters, occurring most abundantly in the central and northern North Sea, occasionally off north-west Scotland, the Irish Sea and the western Channel. Most common in late summer (June to September). Population estimates for North Sea & English Channel in 1994 of 6,000-21,000. **Atlantic white-sided dolphin** *Lagenorhynchus acutus* – widely distributed throughout northern North-East Atlantic. In UK waters, distribution concentrated on the Hebrides, Northern Isles and the northern North Sea. Also occurs in the Western Approaches, but rare in eastern English Channel and southern North Sea. No estimate for population size exists. In UK waters, the species is most common between July and September, although this may reflect favourable observing conditions. **Common dolphin** *Delphinus delphis* – abundant and widely distributed in eastern North Atlantic. In UK waters it is common in the Western Approaches, in the southern Irish Sea (particularly around the Celtic Deep off Pembrokeshire) and around the Inner Hebrides north to Skye. It is generally rare in the southern North Sea and eastern Channel. No overall population estimate exists, but the population around the Celtic Deep was estimated to be between 23,000-249,000. **Striped dolphin** *Stenella coeruleoalba* – a subtropical and warm temperate species, rarely recorded in UK waters, mainly in the Western Approaches though occasional sightings and standings have occurred as far north as Shetland. Most records near-shore to the UK occur between July and December.
Protective measures:	All cetaceans are protected under Schedule 5 of the W&C Act 1981 and the Wildlife (Northern Ireland) Order 1985; and all are listed on Annex A of EU Council Regulation 338/97. Listed on Appendix 1 of CITES (thus prohibiting commercial trade), & Annex IV of EC Habitats Directive. The bottlenose dolphin is also listed under Annex II of the EC Habitats Directive. All of these small dolphins are included in the ASCOBANS agreement, and its parent Convention, the Bonn Convention. The North Sea populations of the bottlenose, Risso's, white-beaked, Atlantic white-sided and common dolphin are included in Appendix II of the Bonn Convention.
Current factors causing loss or decline:	The present status of each of these species in UK waters is not known sufficiently to evaluate properly changes in populations. However, four main human activities are recognised as currently likely to be detrimental to dolphins: **activities** (associated with widespread over-exploitation of marine biological resources) **leading to ecosystem changes** have the potential to affect energy budgets and thence reproduction and survival of all UK dolphin species. **interactions with fisheries**. All the dolphin species considered here have been recorded as by-catches of various fisheries. There is evidence of substantial numbers of common and Atlantic white-sided dolphins being caught in pelagic trawls in the Western Approaches and the Celtic Sea. **boat activities**. Through physical damage (collisions and propellers) and by noise. The English Channel is one of the busiest waterways in the world, with the North and Irish Seas not far behind. In recent years there has been increased seismic activity in the Irish Sea, parts of the Channel, along the Atlantic Frontier, and to the west and north of Scotland. **contaminant inputs**, such as organochlorines, may impact the reproductive potential or cause immunosuppression in dolphins. Global climate change may also have an effect, but impacts on marine mammals are very difficult to predict.
Action plan objectives and targets:	Short term: maintain the current range and abundance of small dolphins. Long term: seek to increase the range of small dolphin populations where appropriate.

Past or present surveys:	Three international North Atlantic Cetacean Sightings Surveys took place in 1987, 1989 & 1995. Distribution surveys have been undertaken by JNCC since 1980. SMRU co-ordinated the international SCANS survey in 1994. Sightings surveys also conducted from seismic survey vessels. The Sea Watch Foundation collects distributional information from a broad range of individuals and organisations.
Future research & monitoring:	Commission acoustic and video research on behavioural aspects of cetacean by-catch to understand better the ways to mitigate conflicts from particular fisheries. Establish independent observer schemes for monitoring by-catches from all fisheries thought to pose a threat to dolphin populations in UK waters (drfit net, pelagic trawl & fixed bottom-set gill net). Maintain and develop national strandings schemes and integrate with post-mortem studies.
Suitability for surveying by volunteers:	Yes. Some sightings schemes already exist for small cetaceans, such as those run by the Sea Watch Foundation, Whale & Dolphin Conservation Society, the Hebridean Whale & Dolphin Trust and Seaquest (SW England).
Additional notes:	Under Annex II of the Habitats Directive, candidate marine SACs are being established in the Moray Firth (NE Scotland) and in Cardigan Bay (W Wales). In 1999, DETR produced two sets of guidelines aimed at minimising disturbance to cetaceans: *Minimising disturbance to cetaceans from whale watching operations*, and *Minimising disturbance to cetaceans from recreation at sea*. These include avoidance of sudden alteration in vessel speed or direction and the pursuit of animals. Recommendations have also been made to limit the number of vessels in close proximity, and the length of time of encounter.

5.3.5 Marine turtles

Name of plan:	**Marine turtles Grouped Species Action Plan**
Lead partner:	Marine Conservation Society / Herpetological Conservation Trust
Current status:	Five (out of the seven species present worldwide) have been recorded in UK waters: leatherback turtle *Dermochelys coriacea;* loggerhead turtle *Caretta caretta*; Kemp's ridley turtle *Lepidochelys kempii*; green turtle *Chelonia mydas*; hawksbill turtle *Eretmochelys imbricata*. In UK waters, the leatherback has a distinct seasonal occurrence with the majority of sightings between August & October. Likely that these have followed the great oceanic gyre of the North Atlantic, travelling from and returning to nesting beaches of the tropical and sub-tropical regions of the eastern American mainland coast and Caribbean islands. Other species (by inference) are 'strays'. All five species regarded as threatened at a global level.
Protective measures:	All five species are listed on Appendix 1 of CITES 1975; Appendix II of the Bern Convention 1979; Appendices 1 & II of the Bonn Convention 1979; and Annex IV of the EC Habitats Directive. The loggerhead is also listed as a 'priority species' on Annex II of the EC Habitats Directive. All five species are listed under Schedule 5 of the Wildlife & Countryside Act 1981 and the Conservation (Natural Habitats etc.) Regulations 1994.
Current factors causing loss or decline:	Over-harvesting of turtles for meat or eggs abroad, mainly in the vicinity of nesting areas. Detrimental impacts of tourist industry, especially construction of developments along egg-laying beaches and purchase of curios made from turtle products. Collisions between turtles and boats. Incidental capture in nets. Pollution (particularly ingestion of marine debris). Disease (particularly affecting green turtles).
Action plan objectives and targets:	Avoid accidental harm to, and by-catch of, marine turtles when present in UK waters. Contribute to international measures for the conservation of marine turtles.
Past or present projects/ surveys:	'TURTLE' database being established (2002/3) by Rod Penrose of Marine Environmental Monitoring. Project work using volunteers taking place in Overseas Territories in the Caribbean.
Future research & monitoring:	Set up central UK database for marine turtle records. Seek to minimise by-catch by promoting research into fishing gear. Establish system for undertaking autopsies on dead turtle specimens. Further promote a system for undertaking surveillance of turtles in UK waters. Further promote a system for monitoring and reporting incidental capture and killing of marine turtles.
Suitability for surveying by volunteers:	Yes, under guidance from an expert. Within UK waters, volunteers could also assist with tagging and tracking of individual turtles.
Additional notes:	Many of the UK Overseas Territories have important nesting populations.

5.3.6 Basking shark

Name of plan:	**Basking shark (*Cetorhinus maximus*) Species Action Plan**
Lead partner:	The Wildlife Trusts / Shark Trust / Herpetological Conservation Trust
Current status:	Very large plankton-feeding pelagic shark, the largest fish in UK waters (*ca*. 12 m max. length) and the second largest in the world. Mainly recorded in UK waters from April to September. Numbers recorded vary considerably from year to year. The global status of the basking shark is assessed as Vulnerable (A1a,d,A2d) in the 1996 IUCN Red List.
Protective measures:	Protected under Schedule 5 of the W&C Act 1981 (1998 Amendment) which prohibits the intentional killing, capture or disturbance within 12 nm of the coast. In November 2002 it was added to Appendix II of the Convention on the International Trade in Endangered Species of Wild Fauna and Flora (CITES). This CITES Appendix 2 listing provides important data collection and reporting requirements on 160 countries that attend the Convention with regards their trade in basking shark products.
Current factors causing loss or decline:	Food availability. Capture in by-catch fisheries. Future threats may come from coastal and deep-water fisheries. Shark fins are sold to Far East markets for use in soup and in Chinese traditional medicine. Meat and cartilage are also used, but are less valuable.
Action plan objectives and targets:	Maintain the current basking shark population.
Past or present surveys:	MCS has been running its Basking Shark Watch project since 1987. Since then, its database has on it 4055 records reporting 17,543 sharks (MCS, 2003). The Shark Trust runs a basking shark photo-ID project which began in 2001. The Basking Shark Society (based in the Isle of Man) has had an interest in shark sightings around the Isle of Man in the past, but it is unsure whether this Society is still running. Other research projects are being undertaken through universities and marine laboratories.
Future research & monitoring:	Elucidating life cycle is essential in order to construct a sound management plan, together with studies to determine the species' demography ,population dynamics and patterns of migration. Tagging studies using satellite tracking are currently being undertaken by Dr David Sims at the MBA in Plymouth.
Suitability for surveying by volunteers:	Yes, though on an individual basis. Suggest wider promotion of sightings schemes, with greater emphasis on where to send records of sightings or how to report them directly on-line.
Additional notes:	The development of a code of conduct for non-harassment of basking sharks is recommended in the Species Action Plan.

5.4 BAP species & habitats suitable for surveying by non-divers

- *Ascophyllum nodosum* ecad *mackaii*
- Littoral chalk
- *Sabellaria alveolata* reefs
- Mudflats

5.4.1 *Ascophyllum nodosum* ecad *mackaii*

Name of plan:	***Ascophyllum nodosum* ecad *mackaii* (a brown alga) Species Action Plan**
Lead partner:	Plantlife (Scotland)
Current status:	*Ascophyllum nodosum* (known commonly as egg or knotted wrack) is a common brown seaweed which grows on sheltered rocky shores all around Britain. However, the *mackaii* distinctive free-living ecad (a form which develops in response to environmental rather than genotypic differences) has a very limited distribution, occurring in Scotland, some sites in Northern Ireland and the Irish Republic. The main British (and world) populations are confined to extremely sheltered shores in Scottish sea lochs. Fragments of 'normal' *A. nodosum* grow into unattached, often bladderless, wig-shaped masses at upper or mid-tide levels. Once formed, the ecad can proliferate itself vegetatively from its own broken fragments, which continue to divide forming new plants. Extensive beds sometimes develop in appropriate conditions, over mud or muddy sand and small stones. More often, though, the beds are only a few metres across, typically in small bays between rock outcrops.
Protective measures:	*A. nodosum* ecad *mackaii* is <u>not</u> protected under Sch 8 of the Wildlife & Countryside Act. Nor are the beds listed as an Annex I habitat in the EC Habitats Directive. Several SSSIs in Scotland include A. *nodosum* ecad *mackaii* within their boundaries, though most do not list the species as an interest feature within the citation. At least 3 pSACs and 1 cSAC in Scotland include *A. nodosum* ecad *mackaii*, although the largest Scottish bed in Loch Duich lies outside the SAC boundary as presently drawn.
Current factors causing loss or decline:	Ignorance of importance – one dense bed at Kyle of Lochalsh was entirely removed by contractors during 'tidying-up' prior to the opening of the Skye Bridge. More than two years after this happened, there was still no sign of recovery of this bed.
Action plan objectives and targets:	Maintain the extent and distribution of *A. nodosum* ecad *mackaii* on UK shores. If positive results are obtained from research into the re-establishment of recently lost beds, apply targets to further sites.
Past or present surveys:	In 1957, Dorothy Gibb published the results of a detailed study on Scottish *A. nodosum* ecad *mackaii*, which remains the classic work on this ecad. Information on its distribution, together with information on associated substrata and species was collected by the JNCC's MNCR. Surveys and casework by, and commissioned by, SNH have added to the distributional information.
Future research & monitoring:	Complete surveying of current distribution, quality & associated biota of beds. Commission further research into the factors required for formation of beds. Commission research on potential for the recovery of beds. Carry out survey of biota of shores with beds compared to those without.
Suitability for surveying by volunteers:	Yes. Small group(s) could be organised to survey distribution and extent of *A. nodosum* ecad *mackaii* beds using hand-held GPS, and in assessing their quality.
Additional notes:	'Extremely sheltered mid-eulittoral mixed substrata with *A. nodosum* ecad *mackaii* beds' (SLR.AscX.mac) was classified as a distinct biotope by the MNCR. *A. nodosum* ecad *mackaii* beds are listed by JNCC as being a community of national or more than national importance.

5.4.2 Littoral chalk

[note that this is part of a single plan but it has been split into two here. See also 5.5.9]

Name of plan:	Littoral [and sublittoral chalk] Habitat Action Plan
Lead partner:	English Nature
Current status:	Chalk is a relatively soft and friable, easily eroded, sedimentary rock laid down in the Upper Cretaceous period. There are three main types of chalk (Upper, Middle, Lower) which differ in hardness and also content of flint. Chalk at Flamborough Head is notably different in being particularly hard due to compression by overlying strata and by glaciation. On the Isle of Wight and in Dorset, chalk is vertically bedded in contrast to horizontal bedding elsewhere. Coastal chalk is exposed principally in the south and east of England, from Dorset to Flamborough Head. The most extensive areas of littoral and sublittoral chalk occur in Kent and Sussex. In Britain, chalk forms less than 0.6% (113 km) of the coastline. However, the greatest proportion of European coastal chalk (57%) is located on the coast on England and the UK has an international responsibility to ensure the conservation of this scarce habitat.
Protective measures:	75% (17 sites) of coastal chalk has been notified as SSSIs under the Wildlife & Countryside Act 1981. Statutory protection exists at four sites (Flamborough Head, Thanet Coast, South Wight & Rathlin Island) through their candidature as SACs.
Current factors causing loss or decline:	A recent survey of chalk cliffs throughout England revealed that 56% of coastal chalk in Kent and 33% in Sussex has been modified by coastal defence and other works. A factor affecting chalk biota is human disturbance of littoral plant and animal communities, especially by trampling, stone-turning and damage to rocks through the removal of piddocks.
Action plan objectives and targets:	Seek to retain, and where possible increase, the existing extent of littoral chalk habitats unaffected by coastal defence and other engineering works. Allow natural coastal processes to dictate, where possible, the geomorphology of the littoral environment. Adopt sustainable management practices for all uses on littoral chalk habitats.
Past or present surveys:	During the existence of JNCC's MNCR team (1987-1998) all of England's littoral chalk sites were surveyed.
Future research & monitoring:	Commission research to identify locations where littoral stabilisation works may no longer be necessary in the future. Implement a surveying and monitoring programme by 2003 to provide data on the changes in extent and quality of littoral chalk resources in England & N. Ireland. This will enable progress towards the objectives of this plan to be assessed.
Suitability for surveying by volunteers:	A certain amount of survey work could be achieved by volunteers, especially in terms of measuring the extent and nature of the habitat, as well as alterations to coastal defence structures. Less emphasis should be placed on the identification of littoral chalk biotopes, unless volunteers were known to be experienced in this type of work.
Additional notes:	Current (1998) costings for littoral *and* sublittoral chalk are given in the Action Plan as £30.6k per year for the 5 years up to 2004/5, falling to £9.2k per year for the next 10 years.

5.4.3 *Sabellaria alveolata* reefs

Name of plan:	***Sabellaria alveolata* reefs Habitat Action Plan**
Lead partner:	English Nature
Current status:	The honeycomb worm *Sabellaria alveolata* constructs tubes in tightly packed masses, forming biogenic reefs. The reefs can be 30-50 cm thick and take the form of hummocks or sheets. Typically, the reefs occur on the bottom third of the shore, extending into the subtidal in places. In Britain they are found on S and W coasts, from Lyme Regis to the Solway Firth. The British Isles represent the northern extent of the range of *S. alveolata*, which extends south to Morocco and the Mediterranean.
Protective measures:	Intertidal protection for *S. alveolata* reefs can be achieved through SSSI designation. *S. alvolata* reefs also occur as sub-features of non-reef Annex 1 habitats (e.g. intertidal mudflats and sandflats) under the Habitats Directive. They are present in a number of cSACs. However, many reefs lie outside these areas.
Current factors causing loss or decline:	*Sabellaria alveolata* reefs are at the northern end of their range in Britain and are affected by extremely cold winters after which they may die back from many years. Though they can tolerate periodic immersion by sand, prolonged burial will cause mortality. Accumulations or losses of sand (resulting from shoreline development) are a potential threat to the reefs. They may also suffer from trampling damage by beach users and boulder-turning by bait diggers. There is some evidence that competition for space with common mussels *Mytilus edulis* occurs, particularly on boulder scars.
Action plan objectives and targets:	With the proviso that it is difficult to set biological targets for this habitat about which little is known, the following are suggested: Maintain the extent and quality of *S. alveolata* reef habitats. Within 15 years, attempt to re-establish *S. alveolata* reefs in 5 areas where they were formerly present. Establish a monitoring programme for this initiative.
Past or present surveys:	There is presently very little research on *S. alveolata* within Britain, although small scale surveys of recently developed reefs off Heysham in Morecambe Bay have been carried out. Aerial photos have been used to map intertidal reefs and the MNCR database [Mermaid] holds information on distributions. It is probable that subtidal reefs in the Severn Estuary pSAC will be monitored by CCW and EN.
Future research & monitoring:	By 2003 establish the extent and quality of areas of reef habitat in the UK. Commission research on growth rates, longevity and persistence of both individual worms and associated reef dynamics under a variety of environmental conditions. Establish by 2003 the necessary habitat conditions for the re-establishment of *S. alveolata* reefs within former areas.
Suitability for surveying by volunteers:	A certain amount of survey work could be achieved by volunteers, especially in terms of identifying the location of reef sites and in measuring the extent of the habitat.
Additional notes:	Refer to the *Sabellaria spinulosa* reefs HAP, with regard to common actions for these habitats in the subtidal; and also the sublittoral sands and gravels HAP. Current (1998) costings for this Action Plan are £62.8k per year for the 5 years up to 2004/5, falling to £28.4k per year for the next 10 years.

5.4.4 Mudflats

Name of plan:	Mudflats Habitat Action Plan
Lead partner:	Environment Agency
Current status:	Mudflats are sedimentary intertidal habitats created by deposition in low energy coastal environments, particularly estuaries and other sheltered areas. In large estuaries they may be several kilometres wide, though in many places they have been much reduced by land claim. Mudflats are characterised by high biological productivity and abundance of organisms, but low diversity with few rare species. They support large numbers of migrant and wintering waterfowl and are also an important nursery areas for flatfish. UK intertidal mudflats cover about 270,000 ha.
Protective measures:	Various international and EU agreements, implemented by the relevant UK enabling legislation. This includes the Ramsar Convention (protecting wetlands of international importance), the Bonn Convention (to protect migratory species of wild animals), and the Bern Convention (to conserve European wildlife and habitats). Sites designated under EU law include SPAs (for birds) and SACs (for habitats). Under the W&C Act 1981, over 300 SSSIs have been designated on estuaries which include mudflats. A number of EC Directives also cover water quality, many included in the forthcoming Water Framework Directive. Mudflats may be included within Shoreline Management Plans, Estuary Management Plans and Local Environment Agency Plans. Many are designated as nature reserves of one form or another
Current factors causing loss or decline:	Sea level rise: predictions that 8,000-10,000 ha of intertidal flats in England will be lost between 1993 and 2013. Land claim has removed about 25% of GB estuarine intertidal flats and up to 80% in some estuaries. Mudflats are affected by diffuse and point source discharges from agriculture, industry and urban areas. They are also affected by maintenance dredging for navigation purposes, bait digging and fishing (e.g. suction dredging).
Action plan objectives and targets:	Maintain at least the present extent and regional distribution of UK's mudflats. Create and restore enough intertidal area over the next 50 years to offset predicted losses to rising sea level in the same period. Predicted losses in the next 15 years should be offset in the next 10 years. Restore estuarine water quality to ensure that existing mudflats fulfil their important ecological and conservation role.
Past or present surveys:	The NERC Land Ocean Interaction Study (1994-98) included estuarine and coastal processes with a component on littoral sediment processes. Similarly, the EU Marine, Science and Technology (MAST) programme ECOFLAT studied mudflat physical and biological processes and interactions. English Nature, together with EA and Defra, have been studying managed set-back as a flood defence option.
Future research & monitoring:	Various policies to be implemented by set target dates. Also habitat restoration.
Suitability for surveying by volunteers:	Surveys of mudflats and their associated wildlife by volunteers are likely to centre on counts of waders and wildfowl, often using binoculars. This type of surveying is beyond the remit of this study. As mudflats can be dangerous places, it is *not* recommended that volunteers be asked to survey mudflat infauna on foot without professional training and support being in place.
Additional notes:	This is a costed AP. Reference should be made to saltmarsh and seagrass beds HAPs.

5.5 BAPs species & habitats suitable for surveying by SCUBA divers

Species

Anotrichium barbatum – a red alga
Atrina fragilis – a fan shell
Ostrea edulis – native oyster
Leptopsammia pruvoti – sunset cup coral
Eunicella verrucosa – pink sea fan
Amphianthus dorhnii – sea fan anemone
Edwardsia ivelli – Ivell's sea anemone
Nematostella vectensis – starlet sea anemone

Habitats

Serpulid reefs
Sabellaria alveolata reefs (see section 3.4.3)
Sabellaria spinulosa reefs
Modiolus modiolus beds
Maerl beds
Seagrass beds
Saline lagoons
Tidal rapids
Sublittoral chalk (see section 3.4.2)
Sheltered muddy gravels
Sublittoral sands and gravels

5.5.1 *Anotrichium barbatum* – a red alga

Name of plan:	***Anotrichium barbatum* (a red alga) Species Action Plan**
Lead partner:	Countryside Council for Wales
Current status:	From 1901 until 1997, this species was unknown in Britain. In 1997 a Species Statement was prepared for this species as there had been no records of its occurrence within UK waters since 1901 (Maggs, 2000). However, in August 1998 it was discovered to be growing in one area of the northern part of Cardigan Bay (between Pwlheli and Abersoch), Wales. Consequently, the Statement was upgraded to an Action Plan. Its habitat in Cardigan Bay is on pebbles and gravel at a depth of about 7 m below Chart Datum.
Protective measures:	*Anotrichium barbatum* is not listed in the Schedules of the Wildlife and Countryside Act 1981.
Current factors causing loss or decline:	This species was regarded as being 'exceedingly rare' in the mid-19th century, when its only known location in the UK was from the coasts of Sussex, Hampshire and Dorset. It was widely collected by enthusiasts for their own personal herbariums, and the Action Plan suggests that this intense collecting may have led to its demise. Current threats (to the population in Cardigan Bay) include spoil dumping from channel dredging operations.
Action plan objectives and targets:	Maintain the current known population. Establish the distribution of this species in the UK by 2001 [it is not known whether this has been done or not].
Past or present surveys:	Diving survey of Cardigan Bay in 1998 by the Countryside Council for Wales. A repeat survey of the same site in 1999 (Maggs, 2000) found far fewer plants of *A. barbatum* than in 1998. This was put down to the fact that the size of the 1998 population was unusual and was linked to elevated sea water temperatures during the winter of 1997/8.
Future research & monitoring:	Establish and monitor the size of the *A. barbatum* population in Tremadog Bay for a few years to determine whether it is stable or fluctuates between years. Commission research to establish the environmental variables to which the species is most sensitive. Conduct surveys in locations where the species was formerly present in England searching (shallow areas in the depth range 0-10 m where suitable habitat is present), and consider the feasibility of re-establishment. Also low shore rock pools in the Channel Islands (Maggs, 2000).
Suitability for surveying by volunteers:	Searches by 'expert' volunteers only, under guidance of a professional algologist. The species is small (its fine, filamentous tufts only growing 2-6 cm high) and easily overlooked. Such 'expert' searches could be targeted at places where it was once found, i.e. off the Sussex and Dorset coasts.
Additional notes:	The population in Tremadog Bay, north Cardigan Bay, is at the extreme northern limit for this species, apparently growing as an isolated small community. Sanderson (1996) has suggested that near the edge of their geographical range, species may be more susceptible to environmental disturbances that they are elsewhere.

5.5.2 *Atrina fragilis* – a fan shell

Name of plan:	***Atrina fragilis* (a fan shell) Species Action Plan**
Lead partner:	Marine Conservation Society
Current status:	*Atrina* (= *Pinna*) *fragilis* is one of the largest (30-48 cm long) European bivalve molluscs. Occurs from the sublittoral fringe to 400 m depth, in mud, sand or fine gravel. Between a third and two-thirds of the length of the shell can be buried below the sediment surface. Exists as 'metapopulations' – composed of small groups or patches of individuals. As fertilisation is external, dependent on close proximity of other spawning individuals. The large size of individuals suggests that this is a long-lived species. Distribution extends from the Iberian peninsula north to the north of Scotland. Widespread but rarely encountered.
Protective measures:	Listed under Schedule 5 of the Wildlife and Countryside Act 1981 and the Wildlife (NI) Order 1985. Not listed on Annexes II, IV or V of the EC Habitats Directive.
Current factors causing loss or decline:	It has been suggested that the populations of *A. fragilis* around the UK and Ireland have declined since the turn of the last century due to the impacts of demersal fishing activities, and, in some areas, sand and gravel extraction.
Action plan objectives and targets:	Maintain and (if possible) enhance the distribution and status of *A. fragilis* within the UK.
Past or present surveys:	Members of the family Pinnidae have not been the subject of major ecological or physiological research programmes. In 2003, a survey was launched by the Marine Conservation Society, asking divers to send in any sightings of where they have seen this fan shell (*pers. comm.*, J-L Solandt, MCS).
Future research & monitoring:	• Collate all the UK distribution records of *A. fragilis* to provide an indication of historical and current distribution and status. • Instigate a national reporting scheme to ensure that all new records from fishermen, divers and others are added to the distribution database. • When any sites are discovered, take action to maintain and enhance the population by excluding demersal fishing and dive collection. • Establish the biological and ecological requirements of both the larval and adult stages of *A fragilis*. • Investigate the population genetics, to evaluate the extent of larval dispersal and recruitment and the gene flow between populations.
Suitability for surveying by volunteers:	Yes, appropriate to ask all divers to look out for this species (as per the MCS survey mentioned above) during their dives. Most dives, however, are undertaken on rocky or wreck substrata, so this species will not be seen during these dives. Also, as much as 70% of the animal/shell may be hidden within the sediment, so they may prove difficult to see.
Additional notes:	"The actions and objectives of this Action Plan are relevant to the Habitat Action Plans for sheltered muddy gravels, mud in deep water and offshore sands and gravels. Particular attention is drawn to the damage that may be caused to benthic organisms by demersal fishing, dredging and aggregate extraction."

5.5.3 *Ostrea edulis* – native oyster

Name of plan:	**Native Oyster (*Ostrea edulis*) Species Action Plan**
Lead partner:	Shellfish Association of Great Britain
Current status:	The native or flat oyster *Ostrea edulis* is a sessile, filter-feeding bivalve mollusc. Associated with highly productive estuarine and shallow coastal habitats with sediments ranging from mud to gravel and shell gravel. Widely distributed around the British Isles, the North Sea, Mediterranean and Black Sea. Stock abundance was probably greatest in the 18th and 19th centuries, when landings were 100 times greater than today's 100-200 tonnes.
Protective measures:	Native oyster fisheries are subject primarily to UK shellfisheries conservation legislation; the species is not named in any national or international nature conservation legislation or conventions.
Current factors causing loss or decline:	Dramatic reduction in stock in the middle of the 19th century attributed mainly to over-exploitation, following the increased demand that accompanied improved rail transport. Introduced species from North America (including the American oyster drill *Urosalpinx cinerea* and the slipper limpet *Crepidula fornicata*) around 1900 are also likely to have affected populations. A parasitic protozoan *Bonamia ostreae* has caused considerable mortalities in English populations and others on mainland Europe and Iceland. TBT anti-fouling paints caused stunted growth and probably affected reproductive capacity.
Action plan objectives and targets:	Maintain and, where possible, expand the existing geographical distribution and abundance of the native oyster within UK inshore waters.
Past or present surveys:	CCW undertook a survey in September 2002 of sites in Pembrokeshire and south Wales where native oysters where thought to be present. Some were found in Milford Haven (where they are still actively fished), but none were found off Swansea or Porthcawl where they have been traditionally fished in the past.
Future research & monitoring:	Review the evidence of a relationship between spawning stock biomass and recruitment, and define safe biological reference points. Provide managers of several and regulated fisheries with guidelines and code of practice for habitat protection, stock management and species protection. Continue and extend surveys of all wild stocks and fisheries to establish stock biomass, distribution and spatfall variability including assessments of any recovery in areas previously contaminated by TBT. Assess and report on the implications for genetic variability and biodiversity of using hatchery brood stock to produce seed for stock replenishment.
Suitability for surveying by volunteers:	Yes. Diving surveys of areas where native oysters are thought to be and, where found, use counts along transects to assess density.
Additional notes:	The habitat action plans for mudflats and sheltered muddy gravels are of relevance to this plan.

5.5.4 *Leptopsammia pruvoti* – sunset cup coral

Name of plan:	**Sunset cup coral (*Leptopsammia pruvoti*) Species Action Plan**
Lead partners:	The Wildlife Trusts & Worldwide Fund for Nature (UK)
Current status:	*Leptopsammia pruvoti* occurs in groups of a few tens to several hundred individuals, attached to rock at a small number of isolated locations in south-west England. In other parts of the NE Atlantic it has been recorded in the Channel Isles, Brittany and Portugal and occurs widely in the Mediterranean, especially in caves. It was first recorded in Britain at Lundy in 1969. It prefers shaded bedrock habitats, for instance under overhangs and in caves or gullies. Populations at Lundy and the Isles of Scilly were monitored for 12 years and showed no or negligible recruitment. One sub-population at Lundy had declined by 22% between 1993 and 1997.
Protective measures:	The sunset cup coral is not protected under any UK statutes or listed in Directives or Conventions.
Current factors causing loss or decline:	There are several possible reasons why the sunset cup coral has a restricted distribution and is in decline. However, little observational or experimental work has been undertaken to establish either status or decline. Populations are at the northern limit of their distribution and may be a relic of a former, more extensive distribution approximately 700 years ago. They are now restricted to 'ideal' locations. Populations recruit extremely infrequently probably because water temperatures are too low for gamete production. Adult populations decline because of lack of recruitment. Non-recruiting populations decline because of weakening of the skeleton by boring organisms. Recruitment into populations may occur from distant sources such as populations to the south in continental Europe and only when appropriate water bodies move into SW England. There is evidence that this sort of movement of water bodies might occur every 25-30 years.
Action plan objectives and targets:	Promote a better understanding of the current distribution, abundance and life history characteristics of the sunset cup coral and create a baseline of information by the end of 2004. Maintain the distribution and abundance of known viable populations and those identified by the 2004 baseline.
Past or present surveys:	Photographic monitoring studies were carried out on selected Lundy and Isles of Scilly populations during the 1980s and early 1990s. Distributional studies at Lundy have been undertaken by groups of MCS volunteer divers.
Future research & monitoring:	Ensure *Leptopsammia* is included in SAC monitoring programmes where appropriate. Undertake work to understand the factors that affect the coral's recruitment and survival. This would involve a programme of *ex-situ* studies.
Suitability for surveying by volunteers:	As fully-grown specimens are relatively easy to identify in amongst faunal turf, volunteer divers can be utilised to help count, photograph and assess the presence of boring organisms in the vicinity of corals, with high confidence of correct identification (as has been done by MCS volunteer diving groups at Lundy).
Additional notes:	*Leptopsammia* occurs in the same area as the pink sea-fan and the sea-fan anemone, so there is a possibility of combining survey and monitoring activities.

5.5.5 *Eunicella verrucosa* – pink sea fan

Name of plan:	**Pink sea-fan (*Eunicella verrucosa*) Species Action Plan**
Lead partners:	The Wildlife Trusts & Worldwide Fund for Nature (UK)
Current status:	*Eunicella verrucosa* is widely distributed in SW Britain, from Portland (Dorset) to north Pembrokeshire. It also occurs on the west coast of Ireland and southwards into the Mediterranean. In the Bristol Channel the eastward extent is to approximately Combe Martin (North Devon). Sea-fans attach to upward-facing bedrock or stable boulders typically below 15 m depth. They grow up to 60 cm broad and tall, with branching usually in one plane, orientated at right angles to predominant water currents. At most locations, individual sea-fans are widely separated, though occasionally they are found in dense clusters. Large specimens may be as much as 40 years old. The pink sea-fan (and its close relative the northern sea –fan *Swiftia pallida*) are both hosts to another BAP species, the sea-fan anemone *Amphianthus dorhnii*.
Protective measures:	*Eunicella verrucosa* is protected under Schedule 5 of the Wildlife and Countryside Act 1981 against killing, injuring, taking possession and sale.
Current factors causing loss or decline:	Collected as souvenirs, including commercial collection, during the late 1960s, which may have reduced populations in the long term. Effects of climate change on current UK distribution of this species are not known. Nor are local anthropogenic impacts. Long-term effects of intensive potting and netting on local populations not known and require further investigation. Fin-strike damage by scuba divers may also be detrimental. Sea-fans can die whilst still attached to the seabed after becoming smothered by other organisms (such as by ephemeral seaweeds at shallow depths during early summer).
Action plan objectives and targets:	Ensure that the pink sea-fan maintains its current abundance and distribution from the 1998 baseline.
Past or present surveys:	Survey of pink sea-fans in 2001/2 by MCS volunteers, assessing size and condition of colonies (Wood, 2001 & 2002). Continuation of work carried out at Lundy by MCS volunteers since 1995. Photographic monitoring of individual fans at Skomer MNR since mid 1980s.
Future research & monitoring:	Continue to monitor abundance and condition of sea-fans as part of established monitoring work and ensure that they are included in SAC monitoring programmes. Research the factors which affect recruitment and survival of the pink sea-fan. Studies are currently being undertaken on this by Reef Research based in Devon.
Suitability for surveying by volunteers:	A very good subject for surveying by volunteers, as was demonstrated in 2001/2. Easy to recognise, static, clear growth form for measuring dimensions, and sufficiently robust to withstand minor disturbance. There may be difficulties however with the identification of small molluscan predators such as the cryptic seaslug *Tritonia nilsodhneri* and the small prosobranch *Simnia patula*.
Additional notes:	A recent study by MCS volunteer divers showed the average size of pink sea-fans to vary according to location. Also, those off the east coast of Lundy were found to be in the poorest state of health (Wood, 2002).

5.5.6 *Amphianthus dorhnii* – sea-fan anemone

Name of plan:	**Sea-fan anemone (*Amphianthus dorhnii*) Species Action Plan**
Lead partners:	The Wildlife Trusts & Worldwide Fund for Nature (UK)
Current status:	*Amphianthus dorhnii* is found attached to certain benthic organisms in a few locations in south-west Britain (on the pink sea-fan *Eunicella verrucosa*) and in western Scotland (on the northern sea-fan *Swiftia pallida*). It has also been recorded on certain hydroids. It also occurs in south-west Europe and the Mediterranean, although recently the anemone appears to have become rare over its entire range. The anemone is about 10 mm across the disc, has a short column and approximately 80 tentacles. The colours varies, being buff, pink, orange or red, usually streaked or splashed with white. Reproduction is by basal laceration, although sexual reproduction is also likely.
Protective measures:	*Amphianthus dorhnii* is not protected or listed under any statutes, conventions or directives. However, its main host, the pink sea-fan *Eunicella verrucosa*, is protected under Schedule 5 of the Wildlife and Countryside Act 1981.
Current factors causing loss or decline:	The species was first described in 1878. Its numbers may have declined due to: Change in water masses. Since the mid-1970s, water masses have been colder and of a different character, seeming not to favour species near the northern limits of their distribution. This is believed to be part of a natural cycle. Poor larval supply. The supply of larvae may be from the south of the British Isles and dispersal to the north and east would require strong south-westerly currents. Contamination of water quality by human activities affecting the survival of larvae and possibly adults.
Action plan objectives and targets:	Maintain the distribution and abundance of known viable populations and of those identified from a baseline to be established by 2004.
Past or present surveys:	Individual records through MNCR surveys and others. Survey of pink sea-fans (together with presence/absence records of sea-fan anemones) in 2001/2 by MCS volunteers (Wood, 2001 & 2002).
Future research & monitoring:	Establish the current distribution and abundance of sea-fan anemones on various substrata within its geographical range. Volunteer surveyors should be used where possible and effort should be combined with studies of the pink sea-fan. Direct research at examining the factors that affect recruitment, survival and reproduction of the sea-fan anemone. Information will be obtained from studies of other *Amphianthus* species, including deep-water species currently being studied. Further study is also needed of reproduction by basal laceration.
Suitability for surveying by volunteers:	As both of the main host species, the pink sea-fan *Eunicella verrucosa* and the northern sea-fan *Swiftia pallida*, are easy to recognise, there can be a reasonably high confidence that checking for the presence of sea-fan anemones on them can be undertaken by volunteers with some certainty. However, these anemones are cryptic and may be overlooked unless each sea-fan is carefully inspected.
Additional notes:	The successful conservation of the pink sea-fan, through its own action plan, is part of the requirement for conservation of the sea-fan anemone and studies of the two species could be carried out simultaneously.

5.5.7 *Edwardsia ivelli* – Ivell's sea anemone

Name of plan:	**Ivell's sea anemone (*Edwardsia ivelli*) Species Action Plan**
Lead partner:	Worldwide Fund for Nature (UK)
Current status:	Ivell's sea anemone *Edwardsia ivelli* is known from only one location in the world – Widewater Lagoon in West Sussex. It was last seen in 1983 and is now possibly extinct. It was named by Richard Manuel after its discoverer, Richard Ivell, who at the time (1973) was undertaking studies on the lagoon cockle *Cerastoderma glaucum* for his Ph.D at Oxford University. The anemone is very small (only 20 mm long and 1.25 mm in diameter when fully extended) and almost transparent. Consequently, it is extremely difficult to detect it *in situ*, not only because of its small size but also because algal mats often obscure the sediment surface.
Protective measures:	*Edwardsia ivelli* is protected under Schedule 5 of the Wildlife and Countryside Act 1981, and as a globally threatened species is listed by IUCN/WCMC.
Current factors causing loss or decline:	Reduced seawater penetration and water infusion from adjacent marshes. Pollution, especially agrochemical run-off from adjacent gardens.
Action plan objectives and targets:	Establish whether the species survives at its sole recorded site. Restore the habitat through improvement of water quality and quantity. If the species is re-discovered, consider translocating individuals to other sites.
Past or present surveys:	There have been a number of surveys of Widewater Lagoon since the 1930s. In the past 20 years, several studies have been undertaken by M.Sc. and Ph.D. students at Southampton University, under the guidance of Dr Martin Sheader. Dr Sheader studied the invertebrate fauna of the lagoon in 1983 (Sheader *et al*., 1993) and Robert Irving surveyed the lagoon in 1997 specifically to search for *Edwardsia ivelli* (Irving 1997). A Management Plan for Widewater Lagoon was prepared by the Nature Conservation Bureau in 1993 (Everett, 1993). Most recent studies have been undertaken by Brighton University, as part of a contract to survey lagoonal habitats throughout Sussex, on behalf of English Nature (Surrey & Sussex Team).
Future research & monitoring:	Continue to search for this species through surveys of brackish lagoon habitat. Pass information gathered during survey and monitoring of the species to JNCC or BRC, so that it can be incorporated in national databases. Provide information annually to the World Conservation Monitoring Centre on the UK status of the species to contribute to maintenance of up-to-date global red lists.
Suitability for surveying by volunteers:	Not suitable. Lagoonal habitats are fragile places, particularly because of their shallow depths and silty mud substrata which can be easily stirred up. The water depth at Widewater Lagoon varies (at high tide seawater percolates into the lagoon through the gravel beach), though is typically only 0.5-1.0 m deep. Being such a rare anemone, any disturbance such as might be created by volunteer surveyors would be unacceptable.
Additional notes:	

5.5.8 *Nematostella vectensis* – starlet sea anemone

Name of plan:	**Starlet sea anemone (*Nematostella vectensis*) Species Action Plan**
Lead partner:	Worldwide Fund for Nature (UK)
Current status:	The starlet sea anemone occurs in only a few coastal lagoons in the Isle of Wight, Sussex, Hampshire and Dorset, and also along the East Anglian coast/ It may occur in some brackish ponds and ditches too. Worldwide, it is also found at a few sites in Canada and the USA (Pacific and Atlantic coasts).
Protective measures:	The species is protected under Schedule 5 of the Wildlife and Countryside Act 1981. It is listed as vulnerable by IUCN/WCMC and rare of the GB Red List.
Current factors causing loss or decline:	Loss and damage to lagoon and other sheltered brackish water habitats caused by pollution, drainage and other activities. Isolation of pools leading to fragmentation of populations. Coastal defence works and associated infilling.
Action plan objectives and targets:	Maintain and protect viable populations at all known localities. Assess status in brackish ponds and ditches. If feasible, re-introduce to five sites by the year 2005.
Past or present surveys:	A number of surveys of brackish water bodies/saline lagoons were undertaken on behalf of NCC during the 1980s (see Barnes, 1988 and Smith & Laffoley, 1992). A study was carried out in 1998 by Francis Bunker (Marine Seen) on behalf of WWF to obtain video and still images of *Nematostella vectensis*.
Future research & monitoring:	Promote surveys to determine the full extent of the species' distribution, especially in brackish ponds and ditches. Seek to identify former sites suitable for re-introduction. Encourage regular monitoring of existing populations and identify further threats to the species. Pass information gathered during survey and monitoring of this species to JNCC or BRC so that it can be incorporated in national databases. Provide information annually to WCMC on the UK status of the species to contribute to maintenance of an up-to-date global red list.
Suitability for surveying by volunteers:	Not suitable. Lagoonal habitats are fragile places, particularly because of their shallow depths and silty mud substrata which can be easily stirred up. Being such a rare anemone, any disturbance such as might be created by volunteer surveyors would be unacceptable.
Additional notes:	Saline lagoons are a priority habitat under the EC Habitats Directive. It is suggested that, where possible, the amount of brackish lagoon habitat and ditches in areas within the dispersal range of this species should be increased, to encourage expansion of existing colonies.

5.5.9 Sublittoral chalk

[note that this is part of a single plan but it has been split into two here. See also 5.4.2]

Name of plan:	**Littoral and sublittoral chalk Habitat Action Plan**
Lead partner:	English Nature
Current status:	Chalk is a relatively soft and friable, easily eroded, sedimentary rock laid down in the Upper Cretaceous period. There are three main types of chalk (Upper, Middle, Lower) which differ in hardness and also content of flint. Chalk at Flamborough Head is notably different in being particularly hard due to compression by overlying strata and by glaciation. On the Isle of Wight and in Dorset, chalk is vertically bedded in contrast to horizontal bedding elsewhere. Coastal chalk is exposed principally in the south and east of England, from Dorset to Flamborough Head. The most extensive areas of littoral and sublittoral chalk occur in Kent and Sussex. Due to the limited nature of this habitat, the UK has an international responsibility to ensure the conservation of this scarce resource. In SE England, infralittoral communities are limited or absent and animal-dominated circalittoral communities occur in relatively shallow waters due to local high turbidity. At Flamborough, the Isle of Wight and Studland, infralittoral communities are more diverse and extend into deeper waters.
Protective measures:	Statutory protection for sublittoral chalk exists at four sites (Flamborough Head, Thanet Coast, South Wight & Rathlin Island) through their candidature as SACs. Off the Sussex coast, subtidal chalk platforms are included within the Seven Sisters VMCA, and eight sublittoral sites where chalk outcrops occur have recently been identified as Marine Sites of Nature Conservation Importance, a non-statutory designation which serves to highlight the nature conservation interest of these sites.
Current factors causing loss or decline:	There has been less alteration of sublittoral chalk exposures than littoral chalk, although the development of large ports at Dover and Ramsgate, together with harbour developments at Margate, Folkestone, Newhaven and Brighton Marina, have led to loss of sublittoral chalk habitats. In Sussex waters, the greatest concern results from the use of dragged fishing gear (e.g. bottom trawls) at sites where low chalk cliffs occur, leading to the gradual breakdown of the cliff feature.
Action plan objectives and targets:	Seek to retain, and where possible increase, the existing extent of sublittoral chalk habitats unaffected by coastal defence and other engineering works. Allow natural coastal processes to dictate, where possible, the geomorphology of the sublittoral environment. Adopt sustainable management practices for all uses on sublittoral chalk habitats.
Past or present surveys:	Marine biological surveys of sublittoral chalk reefs were undertaken as part of the JNCC's MNCR. A number of other surveys, particularly Seasearch, have also been undertaken on sublittoral chalk reef sites, particularly off the Sussex coast.
Future research & monitoring:	Assist in the development and implementation of monitoring programmes for sublittoral chalk habitats in line with statutory reporting requirements for SAC management schemes. Implement a surveying and monitoring programme by 2003 to provide data on the changes in extent and quality of the sublittoral chalk resource in England & N.I. Commission a research programme for completion by 2005 to investigate the effects of invasive non-native species on the local ecology of sublittoral chalk, and determine how to eradicate such species.
Suitability for surveying by volunteers:	Yes. The extent and nature of chalk reefs can be surveyed by volunteer divers, particularly as part of Seasearch 'Specialist' level projects.
Additional notes:	Current (1998) costings for littoral *and* sublittoral chalk are given in the Action Plan as £30.6k per year for the 5 years up to 2004/5, falling to £9.2k per year for the next 10 years.

5.5.10 Serpulid reefs

Name of plan:	**Serpulid reefs Habitat Action Plan**
Lead partner:	Scottish Natural Heritage
Current status:	*Serpula vermicularis* is a polychaete worm which makes a hard, calcareous tube 4-5 mm in diameter and up to 150 mm long. In most places the worms are solitary, though they can also aggregate into clumps or 'reefs' up to 1 m across. The species has a worldwide distribution (except for polar seas) in sheltered sites, but the reef form has been reported from only a few locations. The best developed serpulid reefs in the world are found in Loch Creran on the west coast of Scotland. The best examples are found in a relatively narrow vertical zone in the loch, at a depth between 6-10 m.
Protective measures:	*Serpula vermicularis* reefs are not specifically listed as a protected species or habitat by either the Wildlife and Countryside Act 1981 or the EC Habitats Directive. However, they can be covered by the latter under 'reefs', which includes 'biogenic' reefs, where the reef is made up of massed living animals or plants, together with their non-living protective structures (shells, tubes etc.). There is no current legal protection for the serpulid reefs in Loch Creran. However, Loch Creran is a Marine Consultation Area, a non-statutory designation used by SNH to denote areas of special marine interest.
Current factors causing loss or decline:	It is not known why there are so few sites where serpulid reefs occur and so the factors which might cause loss or decline are unclear. Serpulid reefs are fragile and vulnerable to mechanical disturbance, such as from mobile fishing gear and also creels. Anchors and mooring chains could also cause considerable damage to the reefs. Changes in the water flow regime may have adverse effects on the reefs.
Action plan objectives and targets:	Maintain the extent and quality of serpulid reefs and their associated plant and animal communities in the UK. Restore lost reefs in Loch Sween.
Past or present surveys:	MNCR surveys and subsequent SNH surveys have confirmed Loch Creran to be the only Scottish sea loch with well developed *Serpula vermicularis* reefs.
Future research & monitoring:	Complete survey and recording of the distribution, extent, quality and composition of the serpulid reefs and their associated species in Loch Creran. Monitor closely the health of the reefs in Loch Creran, together with important physical and biological factors. Resurvey the Linne Mhuirich arm of Loch Sween to establish the current status of the serpulid reefs and explore the potential for restoration. Encourage research into factors affecting the settlement, growth, maintenance and ecology of the reefs in Loch Creran. Monitor the recovery of marine communities after construction works on the Creagan Bridge to establish the effectiveness of mitigation methods.
Suitability for surveying by volunteers:	Studies of the distribution, extent and quality of the Loch Creran reefs could well be undertaken by volunteer divers, given appropriate training. The composition of the associated fauna and flora may require professional assistance.
Additional notes:	This is a costed Action Plan. 1998 costings for serpulid reefs are given as £30k per year for the 5 years up to 2004/5, falling to £5k per year for the next 10 years. There are similarities between this HAP and that for *Sabellaria spinulosa* reefs, in that attention needs to be drawn to potentially damaging operations for both habitats.

5.5.11 *Sabellaria spinulosa* reefs

Name of plan:	***Sabellaria spinulosa* reefs Habitat Action Plan**
Lead partner:	English Nature
Current status:	*Sabellaria spinulosa* reefs comprise dense subtidal aggregations of this small, tube-building polychaete worm. *S. spinulosa* can act to stabilise cobble, pebble and gravel habitats. The reefs are solid (albeit fragile), massive structures at least several centimetres thick, raised above the surrounding seabed and persisting for many years. As such, they provide a biogenic habitat that allows many other associated species to become established. The *S. spinulosa* reef habitats of greatest nature conservation significance are those which occur on predominantly sediment or mixed sediment areas. *Sabellaria spinulosa* is widespread and common around the British Isles. However, in most parts of its geographical range it does not form reefs but is solitary or found in small groups encrusting pebbles, shell and bedrock. The Wash has extensive areas of reef, rising up to 60 cm above the seabed and covering linear extents of 300 m.
Protective measures:	There is currently no statutory protection for known examples of this sublittoral habitat in the UK. None of the UK's cSACs were selected specifically for biogenic reefs, although they may represent important sub-features of other Annex I habitats ('Sandbanks which are covered by seawater at all times'; 'Large shallow bays and inlets'; and 'Estuaries'), for which a site was selected.
Current factors causing loss or decline:	The greatest impact on this habitat is considered to be physical disturbance from fisheries activities. Dredging for oysters and mussels, trawling for shrimp or fin fish, net fishing and potting can all cause damage to the *S. spinulosa* reef communities. Aggregate dredging is also likely to have a direct impact on *S. spinulosa* reefs, but it is not considered to be as significant a threat as commercial fisheries, provided that the environmental assessments identify reefs and that these are avoided during dredging operations.
Action plan objectives and targets:	By 2004 quantify and maintain the extent, distribution and quality of existing *S. spinulosa* reefs in the UK. Ensure known areas of *S. spinulosa* reef are avoided by seabed operations that may cause direct impact. By 2004 establish and ensure necessary habitat conditions required for re-establishment of *S. spinulosa* reef where formerly found, for example in the Essex estuaries and Morecambe Bay. Establish monitoring programmes to determine the success of these initiatives.
Past or present surveys:	Towed video survey of reefs undertaken by Seamap in the Wash in 1996 as part of a broadscale mapping survey of sublittoral biotopes (Foster-Smith *et al*., 1997).
Future research & monitoring:	Refine the MNCR list of characteristic species associated with *S. spinulosa* reefs. Investigate and assess the distribution, area and habitat quality of *S. spinulosa* reefs. Investigate life cycles, recruitment and longevity of reefs and their associated fauna. Initiate biological monitoring programmes in aggregate dredged and undredged areas. Study the effect of towed fishing gear on *S. spinulosa* reefs, their potential for recovery and rates of recovery. By 2004 compile an inventory of areas which formerly supported *S. spinulosa* reefs, establish the necessary habitat conditions for re-establishment and identify the highest priority sites for re-establishment.
Suitability for surveying by volunteers:	*S. spinulosa* reefs tend to occur on mixed sediment seabeds where visibility is very poor and there are often noticeable currents. Such conditions are tricky for divers to cope with, especially inexperienced divers. Surveys of these areas should therefore only be undertaken by experienced divers and surveyors.
Additional notes:	This is a costed Action Plan. 1998 costings for *Sabellaria spinulosa* reefs are given as £54k per year for the 5 years up to 2004/5, falling to £21k per year for the next 10 years. In this Action Plan and those for *Sabellaria alveolata*, *Serpula vermicularis* and sublittoral sands and gravels, emphasis is placed on their vulnerability to physical disturbance, particularly through fishing activities and aggregate extraction.

5.5.12 *Modiolus modiolus* beds

Name of plan:	***Modiolus modiolus* beds Habitat Action Plan**
Lead partner:	Countryside Council for Wales
Current status:	The horse mussel *Modiolus modiolus* forms dense beds at depths of 5-70 m in fully saline, often moderately tide-swept areas off northern and western parts of the British Isles. Although it is a widespread and common species, true beds forming a distinctive biotope are much more limited and are not known south of the Humber and Severn estuaries. Beds are known from Shetland, Orkney, the Hebrides and other parts of western Scotland, the Ards peninsula, Stangford Lough, off both ends of the Isle of Man, off north-west Anglesey and north of the Lleyn peninsula. In a few places, beds are more or less continuous and may be raised up to several metres above the surrounding seabed. JNCC's MNCR has identified four major biotopes dominated by dense *M. modiolus*. *M. modiolus* is a long-lived species and individuals within beds are frequently 25 years old or more. The shell's byssus threads have an important stabilising effect on the seabed, binding together live shells, dead shells and sediments. There is an extremely rich fauna associated with *M. modiolus* beds, sometimes with hundreds of species.
Protective measures:	There is no specific protection for *M. modiolus* as a species *per se*, but a number of beds fall within cSACs or MNRs. For some places within England and Wales, local Sea Fisheries Byelaws (or Several and Regulating Orders in Scotland) prohibit disturbance of mussel beds without defining the species.
Current factors causing loss or decline:	• Fishing, particularly using trawls and dredges for scallops and queen scallops, is known to have caused widespread and long-lasting damage to beds in Stragford Lough and off the SE of the Isle of Man. • *Modiolus* beds are also likely to be damaged by aggregate extraction, trenching and pipe/cable-laying, dumping of spoil/cuttings, or use of jack-up rigs. • Natural predation on young mussels (less than 3-6 years old) will affect the population structure of beds, though in the long term they seem to be stable features.
Action plan objectives and targets:	Maintain the extent, distribution and quality of *M. modiolus* beds in UK waters.
Past or present surveys:	Existing survey and monitoring data for *M. modiolus* beds are limited; the Strangford Lough beds are the best studied. Work is also being carried out on the beds off the Lleyn peninsula to develop appropriate survey and monitoring techniques. The most promising techniques for measuring the extent and integrity of the beds are acoustic surveys and video.
Future research & monitoring:	• By 2004 assess the distribution, extent and quality of beds of different types. This needs to include investigation of the associated flora and fauna in different conditions. • Investigate the natural dynamics of *M. modiolus* beds. • Assess the potential effects of chronically high sediment loads on condition, spawning and recruitment in *M. modiolus* beds. • Assess the potential for damage by eutrophication or organic enrichment in enclosed systems such as sea lochs, especially where water exchange is low or where there is high localised organic or nutrient input (e.g. from fish farms, factories etc.). • Assess the potential for recovery of beds after cessation of damaging activities. • Assess the feasibility of restoring beds by relaying *M. modiolus*.
Suitability for surveying by volunteers:	Volunteer divers could assist with the collection of samples from *M. modiolus* beds and undertake limited descriptive surveys of seabed types and dominant associated characterising species. Detailed studies would need to be left to professional marine biologists.
Additional notes:	This is a costed Action Plan. 1998 costings for *Modiolus modiolus* beds are given as £102k per year for the 5 years up to 2004/5, falling to £20k per year for the next 10 years. Reference should be made to the biogenic reef habitat action plans (i.e. *Sabellaria alveolata*, *Sabellaria spinulosa* and *Serpula vermicularis*). Emphasis is given to the vulnerability of these habitats to disturbance by a variety of activities.

5.5.13 Maerl beds

Name of plan:	Maerl beds Habitat Action Plan
Lead partner:	Scottish Natural History
Current status:	Maerl is a collective term for several species of calcified red seaweed. It grows as unattached nodules on the seabed and can form extensive beds in favourable conditions. Maerl is slow-growing, but over long periods its dead calcareous skeleton can accumulate into deep deposits (an important habitat in its own right), overlain by a thin layer of pink, living maerl. Maerl beds typically develop where there is some tidal flow, such as in the narrows and rapids of sea lochs, or the straits and sounds between islands. Live maerl has been found at depths of 40 m, but beds are typically much shallower, above 20 m and extending up to the low tide level. Maerl beds are found off the southern and western coasts of the British Isles, north to Shetland, but are particularly well developed around the Scottish islands and in sea loch narrows, around Orkney, and in the south in the Fal estuary. Maerl beds are an important habitat for a wide variety of marine animals and plants which live amongst or are attached to its branches.
Protective measures:	No maerl species are specifically listed for protection under the Wildlife and Countryside Act 1981. However, Annex V of the Habitats Directive lists two maerl species (*Lithothamnium coralloides* and *Phymatolithon calcareum*) as species of community interest whose taking in the wild and exploitation may be subject to management measures. Maerl beds are covered by four different habitat types of Annex I of the same Directive: 'Sandbanks which are slightly covered by seawater at all times' (the main one); 'Large shallow bays and inlets'; 'Estuaries' and the priority habitat 'Lagoons'.
Current factors causing loss or decline:	Maerl is of commercial value as a soil conditioner, an animal food additive, for the filtration of water and in pharmaceutical and cosmetics products. The largest 'worked' area is in the Fal estuary. Scallop dredging can have a big impact on maerl beds, breaking and burying the thin layer of living maerl. Heavy anchors and mooring chains can also cause considerable damage. Maerl communities in Brittany have been damaged by eutrophication, which has caused smothering of the maerl by excess growth of other seaweeds and increased sedimentation.
Action plan objectives and targets:	Maintain extent, variety and quality of maerl beds and associated plant and animal communities in the UK, subject to the best available information.
Past or present surveys:	Surveys undertaken throughout Britain by JNCC's MNCR team and subsequent surveys commissioned by country agencies have identified maerl bed sites, and described and classified the communities within them. The University Marine Biological Station, Millport, has co-ordinated a 3-year EU-funded project looking at maerl bed biodiversity, function, structure and anthropogenic impacts at sites throughout Europe.
Future research & monitoring:	Complete the survey and recording of the extent, quality and composition of maerl bed habitats by 2005. Monitor the recovery of sites after previously consented construction works (e.g. the Skye Bridge), to establish the effectiveness of mitigation measures. Establish a monitoring programme by 2005 that will enable progress towards the objective of this plan to be properly assessed.
Suitability for surveying by volunteers:	Volunteer divers would be able to help out with determining the extent of maerl beds, the depth of the 'living layer' and of seabed descriptions. They would also be able to take photographs of quadrats and video footage. Detailed descriptions of maerl communities would need to be left to professional marine biologists.
Additional notes:	This is a costed Action Plan. 1998 costings for maerl beds are given as £54k per year for the 5 years up to 2004/5, falling to £30k per year for the next 10 years. Reference should be made to the habitat action plans for saline lagoons and tidal rapids. In particular, attention needs to be drawn to operations that may damage benthic habitats.

5.5.14 Seagrass beds

Name of plan:	**Seagrass beds Habitat Action Plan**
Lead partner:	Environment and Heritage Service, Northern Ireland
Current status:	Seagrass beds develop in intertidal and shallow subtidal areas on sands and muds. Three species of *Zostera* occur in the UK, and all are considered to be scarce. Dwarf eelgrass *Zostera noltii* is found highest on the shore, often adjacent to lower saltmarsh communities; narrow-leaved eelgrass *Z. angustifolia* on the mid to lower shore; and eelgrass *Z. marina* predominantly in the sublittoral. The plants stabilise the substratum, are an important source of organic matter, and provide shelter and a surface of attachment for other species. Intertidal eelgrass is an important food source for wildfowl (particularly brent geese and widgeon). Subtidal beds act as important nursery areas for flatfish and, in some areas, cephalopods. Five different community types have been identified for seagrass beds from the southern North Sea and the English Channel.
Protective measures:	Areas of seagrass are included in some coastal SSSIs, Ramsar sites, SPAs and voluntary marine protected areas. Two out of three UK MNRs have seagrass beds and the habitat occurs in a number of areas proposed as SACs under the EC Habitats Directive. It has been suggested that when the Annexes of the Habitats Directive are reviewed by the EC, that *Zostera* be included as appropriate.
Current factors causing loss or decline:	**Disease** – a wasting disease was responsible for die-back of large areas of seagrass in the UK in the 1930s. **Natural cycles** – the extent of seagrass beds may change as a result of natural factors such as severe storms, exposure to air and freshwater pulses. Warm sea temperatures coupled with low levels of sunlight may cause significant stress and die-back of seagrasses. **Physical disturbance** – for example by trampling, land claim, dredging and use of mobile bottom fishing gear. **Introduction of, and competition from, alien species** – such as *Spartina anglica* and *Sargassum muticum*. **Increased turbidity** – reducing photosynthesis. **Nutrient enrichment** – at low levels, may increase production in *Zostera*, though high nitrate concentrations have been implicated in the decline of mature *Z. marina*. **Marine pollution** – eelgrass is known to accumulate tributyl tin and possibly other metals and pollutants.
Action plan objectives and targets:	Maintain extent, quality and distribution of seagrass beds in UK waters. Assess feasibility of restoration of damaged or degraded seagrass beds. Until surveys assess the extent of the seagrass resource, it will not be possible to assess whether restoration is necessary, or to specify a final target. An interim target of 1000 ha has been costed.
Past or present surveys:	Information on the distribution and extent of seagrass beds has been collected by JNCC's MNCR team and subsequently by the country agencies. Eelgrass beds in the Isles of Scilly were monitored for several years by NCC and have been re-surveyed by volunteers. Volunteers have also been assisting with the mapping of the eelgrass bed within the Skomer MNR. The beds within Milford Haven and the Fleet were re-surveyed in 1999.
Future research & monitoring:	Compile and publish an up-to-date record of the extent, quality and distribution of seagrass around the UK. Complete a classification of the different types of seagrass communities around the UK as part of the EC BIOMAR project. Advise on the establishment of a programme to set up a network of seagrass monitoring stations across the full range of types of seagrass beds in the UK. Carry our further research into the factors which adversely affect seagrass beds to understand how these may be avoided or minimised. Carry out research and feasibility studies on the restoration of seagrass beds through transplanting and germination.
Suitability for surveying by volunteers:	As indicated above, volunteer divers have already been surveying *Zostera marina* eelgrass beds for some time, typically on behalf of the country agencies. This valuable work should be continued and be expanded (in terms of resource input, support and frequency of visits) where possible.
Additional notes:	This is a costed Action Plan. However, as a result of limited data on habitat restoration and management of seagrass beds, the costs given are simply indicative – namely, for 1000 ha to be restored, £330,000 will be needed per annum from 1997 until 2010. Reference should be made to the habitat action plans for saline lagoons, saltmarsh and mudflats.

5.5.15 Saline lagoons

Name of plan:	Saline lagoons Habitat Action Plan
Lead partner:	English Nature
Current status:	Lagoons in the UK are essentially bodies of saline water (either natural or artificial) partially separated from the adjacent sea. They retain a proportion of their sea water at low tide and may develop as brackish, full saline or hyper-saline water bodies. The flora and invertebrate fauna present can be divided into three main components: those that are essentially freshwater in origin, those that are marine/brackish species and those that are more specialist lagoonal species. The presence of certain indigenous and specialist plants and animals make this habitat important to the UK's overall biodiversity. There are several different types of lagoons recognised.
Protective measures:	In GB, 12 species of invertebrate and plant associated with lagoons are protected under the Wildlife and Countryside Act 1981. Of the 177 lagoon sites surveyed in England, just over 50% occur within existing SSSIs and about 10% occur within NNRs and as many in LNRs. Fewer examples are found in Wales where only between 5 and 10 lagoons are recognised. 139 sites have been identified in Scotland of which 15% are SSSIs and less than 2% are within NNR. A preliminary study suggest there may be 30 lagoonal habitat sites in Northern Ireland, all of which will eventually fall within the ASSI/SPAs network. Internationally important lagoons have been designated for their bird interest as SPAs under the EC Birds Directive. Coastal lagoons are also listed as a priority habitat on Annex 1 of the EC Habitats Directive; the UK Government has identified 10 cSACs under this Directive, some of which include several individual lagoon sites.
Current factors causing loss or decline:	Human coastal activities – formation of new lagoons will not keep pace with the process of lagoon loss. Many lagoons are naturally transient, gradually changing from saline to freshwater conditions, or being in-filled with sediments as protective 'bars' move landward. Pollution – in particular nutrient enrichment leading to eutrophication. Sea level rise and coastal defence works – a study in 1992 estimated that about 120 ha of coastal lagoons in England (10% of the existing resource) would be lost over the subsequent 20 years, mainly as a consequence of sea level rise. However, sea level rise may also provide opportunities for the creation of new lagoonal habitats.
Action plan objectives and targets:	The current number, area and distribution of coastal lagoons should be maintained and enhanced. There are at present about 5200 ha of known saline lagoonal habitats in the UK. Create, by the year 2010, sufficient lagoon habitat to offset losses over the last 50 years. It is suggested that 120 ha of new lagoon habitat be created by 2010.
Past or present surveys:	Various surveys have been carried out on behalf of the country agencies in England, Scotland and Wales, during the 1980s and 1990s. An MNCR team surveyed numerous lagoons in the Hebrides, Shetland, Orkney and west coast Scottish mainland.
Future research & monitoring:	Assess the feasibility of using some derelict docks as sites for the creation of lagoons including for possible ex-situ conservation of threatened lagoonal species. Use saline lagoon habitat creation schemes to test methods and the approach for creating new habitat. Such opportunities may arise, for example, through coastal defence set-back and perhaps also land use by industry. Support research into the environmental requirements and other elements of the ecology and genetic variability of populations of certain key characterising lagoonal species. This would provide a sound basis for management.
Suitability for surveying by volunteers:	Not suitable. Lagoonal habitats are fragile places, particularly because of their shallow depths and silty mud substrata which can be easily stirred up. Sampling of these sites needs to be carefully controlled. Also there is considerable risk of damaging, albeit inadvertently, various rare or scarce protected species.
Additional notes:	This is a costed Habitat Action Plan. However, as a result of limited data on habitat restoration and management of saline lagoons, the costs given are simply indicative – namely, for 700 ha to be maintained/enhanced, £800,000 will be needed per annum in 1997, £1,500,000 per annum in 2000, and £600,000 per annum in 2010.

Lagoon species statements	A number of species found only, or predominantly, in saline lagoons are listed as priority species under the UK Biodiversity Action Plan. The species considered to be associated with saline lagoons are: starlet sea anemone *Nematostella vectensis* Ivell's sea anemone *Edwardsia ivelli* lagoon sandworm *Armandia cirrhosa* the hydroid *Clavopsella navis* lagoon sand shrimp *Gammarus insensibilis* the lagoon seaslug *Tenellia adspersa* Baltic stonewort *Chara baltica* bearded stonewort *Chara canescens* foxtail stonewort *Lamprothamnion papulosum* bird's nest stonewort *Tolypella nidifica*
Objectives for the species	The objectives for the habitat will, by default, contribute to the protection and conservation of the species, with the exception of where they occur outside of saline lagoons. The following additional objectives apply to all the species: Maintain, and where appropriate enhance, existing populations and, where appropriate, restore populations at former sites. Maintain the range and number of sites including, where appropriate, through introduction to adjacent localities where existing localities become unsuitable.

5.5.16 Tidal rapids

Name of plan:	**Tidal rapids Habitat Action Plan**
Lead partner:	Environment and Heritage Service, Northern Ireland
Current status:	The term 'tidal rapids' here is used to cover a broad range of high energy environments including deep tidal streams and tide-swept habitats. These may occur at the mouths of sealochs, or as bodies of water between islands or between an island and the mainland. Wherever they occur, strong tidal streams result in characteristic marine communities rich in diversity, nourished by a constantly renewed food source brought in on each tide. Particularly good examples of tide-swept communities, considered of national importance, are present in the Menai Strait and in the Isles of Scilly.
Protective measures:	Strangford Lough in N. Ireland is protected as a statutory MNR, and the Menai Strait is a proposed MNR. A few Scottish rapids are partly included within intertidal SSSIs, but these designations do not include the sublittoral parts of the rapids which contain much of the marine biological interest. The importance of UK rapids in an international context means that current protection though site designation is inadequate.
Current factors causing loss or decline:	The richness and variety of marine life in tidal rapids relies primarily on the strong water currents to carry food in, and waste materials and fine sediment away. Any obstruction to the water flow (e.g. from barrages or causeways) can be expected to have adverse effects on the fauna and flora.
Action plan objectives and targets:	Maintain the extent, variety and quality of marine communities in tidal rapids based on best available information.
Past or present surveys:	The surveys of sea lochs and other surveys undertaken by JNCC's MNCR team and subsequent surveys commissioned by SNH have included many Scottish rapids sites. The rapids in Strangford Lough have also been well studied and documented. Specific studies have been carried out at some rapids sites in conjunction with the impact of road and bridge schemes.
Future research & monitoring:	Complete survey and recording of the extent, quality and composition of the habitats and communities of tidal rapids by 2005, and establish a monitoring programme that will enable progress towards the objective of this plan to be properly assessed. Monitor the recovery of sites after construction works to establish the impacts and effectiveness of mitigation measures. Where barriers have been built across tidal rapids, commission surveys to document the effects on the floral and faunal communities.
Suitability for surveying by volunteers:	It may be possible to undertake some surveys of tidal rapids utilising volunteer divers, but the volunteers would need to be experienced, well trained and closely supervised. Tidal rapids can be dangerous places, with slack water periods often only lasting a matter of tens of minutes. The safety implications in some circumstances of asking volunteers to participate in data gathering may be too great to allow them to do so.
Additional notes:	The actions proposed in this Habitat Action Plan should be combined with efforts to implement other action plans for habitats that share high energy environments, for example maerl beds and *Modiolus modiolus* beds.

5.5.17 Sheltered muddy gravels

Name of plan:	**Sheltered muddy gravels Habitat Action Plan**
Lead partner:	None identified.
Current status:	Sheltered muddy gravel habitats occur principally in estuaries, rias and sea lochs, in areas protected from wave action and strong tidal streams. In fully marine conditions on the lower shore, this habitat can be extremely species-rich because the complex nature of the substratum supports a high diversity of both infauna and epifauna. Polychaetes and bivalve molluscs are normally dominant. Although this habitat is also found in low salinity areas (where species richness is considerably reduced), this plan concentrates on the intertidal and shallow subtidal high salinity muddy gravel habitats. Indeed, the 'priority habitat' may be considered as an intertidal extension of a habitat more common in the sublittoral. Good quality examples of this habitat are very scarce. Fully saline sheltered muddy gravel communities are found extensively in the Solent and Helford River. Other known locations include the Fal estuary, Salcombe Harbour, Milford Haven, the Dyfi estuary, Llanbedrog on the Lleyn peninsula, the Sound of Arisaig and Lough Foyle.
Protective measures:	Areas of muddy gravels are incorporated within some Ramsar sites and SPAs. The habitat is also included within some coastal SSSIs. Muddy gravel biotopes occur in a number of cSACs (under the Habitats Directive) including Plymouth Sound, the Fal and Helford Estuaries, the Sound of Arisaig and Lleyn Peninsula. There are, however, areas in many other inlets that are not currently protected by any legislation.
Current factors causing loss or decline:	Physical disturbance: coastal construction projects such as marinas and slipways, sediment extraction, maintenance dredging of channels – all can alter tidal flow patterns, affecting the sedimentary conditions across gravel beds. Bait digging: especially prevalent in reduced salinity conditions where king rag *Neanthes virens* is common. Fisheries: affecting intertidal mollusc (e.g. *Venerupis senegalensis*) beds and subtidal *Mercenaria mercenaria* beds in Southampton water. Organic enrichment: especially sewage pollution stress – leading to anoxic conditions. Persistent bio-accumulating chemicals (e.g. polychlorinated biphenyls and tri-butyl tin). Introduction of non-native species: such as slipper limpet *Crepidula fornicata*, leading to alteration of the surface of the habitat.
Action plan objectives and targets:	Maintain the extent, distribution and quality of sheltered muddy gravel bed habitats.
Past or present surveys:	Survey records from JNCC's MNCR team (1987-1998); NCC's Harbours, Rias and Estuaries surveys (1985-1988); the MBA/SMBA intertidal surveys (1976-1980); and CCW's Phase I Intertidal survey.
Future research & monitoring:	Gather, compile and publish a detailed account of the extent, quality, current status and geographical distribution of fully saline sheltered muddy gravel beds around the UK [by the year 2002]. Undertake further structured survey work, especially within SAC boundaries, especially Plymouth Sound, the Fal estuary and Helford River, Milford Haven and Dornoch Firth. Develop and standardise monitoring methodology specific to the characteristics of sheltered muddy gravel beds [by 2002].
Suitability for surveying by volunteers:	There is scope to utilise volunteers to survey this habitat, both intertidally and subtidally. Primarily this might involve 'ground-truthing' remote survey data (e.g. that acquired by Rox-Ann echo-trace methodology), and for describing characterising epifaunal species. Mapping the extent of this shore/seabed type could also be done by trained volunteers.
Additional notes:	This is a costed Action Plan. 1998 costings for sheltered muddy gravels are given as £42k per year for the 5 years up to 2004/5, falling to £2k per year for the next 10 years. Attention is drawn to the 'sublittoral sands and gravels' and 'mud in deep water' Habitat Action Plans, as these habitats and sheltered muddy gravels occur in similar locations such as sea lochs. A transition with depth is therefore possible between these habitats. Reference should also be made to the native oyster *Ostrea edulis* Species Action Plan.

5.5.18 Sublittoral sands and gravels

Name of plan:	Sublittoral sands and gravels Habitat Action Plan
Lead partner:	English Nature
Current status:	Sublittoral sand and gravel sediments are the most common habitats found below low water mark around the coast of the UK. The sands and gravels found to the west of the UK (English Channel & Irish Sea) are largely shell derived, whereas those from the North Sea are largely formed from rock material. Sand and gravel habitats occur in a wide variety of environments, from sheltered (sea lochs, enclosed bay and estuaries) to highly exposed conditions (open coast). While very large areas of seabed are covered by sand and gravel in various mixes, much of this area is covered by only very thin deposits over bedrock, glacial drift or mud. There is a very wide range of sediment type and structure included within this habitat type, which is reflected in the diversity of communities associated with it (at least 17 recognised biotopes).
Protective measures:	A number of cSACs have areas of sublittoral sand and gravel within them. There are also a number of fisheries byelaws which restrict certain fishing practices taking place in estuaries and bays, often because these act as important nursery areas for juvenile commercial species.
Current factors causing loss or decline:	Sand and gravel habitats are subjected to a variety of anthropogenic factors, including physical disturbance by fishing and aggregate dredging activities (providing the greatest influence on organisms that inhabit sand and gravel substrata), and the influence of pollutants in riverine discharge.
Action plan objectives and targets:	Protect the extent and quality of a representative range of sublittoral sand and gravel habitats and communities.
Past or present surveys:	Information on the distribution of the biotopes included within this habitat was collected by JNCC's MNCR. However, this survey was restricted (in most cases) to an area less than 3 km from the shore. A comprehensive wide-scale survey of benthic communities was undertaken in 1986 by an ICES working group. Sand and gravel communities in the English Channel have been studied by scientists from Plymouth Marine Laboratory and CEFAS. Acoustic survey techniques have been employed to provide descriptions of the seabed in a number of near-shore areas.
Future research & monitoring:	Identify criteria for assessing future significant changes (if any) in the level of biodiversity within sand and gravel habitats. Assess the ecological importance and function and environmental requirements of long-lived species that are sensitive to disturbance in sand and gravel habitats. Investigate and refine techniques for surveying and monitoring subtidal sand and gravel habitats and biotopes.
Suitability for surveying by volunteers:	Yes. However, these seabed types tend to be rather featureless with few conspicuous and interesting species, so some persuasion may be necessary to encourage volunteers to take part in any diving surveys!
Additional notes:	Reference should be made to other Habitat Action Plans that concern sublittoral sediment, in particular those for maerl beds, *Sabellaria spinulosa* reefs and mud in deep water. Also the 'commercial marine fish' and the 'fan shell *Atrina fragilis*' Species Action Plans.

5.6 Marine BAP species and habitats suitable for volunteer surveys

Table 5.5. Summary of which Action Plans are suitable for volunteer participation to help with surveys and which are not.

	Action Plans suitable for volunteer participation	Suitability	Score /10 *
RECORDING FROM CLIFFS OR BOAT	Harbour porpoise	Yes. Some sightings schemes already exist for small cetaceans, such as those run nationally by the Seawatch Foundation and the Whale & Dolphin Conservation Society, and more local schemes such as those run by the Hebridean Whale & Dolphin Trust, Seaquest (SW England), Durlston Country Park (Dorset), Moray Firth, etc.	**8**
	Baleen whales	Yes. Some sightings schemes already exist for baleen whales, such as those run by the Sea Watch Foundation, Whale & Dolphin Conservation Society, the Hebridean Whale & Dolphin Trust and Seaquest (SW England).	**8**
	Toothed whales	Yes. Some sightings schemes already exist for toothed whales, such as those run by the Sea Watch Foundation, Whale & Dolphin Conservation Society, the Hebridean Whale & Dolphin Trust and Seaquest (SW England).	**8**
	Small dolphins	Yes. Some sightings schemes already exist for small cetaceans, such as those run by the Sea Watch Foundation, Whale & Dolphin Conservation Society, the Hebridean Whale & Dolphin Trust, Seaquest (SW England), Durlston Country Park (Dorset), Moray Firth, etc.	**8**
	Marine turtles	Yes, under guidance from an expert. Within UK waters, volunteers could also assist with tagging and tracking of individual turtles. However, individual turtles are few and far between in British waters, so dedicated turtle-surveying trips would be fairly pointless.	**6**
	Cetorhinus maximus – basking shark	Yes, though on an individual basis. Suggest wider promotion of sightings schemes, with greater emphasis on where to send records of sightings or how to report them directly on-line.	**8**

* This score provides a subjective numerical assessment by the author (as a quick check) as to the suitability of asking volunteers to record data of these species / from these habitats, based on the difficulty in training volunteers, the practicalities of organising appropriate surveys and the accuracy of any data obtained.

	Action Plans suitable for volunteer participation	Suitability	Score /10
SHORE RECORDING	*Ascophyllum nodosum* ecad *mackaii* – a brown alga	Yes. Small group(s) could be organised to survey distribution and extent of *A. nodosum* ecad *mackaii* beds using hand-held GPS, and in assessing their quality. Note, however, that these beds are only present in sheltered Scottish sea lochs, N. Ireland and Eire.	**9**
	Littoral chalk	A certain amount of survey work could be achieved by volunteers, especially in terms of measuring the extent and nature of the habitat, as well as alterations to coastal defence structures. Less emphasis should be placed on the identification of littoral chalk biotopes, unless volunteers were known to be experienced in this type of work.	**6**
	Sabellaria alveolata reefs	A certain amount of survey work could be achieved by volunteers, especially in terms of identifying the location of intertidal reef sites and in measuring the extent of the habitat/colonies. However, colonies are often found on the lower shore, so volunteers would need to be aware of tide times and of shore safety issues.	**8**
RECORDING BY DIVERS	*Anotrichium barbatum* – a red alga	Searches by 'expert' volunteers only, under guidance of a professional algologist. The species is small (its fine, filamentous tufts only growing 2-6 cm high) and easily overlooked. Such 'expert' searches could be targeted at places where it was once found, i.e. off the Sussex and Dorset coasts.	**5**
	Atrina fragilis – a fan shell	Yes, appropriate to ask all divers to look out for this species (as per the MCS survey being undertaken in 2003) during their dives. Most dives, however, are undertaken on rocky or wreck substrata, so this species is unlikely to be seen during these dives. Also, as much as 70% of the animal/shell may be hidden within the sediment, so they may prove difficult to find, especially by the untrained eye.	**8**
	Ostrea edulis – native oyster	Yes. Diving surveys of areas where native oysters are thought to be and, where found, use counts along transects to assess density. Also, possibly ask volunteers to measure size of individual oysters, in terms of length and width and weight too. Report if new spatfall observed.	**7**
	Leptopsammia pruvoti – sunset cup coral	As fully-grown specimens are relatively easy to identify in amongst faunal turf, volunteer divers can be utilised to help count, photograph and assess the presence of boring organisms in the vicinity of corals, with high confidence of correct identification (as has been done by MCS volunteer diving groups at Lundy).	**8**

	Action Plans suitable for volunteer participation	Suitability	Score /10
RECORDING BY DIVERS	*Eunicella verrucosa* – pink sea fan	A very good subject for surveying by volunteers, as was demonstrated in 2001/2. Easy to recognise, static, clear growth form for measuring dimensions, and sufficiently robust to withstand minor disturbance. There may be difficulties however with the identification of small molluscan predators such as the cryptic sea slug *Tritonia nilsodhneri* and the small prosobranch *Simnia patula*. Also, small, new colonies (3-5 cm high) may be overlooked by the untrained eye.	**9**
	Amphianthus dorhnii – sea fan anemone	As both of the main host species, the pink sea-fan *Eunicella verrucosa* and the northern sea-fan *Swiftia pallida*, are easy to recognise, there can be a reasonably high confidence that checking for the presence of sea-fan anemones on them can be undertaken by volunteers with some certainty. However, these anemones are cryptic and may be overlooked unless each sea-fan is carefully inspected.	**9**
	Serpulid reefs	Studies of the distribution, extent and quality of the Loch Creran reefs could well be undertaken by volunteer divers, given appropriate training. The composition of the associated fauna and flora may require professional assistance. Also, volunteers could be asked to search for any evidence of living reefs within Loch Sween (where they are thought to have died out).	**8**
	Sabellaria spinulosa reefs	*S. spinulosa* reefs tend to occur on mixed sediment seabeds where visibility is very poor and there are often noticeable currents. Such conditions are tricky for divers to cope with, especially inexperienced divers. Surveys of these areas should therefore only be undertaken by experienced divers and surveyors.	**5**
	Modiolus modiolus beds	Volunteer divers could assist with the collection of samples from *M. modiolus* beds and undertake limited descriptive surveys of seabed types, measurement of the extent of reefs and the dominant associated characterising species. Detailed studies would need to be left to professional marine biologists.	**7**
	Maerl beds	Volunteer divers would be able to help out with determining the extent of maerl beds, the depth of the 'living layer' and of seabed descriptions. They would also be able to take photographs of quadrats and video footage. Detailed descriptions of maerl communities would need to be left to professional marine biologists.	**7**
	Seagrass beds	Volunteer divers have already been surveying *Zostera marina* eelgrass beds for some time, typically on behalf of the country agencies (e.g. in the Isles of Scilly and at Skomer). It is recommended that this valuable work should be continued and be expanded (in terms of resource input, support, new locations and frequency of visits) where possible.	**8**

	Action Plans suitable for volunteer participation	Suitability	Score /10
RECORDING BY DIVERS	Sublittoral chalk	Yes. The extent and nature of chalk reefs can be surveyed by volunteer divers, particularly as part of Seasearch 'Specialist' level projects. Detailed descriptions of the communities associated with sublittoral chalk would need to be left to professional marine biologists.	**8**
	Sheltered muddy gravels	There is scope to utilise volunteers to survey this habitat, both intertidally and subtidally. Primarily this might involve 'ground-truthing' remote survey data (e.g. that acquired by Rox-Ann echo-trace methodology), and for describing characterising epifaunal species. Mapping the extent of this shore/seabed type could also be done by trained volunteers.	**6**
	Sublittoral sands and gravels	Yes. However, these seabed types tend to be rather featureless with few conspicuous or interesting species, so some persuasion may be necessary to encourage volunteers to take part in any diving surveys!	**5**

	Action Plans <u>not</u> suitable for volunteer participation	Why?	
	Mudflats	Great care would need to be exercised if volunteers are asked to survey mudflats. Some sediments, particularly pure mud (as opposed to muddy sand), may be very soft and walking over them on foot is extremely dangerous, especially in places where a tide may flood quickly. Bird counts on mudflats can successfully be undertaken by volunteers with specialist knowledge of waders and wildfowl species, typically with the help of binoculars. Studies of the infauna, involving digging and sieving of sediment on site, will require specialist marine biological knowledge.	–
	Tidal rapids	'Tidal rapids' covers a broad range of high energy environments, including deep tidal streams and tide-swept habitats. These habitats may be present at the entrances to certain sea lochs, between islands or between islands and the mainland. Very strong tidal flows may occur, for example Strangford Lough in Northern Ireland has tidal streams up to 8 knots. In such circumstances, only experienced diving volunteers could participate in surveys, and even then, thorough risk assessments of individual sites would need to be undertaken prior to any fieldwork being carried out.	–

	Action Plans <u>not</u> suitable for volunteer participation	**Why?**	
	Saline lagoons	Saline lagoons are vulnerable to disturbance from snorkelling and/or diving. Most of the specialised fauna and flora living within saline lagoons are not widely known and will be unfamiliar to most volunteers. Should any study with volunteers be considered in the future, it is recommended that these volunteers be experienced surveyors whose actions would lead to minimal disturbance of the habitat.	–
	Edwardsia ivelli – Ivell's sea anemone	*Edwardsia ivelli* has only been recorded from one site in the world: Widewater lagoon near Lancing, West Sussex. It was last recorded here in 1983 and is now thought to be extinct at this site (Irving, 1997). The anemone is very small (only 20 mm long and 1.25 mm in diameter when fully extended) and almost transparent. The muddy sediment of the saline lagoon is sensitive to disturbance and, should any study with volunteers be considered in the future, it is recommended that these volunteers be experienced surveyors whose actions would lead to minimal disturbance of the habitat.	–
	Nematostella vectensis – starlet sea anemone	*Nematostella vectensis* is found in only a few coastal lagoons in the Isle of Wight, Sussex, Hampshire, Dorset and in East Anglia. It is an extremely small, rare anemone which may be easily overlooked, though where conditions are favourable it can occur in high densities. Lagoonal habitats are fragile places, particularly because of their shallow depths and silty mud substrata which can be easily stirred up. Should any study with volunteers be considered in the future, it is recommended that these volunteers be experienced surveyors ('unpaid professionals') whose actions would lead to minimal disturbance of the habitat.	–
	Mud habitats in deep water	'Mud habitats in deep water' typically occur in depths greater than 20-30 m, though at a few sites sheltered from wave action, their associated communities may be found as shallow as 15 m. These habitats may be present in sheltered Scottish sea lochs as well as in offshore situations, such as the northern Irish Sea. As a result of the depths where these habitats/communities are likely to be found, diving investigations can only be undertaken by experienced divers.	–

5.6.1 Discussion of those BAPs where English Nature is the Lead Partner or Contact Point

Table 5.6 Assessment of funding priorities for BAPs in which English Nature is either the Lead Partner (LP) or has a Contact Point (CP)*.

BAP	LP or CP	Allocated 'score' / 10	Comment
HIGH PRIORITY			
Pink sea-fan	CP	9	Continuation of the survey undertaken by MCS diving volunteers in 2001/2. Suitable as a Seasearch 'specialist' level project. As pointed out in Table 5.5, sea-fans are conspicuous and relatively easy to monitor. *Eunicella verrucosa* is also a species whose distribution may indicate climate changes. Funding should not just be confined to volunteer survey effort – it should also go towards academic research into *Eunicella*'s ecological and reproduction requirements.
Sea-fan anemone	CP	9	As above.
Sunset cup coral	CP	8	Some survey work assessing the distribution of *Leptopsammia pruvoti* at Lundy has been undertaken using volunteer divers and further such work here and at other locations should be encouraged. Suitable as a Seasearch 'specialist' level project. *L. pruvoti* is also a 'climate change indicator species'. As with *Eunicella* and *Amphianthus*, funding should not just be confined to volunteer survey effort – it should also go towards academic research into *Leptopsammia'*s ecological and reproduction requirements.
Basking shark	CP	8	A considerable amount of work has been done and is currently underway on investigating various aspects of the biology, ecology and distribution of basking sharks in the waters surrounding the British Isles. Volunteers can help with dedicated basking shark surveys, or by acting individually and returning records of sightings, either on cards, by phone or electronically. Funding should be directed to help promote such recording schemes and for the assimilation and assessment of data so gathered.
Sabellaria alveolata reefs	LP	8	Volunteers could assist with year-on-year monitoring of *S. alveolata* reefs. It may even be possible for small groups of volunteers to 'adopt a reef' if they live locally. Costs would be relatively small and consist mostly of T&S expenses.
Sublittoral chalk	LP	8	Suitable as a Seasearch 'specialist' level project. More academic research required into the impact of fishing gear on sublittoral chalk reefs.
MEDIUM PRIORITY			
Native oyster	CP	7	As the native oyster is still a commercially-caught species, a great deal of funding from MAFF/CEFAS has been spent in the past on its ecology and known distribution. Surveys by volunteers are best directed at helping to assess varying densities of oysters in fished/non-fished areas, and in taking measurements of individuals to assess the age range of populations.
Littoral chalk	LP	6	A considerable amount of ecological survey work has been undertaken by professional marine ecologists over the past 15-20 years on intertidal chalk habitats. Volunteers could assist with assessing gross habitat changes, but there may be inaccuracies in species identification if they were to help with ecological monitoring projects.
Sabellaria spinulosa reefs	LP	5	Due to the inclement conditions in which *S. spinulosa* reefs are found, diving surveys of these areas should only be undertaken by experienced divers and surveyors. It is expected that various remote survey methods are likely to take precedence over diving.

BAP	LP or CP	Allocated 'score' / 10	Comment
Sublittoral sands and gravels	LP	5	As pointed out in Table 5.5, these seabed types tend to be rather featureless with few conspicuous or interesting species, so some persuasion may be necessary to encourage volunteers to take part in any diving surveys!
LOW PRIORITY			
Saline lagoons	LP	0	Too fragile a habitat to encourage surveys by volunteers.
Starlet sea anemone	CP	0	Rare, very small species whose habitat (saline lagoons) is likely to be damaged by volunteers.
Ivell's sea anemone	CP	0	Extremely rare (extinct?), very small species whose habitat (saline lagoons) is likely to be damaged by volunteers.

*Note: CP indicates that English Nature have an allocated member of staff to deal with enquiries about these BAPs. In contrast to other BAPs, as these species/habitats occur within England, English Nature would be expected to contribute towards their survey, monitoring and management.

6. Recommendations

6.1 General

6.1.1 English Nature should publicly acknowledge the work undertaken by voluntary conservation organisations in the past and confirm its commitment to supporting volunteer marine recording schemes in the future.

6.1.2 Lessons should be learned from those recording schemes which are regarded as being successful (such as Seasearch at a national level and the Durlston Country Park Cetacean Watch project at a local level), as well as those which are deemed to have fallen short of expectations. 'Best practice' methods should be highlighted and recommended for use in other schemes. However, it is important to qualify the label of success with the viewpoint from which it is being assessed: that of project organiser, volunteer participant or sponsor.

6.1.3 Within the confines of this scoping study, English Nature have a number of options with regard to the targeting of their support to marine recording projects. These are 1) to provide greater support to existing projects, encouraging greater volunteer participation and delivery of data; 2) encourage existing projects and/or organisations consider new surveys of BAP species and habitats; or 3) seek to establish new projects, perhaps in areas of the country which have little participation in such projects at present.

6.1.4 Of the three options listed above, it is recommended that funding priorities (and higher levels of funding) are given to option 1 first (providing greater support to existing 'good quality' projects); a smaller amount of funding should be allocated to encouraging the running of surveys of 'new' BAP habitats and species – i.e. those currently not being surveyed in any organised way; and finally, it is recommended that only a small amount of funding be allocated to establishing new projects/groups in what might appear to be under-resourced parts of the country.

6.2 survey and recording of BAP habitats and species

6.2.1 A number of marine BAP species and habitats are suitable for inclusion within existing volunteer recording schemes: others are not. In some instances, specific projects may need to be designed in order to acquire data on population sizes and distributions of BAP species. Seasearch 'Level 3' (Specialist) projects would be ideally suited for this type of study.

6.2.2 Four BAP species (pink sea-fan, sea-fan anemone, sunset cup coral and basking shark) and two BAP habitats (*Sabellaria alveolata* reefs and sublittoral chalk) are recommended as being Priority Species/Habitats for English Nature to fund volunteer recording projects of them. A further one BAP species (the native oyster) and three BAP habitats (littoral chalk, *Sabellaria spinulosa* reefs and subtidal sands and gravels) should be given medium priority English Nature funding.

6.3 Cost implications

6.3.1 A minimum annual budget for English Nature to support volunteer recording schemes which are involved with BAP habitats and species has been estimated at £91k (see Table 4.1). A 'moderate' annual budget of £165k and a maximum of £261k has also been suggested.

6.3.2 *How best to spend this funding allocation?* English Nature's funding resources should be steered towards recording projects which are shown to produce good quality data. It is recommended that the budget be divided up amongst the various organisations as listed in Table 4.1. Careful consideration would need to be given to those organisations which have a proven track record of managing successful volunteer recording projects, and those that can show relatively little 'end products' or 'outputs' for the efforts put in by volunteer recorders. This may lead to the distribution being biased towards certain organisations (in particular, the Marine Conservation Society would rate highly in the list).

6.3.3 *If English Nature had an annual allocation of £75k - £100k for three years only, how best would the money be spent?* One of the comments I have heard back from more than one person associated with voluntary recording schemes is that it can be devastating for some successful projects to find that their prime source of funding is removed after an initial 'pump-priming' period. It would be kinder to provide them with smaller amounts of money over a longer time frame. Too often in the past, the momentum of a successful project, which has taken a lot of time and effort to get going, has been 'de-railed' as a result of withdrawal of key funding.

However, if there are strict rules governing how long funding of a particular project should be for (in this scenario for three years), then I would recommend part of it goes towards those projects which are already up and running (such as Seasearch or *MarLIN*) to allow them to develop further, and part goes to possible new projects – which may require creative thinkers to design them in the first place.

6.4 quality assurance

6.4.1 Data gathered by volunteer recorders should be of the highest possible quality. Verification of data is very important at several stages along the way of data processing, to the eventual output of reports and other 'end products' from a database.

6.4.2 In order to ensure the accuracy of recording by volunteers, comprehensive training programmes should be set in place wherever possible. Not only do these help to ensure that recording errors are kept to a minimum, they also are likely to increase the marine biological knowledge of the participants.

6.4.3 The means of recording data other than by writing on underwater slates or notebooks on the shore should be considered carefully. Stills photography and video film can provide useful back-up material to direct recording by eye. The use of digital cameras (where conditions allow) can be extremely useful for certain types of recording.

6.5 Feedback & encouragement of volunteers

6.5.1 Feedback of results and other information is extremely important in maintaining the interest of participants and the financial commitment of sponsors. An allowance for providing suitable feedback should be costed in to project management plans at the start. It is commendable that English Nature have considered this and are currently managing the production of a Biodiversity Action Reporting System (BARS) that will be able to hold project information for projects delivering biodiversity targets. It will eventually be web-based and be available to Lead BAP Partners and with the identification of Local Biodiversity Action Plans in particular.

6.5.2 Project managers and sponsors should never take for granted the time and effort put in by volunteers on a project. It is sometimes all too easy to think that the acquisition of data is the only justifiable purpose of a project – it never is!

7. Abbreviations

ASCOBANS	Agreement on the Conservation of Small Cetaceans in the Baltic and North Seas
BAP	Biodiversity Action Plan
BMLSS	British Marine Life Study Society
BTO	British Trust for Ornithology
CCC	Coral Cay Conservation
CCW	Countryside Council for Wales
CEFAS	Centre for Environment, Fisheries and Aquaculture Science
CITES	Convention on the International Trade in Endangered Species of Wild Fauna and Flora
Defra	Department of the Environment, Food and Rural Affairs
DETR	Department of the Environment, Transport and the Regions
EIA	Environmental Impact Assessment
EN	English Nature
GIS	Geographical Information System
ICES	International Council for the Exploration of the Seas
IT	Information Technology
IUCN	International Union for the Conservation of Nature and Natural Resources
JNCC	Joint Nature Conservation Committee
MarLIN	Marine Life Information Network
MBA	Marine Biological Association of the United Kingdom
MCS	Marine Conservation Society
MNCR	Marine Nature Conservation Review
MNR	Marine Nature Reserve
NBN	National Biodiversity Network
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation. [cSAC = 'candidate' and pSAC = 'possible']
SCUBA	Self-Contained Underwater Breathing Apparatus.
SMRU	Sea Mammal Research Unit
SNH	Scottish Natural Heritage
TBT	Tri-butyl tin. The use of TBT-based anti-fouling paints on vessels less than 25 m in length was banned in 1987 under the Food & Environment Protection Act 1985.
VMCA	Voluntary Marine Conservation Area
WCMC	World Conservation Monitoring Centre

8. References

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Appendices

Appendix 1 Marine species or habitat recording schemes questionnaire

Sea-scope Marine Environmental Consultants have been contracted by English Nature (www.english-nature.org.uk) to undertake a scoping study into the further development of volunteer participation in marine data collection, in order to deliver marine biodiversity action plans. To this end, we should like to find out what volunteer marine biological recording schemes are currently in existence, and have drawn up the following questionnaire to help with this task.

Please complete as appropriate. Continue answers on a separate sheet if necessary.
All responses will be treated in strictest confidence.

Your name *(it may be necessary to contact you direct)*	
Your title/position within the organisation:	
Name of organisation:	
Address of organisation:	
Your tel. no. & e-mail address:	

1.	Please give the name(s) and a brief description of any marine species or habitat recording scheme(s) (on the shore, out at sea, or beneath the waves) which your organisation runs (or participates in). This refers to schemes where the data gathered is for a specific purpose.

2.	When did the recording scheme(s) start? (If more than one, indicate dates above alongside each scheme). Has it run continuously since the start?

3. Does the scheme operate within UK waters, or is it conducted overseas? In which country?

4. If UK-based, is the scheme run nationwide, or is it local/regional to your part of the country?

5. Do any of the recording schemes mentioned above (in UK waters) involve obtaining information on any of the following BAP species or habitats *(please underline or highlight)*:

Grouped Action Plans	Species Action Plans	Habitat Action Plans
Baleen whales	*Cetorhinus maximus* – basking shark	Littoral and sublittoral chalk
Toothed whales	*Raja batis* – common skate	*Sabellaria alveolata* reefs
Small dolphins	*Atrina fragilis* – a fan shell	Mudflats
Marine turtles	*Ostrea edulis* – native oyster	Sheltered muddy gravels
Commercial fish	*Amphianthus dorhnii* – sea fan anemone	*Sabellaria spinulosa* reefs
Deep-water fish	*Edwardsia ivelli* – Ivell's sea anemone	Tidal rapids
	Nematostella vectensis – starlet sea anemone	*Modiolus modiolus* beds
		Seagrass beds
	Eunicella verrucosa – pink sea fan	Maerl beds
	Leptopsammia pruvoti – sunset cup coral	*Lophelia pertusa* reefs
		Saline lagoons
	Anotrichium barbatum – a red alga	Mud habitats in deep water
		Sublittoral sands and gravels

6. Does the recording scheme rely on volunteers (i.e. unpaid workers) to gather data? *(Circle)*

YES NO

If you have answered YES to the above question, please go on to answer questions 7-15 below. If you have answered NO, please go to question 16 on page 3.

7 Are the volunteers required to be members of your (or another) organisation, or is the recording scheme open to anyone who wants to take part?

8. Do the volunteers pay your organisation (or any other body) a fee, or make some other financial contribution, in order to take part in the scheme?

9. Is any training given to volunteers before they embark on recording 'in the field'? Please give details.

10. How many volunteers are likely to participate in the recording scheme during one field season?

11. For the recording of data, do the volunteers act alone / independently (i.e. they return data as and when they can), or are the volunteers organised into groups? If the latter, what is the usual group size (min. & max. nos.) and how are they organised?

12. a. How are the data returned to your organisation for processing? *(Circle)*

On recording cards/sheets Directly to a web site Other means *(please explain)*

b. What format is the data stored in?

c. If a database is used, please state on what platform it is based:

13. Have any tests or analyses been carried out to assess the accuracy of the data obtained by volunteers? If so, what were the results? Have these been published?

14. Why do you think people get involved in the recording scheme(s)? Score each out of 10:

General interest ☐ Concern ☐ Enjoyment ☐ Educational ☐ Other ☐ (explain)

15. Do participants get feedback on what they've done? This might be in the form of a newsletter or a copy of a report etc. Please elaborate.

16. How many of your organisation's staff (i.e. paid workers) take an active part in the surveys you listed on page 1?

17. Do you draft in additional co-ordinators to help organise the volunteers? Are these co-ordinators paid or unpaid?

18. How long is each survey (hours/days/weeks), how frequently are they run and during which months do field surveys take place?

19. Does your organisation receive any grants (or other income) to cover the costs of data gathering? Please state the main providers and the approximate amount of grant.

20. Is your organisation able to cover volunteers' expenses?

21. Do the data get shared with one or more of the country nature conservation agencies, or with some other body? Please state which.

22. Has a report been written which analyses the collected data? Please name the report(s) and state whether or not a copy would be available on loan.

23.	Have any papers been written about the recording scheme (or the data acquired form it) in the scientific press or in a magazine/newspaper? If so, please give a full reference (or include a photocopy of the paper/article with your return).

24.	Do you have any other comments to make?

Many thanks for your time. Please return this form, together with any relevant material describing the recording scheme(s) you have mentioned, either by e-mail or in the enclosed envelope to:

Robert Irving
Sea-scope Marine Environmental Consultants, Combe Lodge, Bampton, Nr Tiverton, Devon EX16 9LB
Tel. 01398 332267 e-mail: Robert@sea-scope.co.uk

Marine species or habitat recording schemes Questionnaire

The questionnaire was sent out to those organisations listed in the following Table.

	Name of organisation	Q. Sent	Q. Returned	Acknowledged (by e-mail)	Contact
1	Basking Shark Society	18.3.03			Ken Waterstone
2	Biological Recording in Scotland	18.3.03			
3	British Divers Marine Life Rescue	18.3.03			
4	British Marine Life Study Society	18.3.03			Andy Horton. Chased by e-mail, 16/4 but e-mail returned
5	British Sub-Aqua Club	18.3.03	Not suitable		
6	British Trust for Conservation Volunteers	18.3.03			
7	British Trust for Ornithology	18.3.03	01.04.03	01.04.03	
8	Coral Cay Conservation	25.3.03	09.04.03	11.04.03	Dr Simon Harding
9	Conchological Society	18.3.03	21.03.03	25.03.03	Jan Light
10	Cornwall Wildlife Trust	18.3.03	22.03.03	22.03.03	Ruth Williams
11	Devon Wildlife Trust	18.3.03	15.04.03	15.04.03	Gavin Black
12	Earthkind	18.3.03			Jane Galloway
13	Earthwatch	18.3.03			
14	Frontier	16.04.04	16.04.04	16.04.04	Nicola Beharrell, Programme Manager
15	Greenforce	18.3.03			
16	Hebridean Whale & Dolphin Trust	18.3.03	02.04.03	02.04.03	
17	The Mammal Society	18.3.03			
18	Marine Conservation Society	18.3.03	25.03.03	25.03.03	Sam Fanshawe / Dr Jean-Luc Solandt
19	Marine Environmental Monitoring (Turtles)	18.3.03			
20	*MarLIN* (Marine Life Information Network)	18.3.03	11.04.03	11.04.03	Jon Parr
21	National Marine Aquarium	18.3.03			Doug Herdson
22	Operation Wallacea	18.3.03			
23	PADI International	18.3.03			Domino Albert
24	Porcupine Marine Natural History Society	15.3.03	02.04.03	02.04.03	Jon Moore / Dr Frances Dipper
25	Royal Society for the Protection of Birds	18.3.03			
26	Scottish Ornithologists Club	18.3.03	27.03.03	01.04.03	
27	Seahorse Trust	18.3.03	25.03.03	01.04.03	Neil Garrick-Maidment
28	Seawatch Foundation	18.3.03			Dr Peter Evans
29	SE Wildlife Trusts	18.3.03			Lisa Browning
30	Shark Trust	18.3.03	25.03.03	01.04.03	Ali Hood
31	~~Sub-Aqua Association~~	13.3.03	Not suitable		Handed to Bryony Chapman
32	Whale & Dolphin Conservation Society	18.3.03			Mark Simmons
33	The Wildlife Trusts	18.3.03			Joan Edwards
34	Wildfowl & Wetlands Trust	01.04.03			Peter Cranswick
35	Worldwide Fund for Nature	18.3.03			Janet Brown

Appendix 2 UK organisations involved in marine survey work using volunteers

Name of Organisation	Contact details	Projects / Notes
UK-based projects		
British Marine Life Study Society (BMLSS)	*Address*: Glaucus House, 14 Corbyn Crescent, Shoreham, West Sussex *Tel*. *Contact*: Andy Horton (founder and Editor of *Glaucus* newsletter) *e-mail*: *Web site*: http://www.glaucus.co.uk	Personal recordings of intertidal species from enthusiasts. Not known if any records submitted to conservation organisations or other bodies. [Note: web site unavailable throughout period of research for this study].
Conchological Society	*Address*: c/o 88 Peperharow Road, Godalming, Surrey GU7 2PN *Tel*. 01483 417782 *Contact*: Jan Light (Marine Recorder) *e-mail*: marine@conchsoc.org or jan@janthina.co.uk *Web site*:	Run 'Marine Census', started some 50 years ago. Scheme covers whole of the NE Atlantic. New members magazine *Mollusc World* issued March 2003.
Hebridean Whale & Dolphin Trust	*Address*: 28 Main Street, Tobermory, Isle of Mull, Argyll PA75 6NU *Tel*. 01688 302859 *Contact*: Juliet Shrimpton (Monitoring Officer) *e-mail*: research@hwdt.sol.co.uk *Web site*: http://www.gn.apc.org/whales	Cetacean & basking shark sightings
Marine Biological Association (MBA) - *MarLIN* (Marine Life Information Network)	*Address*: The Laboratory, Citadel Hill, Plymouth, Devon PL1 2PB *Tel*. 01752 633336 *Contact*: Dr Keith Hiscock (MarLIN Programme Director); Jon Parr (Senior Researcher); Guy Baker (Publicity & Outreach Officer) *e-mail*: g.baker@mba.ac.uk *Web site*: http://www.marlin.ac.uk/signpost	Seashore & sea bed wildlife – 01752 255026 Recently introduced a number of recording schemes in association with other organisations, e.g. PADI Aware, WWF(UK) ORCA, MCS Seasearch.
Marine Conservation Society (MCS)	*Address*: 9 Gloucester Road, Ross-on-Wye, Herefordshire HR9 5BU *Tel*. 01989 566017 *Contact*: Mrs Sam Fanshawe (Head of Conservation); Dr Jean-Luc Solandt (Biodiversity Policy Officer); Chris Wood (Seasearch Co-ordinator) *e-mail*: info@mcsuk.org *Web site*: http://www.mcsuk.org.uk	Seasearch Turtle sightings Basking Shark watch Sea fan / Fan shell sightings Ocean Vigil Beachwatch (Litter surveys) / Adopt-a-beach
Marine Environmental Monitoring	*Address*: Penwalk, Llechryd, Cardigan, Dyfed SA43 2PS *Tel*. 01239 682405 *Contact*: Rod Penrose *e-mail*: *Web site*:	Turtles. Custodians of the TURTLE database.
Porcupine Society for Marine Natural History (PMNHS)	*Address*: c/o Chairman, Cherry Cottage, 11 Ballyhaft Road, Newtonards, Co. Down BT22 2AW, N. Ireland *Tel*. *Contact*: Dr Julia Nunn (Chairman); Jon Moore (Sightings Scheme Co-ordinator) *e-mail*: porcupine@strangfjord.freeserve.co.uk *Web site*: http://www.pmnhs.co.uk	Personal recording of species/habitats. Mostly intertidal.

Name of Organisation	Contact details	Projects / Notes
The Seahorse Trust	*Address*: Drake House, Tanners Road, Goodrington, Torbay, Devon TQ4 6LS *Tel*. 01803 555257 *Contact*: Neil Garrick-Maidment *e-mail*: neil.seahorses@tesco.net *Web site*: http://www.theseahorsetrust.co.uk	Records of British seashorse sightings
Seaquest (SW England)	*Address*: c/o Cornwall Wildlife Trust, Five Acres, Allet, Truro, Cornwall TR4 9DJ *Tel*. 01872 273939 *Contact*: Stephen Westcott *e-mail*: Stephen@cornwt.demon.co.uk *Web site*:	Pioneering marine group of the Cornwall & Devon Wildlife Trusts, effectively harnessing the knowledge of expert conservationists to the enthusiastic efforts of casual or committed sea watchers. Work includes checking seal populations.
Sea Watch Foundation	*Address*: 36 Windmill Road, Headington, Oxford OX3 7BX *Tel*. 01865 717276 (or 764794?) *Contact*: Dr Peter Evans (Director?); Lisa Groth *e-mail*: peter.evans@seawatchfoundation.org.uk *Web site*: http://www.seawatchfoundation.org.uk	Cetacean sightings 35 regional co-ordinators & ~2000 volunteers
Shark Trust	*Address*: National Marine Aquarium, Rope Walk, Coxside, Plymouth PL4 0LF *Tel*. 01752 672020 *Contact*: Alison Hood *e-mail*: ali@sharktrust.org *Web site*: http://www.sharktrust.org	Basking sharks Elasmobranch egg cases
The UK Marine Fish Recording Scheme	*Address*: National Marine Aquarium, Rope Walk, Coxside, Plymouth PL4 0LF *Tel*. 01752 275216 *Contact*: Doug Herdson (Information Officer) *e-mail*: fishreports@national-aquarium.co.uk *Web site*: http://www.national-aquarium.co.uk/fishreports	"The scheme aims to build up a comprehensive source of information on marine and estuarine fish around the British Isles, which is accessible to all. Scheme started in 1998, with most returns comings from commercial fishermen and fish merchants."
Whale & Dolphin Conservation Society (WDCS)	*Address*: Brookfield House, 38 St Paul Street, Chippenham, Wiltshire SN15 1LY *Tel*. 0870 870 0027 *Contact*: Dr Mark Simmons (Head of Science?) *e-mail*: info@wdcs.org *Web site*: http://www.wdcs.org.uk	'Active Seas' (?)
The Wildlife Trusts	*Address*: c/o 16 Burleigh Park Road, Peverell, Plymouth PL3 4QH *Tel*. 01752 768995 *Contact*: Joan Edwards (Manager, Marine Programme) *e-mail*: j_edwards@cix.co.uk *Web site*: http://www.wildlifetrusts.org	Colin Speedie – Basking Shark sightings
Devon Wildlife Trust / Devon Biodiversity Records Centre	*Address*: Shirehampton House, 35-37 St David's Hill, Exeter, Devon EX4 4DA *Tel*. 01392 279244 *Contact*: Gavin Black (Records Centre Officer, Marine) *e-mail*: devonwt@cix.co.uk / gblack@devonwt.cix.co.uk *Web site*: http://www.wildlifetrusts.org	
Cornwall Wildlife Trust	*Address*: Boscawen House, Chapel Hill, Truro, Cornwall TR1 3BN *Tel*. 01872 245520 *Contact*: Ruth Williams (Marine Conservation Officer) *e-mail*: ruth@cec.gb.com *Web site*: http://www.wildlifetrusts.org	

Name of Organisation	Contact details	Projects / Notes
Dorset Wildlife Trust	*Address*: *Tel*. *Contact*: Peter Tinsley *e-mail*: *Web site*:	
SE Wildlife Trusts	*Address*: c/o Hants. & Isle of Wight Wildlife Trust, Woodside House, Woodside Road, Eastleigh, Hants. SO50 4ET *Tel*. 02380 688936 *Contact*: Lisa Browning *e-mail*: LisaB@hwt.org.uk *Web site*: http://www.wildlifetrusts.org	
World Wide Fund for Nature (WWF-UK)	*Address*: Marine & Coastal Policy Team, WWF-UK, Panda House, Weyside Park, Cattershall Lane, Godalming, Surrey GU7 1XR *Tel*. 01483 737663 *Contact*: Janet Brown (Marine Policy Officer); Sylvette Peplowski *e-mail*: jbrown@wwf.org.uk *Web site*: http://	WWF Orca recording scheme (in association with *MarLIN*?)
British Trust for Ornithology (BTO)	*Address*: The Nunnery, Thetford, Norfolk IP24 2PU *Tel*. 01842 750050 *Contact*: Andy Musgrove (Research Manager, Wetland Bird Survey) *e-mail*: info@bto.org *Web site*: http://www.bto.org	Probably carry out intertidal bird surveys (waders/wildfowl etc.). Not sure if volunteers are used.
Scottish Ornithologists' Club (SOC)	*Address*: Harbour Point, Newhailes Road, Musselburgh, EH21 6SJ *Tel*. 01620 894037 / 0131 653 0653 *Contact*: Mark Holling (Vice President) *e-mail*: mail@the-soc.org.uk *Web site*: http://www.the-soc.org.uk	
Overseas Projects		
Coral Cay Conservation	*Address*: The Tower, 13th Floor, 125 High Street Colliers Wood, London SW19 2JG *Tel*. 0208 545 7721 *Contact*: Dr Simon Harding (Marine Science Co-ordinator) *e-mail*: info@coralcay.org *Web site*: http://www.coralcay.org	Mostly overseas projects (Belize, Philippines, Indonesia?), but has own sub-aqua club for participants wanting to do u/w projects in UK.
Earthwatch	*Address*: 267 Banbury Road, Oxford OX2 7HT *Tel*. 01865 318838 *Contact*: *e-mail*: mailto:info@earthwatch.org.uk *Web site*: http://www.earthwatch.org	Operate in UK (& elsewhere).
Frontier / Society for Environmental Exploration	*Address*: 50-52 Rivington Street, London EC2A 3QP *Tel*. 0207 613 2422 *Contact*: Nicola Beharrell *e-mail*: Nicola@frontier.ac.uk *Web site*: http://www.frontierprojects.ac.uk	Mostly overseas projects (Tanzania, Mozambique?)
Greenforce	*Address*: 11 – 15 Betterton St, Covent Garden, London WC2H 9BP *Tel* 0870 770 2646 / 0207 470 8888 *Contact*: Alex Cormack (Marine Projects Co-ordinator) *e mail*: info@greenforce.org *Web site*: http://www.greenforce.org	Non-profit organisation and member of the National Council for Voluntary Organisations. Diving projects in Bahamas, Borneo and Fiji.

Name of Organisation	Contact details	Projects / Notes
Operation Wallacea	*Address*: Hope House, Old Bolingbroke, Spilsby, Lincolnshire PE23 4EX *Tel*. 01790 763194 *Contact*: Dr Tim Coles (Project Director) *e-mail*: info@opwall.com *Web site*: http://www.opwall.co.uk	A series of biological and social science expedition projects designed to underpin the achievement of specific wildlife conservation aims. Expeditions have been running for 7 years to Sulawesi, Indonesia, and to Honduras from 2003 onwards.
Raleigh International	*Address*: 27 Parsons Green Lane, London SW6 4HZ *Tel*. 020 7371 8585 *Contact*: *e-mail*: info@raleigh.org.uk *Web site*: http://www.raleigh.org.uk	A youth development charity which inspires people from all backgrounds and nationalities to discover their full potential by working together on challenging environmental and community projects around the world. 3 month expeditions; some diving projects.
Earthdive	*Address:* *Tel.* *Contact:* Chris Long e-mail: chris@earthdive.com *Web site:* http://www.earthdive.com	This London-based organisation is due to be launched in June 2003. It aims to collate dive information from divers all over the world via its website, linking site locations with habitat and species information, and information on anthropogenic impacts to sites.
Voluntary Service Overseas (VSO)	*Address*: 317 Putney Bridge Road, Putney, London, SW15 2PN *Tel*. *Contact*: *e-mail*: enquiry@vso.org.uk *Web site*:	
Diving Organisations		
Professional Association of Diving Instructors (PADI) / PADI Aware	*Address*: Unit 7, St Philips Central, Albert Road, St Philips, Bristol BS2 0XJ *Tel*. 0117 300 7200 *Contact*: Ms Domino Albert *e-mail*: *Web site*: http://www.padi.com/aware/english/get-involved	u/w surveys coastal clean-ups ('splash for trash')
British Sub-Aqua Club (BSAC)	*Address*: Telford's Quay, Ellesmere Port, South Wirral, Cheshire L65 4FY *Tel*. 0151-357-1951 *Contact*: Mark Allen *e-mail*: *Web site*: http://www.bsac.org or www.ukdiving.co.uk/ukdiving/bsac	Diving expeditions – but mostly for adventurous diving, sometimes with biological input
Sub-Aqua Association (SAA)	*Address*: Space Solutions Business Centre, Sefton Lane, Maghull, Liverpool L31 8BX. *Tel*. 0151 287 1001 *Contact*: Bryony Chapman *E-mail*: Admin@saa.org.uk *Web site*: http://www.saa.org.uk	Specialist groups – e.g. 'SPRT'
British Divers Marine Life Rescue	*Address*: 39 Ingram Road, Gillingham, Kent ME7 1SB *Tel*. 01825 765546 / 01634 361188 *Contact:* *e-mail*: mailto:kate@iar.org.uk *Web site*: http://www.bdmlr.org.uk	Deal mostly with rescuing cetaceans and seals. However, also some involvement with basking sharks(?)

Name of Organisation	Contact details	Projects / Notes
Basking Shark Society	*Address*: Cronk Moor, Curragh Road, St Johns, Isle of Man IM4 3LN *Tel*. 01624 801207 *Contact*: Ken Waterson *e-mail*: *Web site*:	Operate out of the Isle of Man. NOT SURE IF THIS SOCIETY STILL EXISTS.
Fringe organisations		
Biological Recording in Scotland	*Address*: c/o Chesterhill, Shore Road, Anstruther, Fife KY10 3DZ *Tel*. 01333 310 330 *Contact*: Anne-Marie Smout, Chairperson *e-mail*: amsmout@aol.com *Web site*: http://www.brisc.org.uk	Have just published a booklet entitled: 'Scottish Natural History Societies and Allied Groups'
British Trust for Conservation Volunteers (BTCV)	*Address*: 36 St Mary's Street, Wallingford, Oxfordshire OX10 0EU *Tel*. 01491 821600 *Contact*: *e-mail*: Information@btcv.org.uk *Web site*: http://www.btcv.org	Mostly involved with terretrial habitat conservation projects. Not sure if includes intertidal volunteer recording, but local BTCV group now involved in organising Seasearch in Kent.
Earthkind	*Address*: Town Quay, Poole, Dorset BH15 1HJ *Tel*. 01202 682344 *Contact*: Jane Galloway (Chief Executive) *e-mail*: info@earthkind.org.uk *Web site*: http://www.earthkind.org.uk	Note that this organisation has now ceased to exist. In 2003, its membership was taken on by MCS. Used to deal mostly with rescuing seals and seabirds. Ran 'Save our Seals' campaign, including a seal adoption scheme. Operated ship 'Ocean Defender'. Some beach clean-ups.
Friends of the Earth		Local groups mostly undertaking terrestrial conservation projects, but also political 'green consciousness'.
Greenpeace		Some local groups, mostly undertaking political reaction to terrestrial green issues.
National Trust	*Address*: 33 Sheep Street, Cirencester, Glos GL7 1RQ *Tel*. 0870 609 5382 *Contact*: *e-mail*: *Web site*: http://www.nationaltrust.org.uk	'Operation Neptune' – simply purchasing the coast!
National Trust for Scotland	*Address*: Wemyss House, 28 Charlotte Square, Edinburgh EH2 4ET *Tel*. 0131 243 9300 *Contact*: *e-mail*: *Web site*: http://www.nts.org.uk	Own St Abbs headland. Have just appointed new 2-yr ranger for the VMNR. Also own St Kilda.
Nautical Archaeological Society (NAS)	*Address*: Fort Cumberland, Fort Cumberland Road, Eastney, Portsmouth PO4 9LD *Tel*. 023 9281 8419 *Contact*: Chris Underwood (Director) *e-mail*: nas@nasportsmouth.org.uk *Web site*: http://www.nasportsmouth.org.uk	Not directly involved with ecological surveys, but must have to bring in biological 'experts' from time to time.
Royal Society for the Protection of Birds (RSPB)	*Address*: The Lodge, Sandy, Bedfordshire SG19 2DL *Tel*. 01767 680551 *Contact*: *e-mail*: *Website*: http://www.rspb.org.uk	In the last 10-15 years, the RSPB has taken a much greater interest in the marine environment. The RSPB supported the (failed) Marine Wildlife and Conservation Bill through parliament in 2001/2.
Scottish Wildlife Trust		New marine officer appointed early in 2003.

Name of Organisation	Contact details	Projects / Notes
Seal Conservation Society	*Address*: 7 Millin Bay Road, Tara, Portaferry, Co. Down, N. Ireland BT22 1QD *Tel*. 028 4272 8600 *Contact*: Susan Wilson *e-mail*: info@pinnipeds.org *Web site*: http://www.pinnipeds.org	Established in 1996. No volunteer programmes. Acts as an information resource centre. Requests information on all pinnipeds worldwide.
Solway Shark Watch	c/o Calum Duncan, MCS Sightings of basking sharks, cetaceans, sunfish and turtles within the Solway Firth (both sides)	The SOLWAY SHARK WATCH & SEA MAMMAL SURVEY is a co-operative jointly organised by the Solway Firth Partnership & Marine Conservation Society in association with the Morecambe Bay Partnership, Cumbria Wildlife Trust, Lancashire Wildlife Trust and with much help, advice and support from Scottish Natural Heritage & English Nature.

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Top left: Radio tracking a hare on Pawlett Hams, Somerset.
Paul Glendell/English Nature 23,020
Middle left: Identifying moths caught in a moth trap at Ham Wall NNR, Somerset.
Paul Glendell/English Nature 24,888
Bottom left: Using a home-made moth trap.
Peter Wakely/English Nature 17,396
Main: Co_2 experiment at Roudsea Wood and Mosses NNR, Lancashire.
Peter Wakely/English Nature 21,792