

Porcupine Newsletter

Volume 6 Number 7

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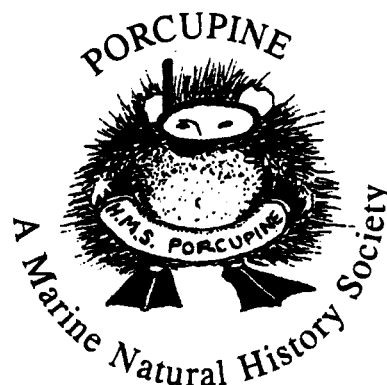
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Shelagh Smith, Hon. Editor
 Woodleigh, Townhead, Hayton, Carlisle, CA4 9JH, UK

Tel: 01228 70676

Fax: 01228 70403



PORCUPINE

HON. SECRETARY

Ian Killeen
163 High Road West
FELIXSTOWE IP11 9BD
UK
01394 274618

HON. TREASURER

Jonathan Moore
FSCRC, 3 Dolphin Court
Brunel Quay, Neyland
DYFED SA73 1PY
UK
01646 691000

EDITORIAL/HON. EDITOR'S REPORT FOR 1996/7

Parts 4-6 of Volume 6 of PORCUPINE NEWSLETTER were published in May and October 1996 and January 1997. Most articles were generated by meetings but others were also submitted.

Items which normally appear in the Editorial are dealt with elsewhere. The main theme of Hon. Editor's Report was the problem have with attracting sufficient copy. This was discussed at the AGM, together with the general future of the PORCUPINE NEWSLETTER, and these ideas are set out in COUNCIL NEWS, see below. I have written to all council members concerning the difficulties, and expect that they will either themselves, or by persuasion of others, provide erudite and fascinating articles to interest readers of PORCUPINE NEWSLETTER.

Most back numbers of PORCUPINE NEWSLETTER are still available and are now all with me. We would be delighted to sell them at £1 per copy including postage & packing. Discounts for larger orders negotiable. Please contact me.

HON. SECRETARY'S REPORT FOR 1996/7

Two meetings were held during 1996. The Spring meeting and AGM was held at University College, Scarborough, organised by Ian Killeen and Jean-Paul Ducrotoy, on the theme of *The North Sea - Past, Present & Future*. The meeting was well attended and a wide selection of papers on the theme were presented. The Hon. Secretary would particularly like to thank Elaine McAdam for all her support in making this meeting a success. An early morning field excursion to Scalby Rocks north of Scarborough provided "Entertainment" to a few hardy Porcupines on the Sunday.

The autumn meeting was a joint venture between PORCUPINE, the Marine Studies Group and the Geology Department of Royal Holloway University of London with the latter hosting the meeting at Egham, Surrey. This meeting brought together biologists and geoscientists for the theme of *Animal and Sediment Interactions in the Marine Environment*. Over 30 people attended and we extend our thanks to Jan Light for all her hard work in organising this successful event, and to John Wilson for his support.

Membership continues to be static. The Society comprises 169 full members, 11 students, 2 life members and 8 free subscriptions. Twelve new members joined since the 1996 AGM (9 full, 3 student) and a few were dropped for non-payment of subscriptions.

MINUTES OF THE TWENTIETH ANNUAL GENERAL MEETING OF PORCUPINE

held at Portaferry
on 6 April 1997

As there were few members present, the AGM was somewhat informal. Apologies for absence were from Mike Bailey, Roger Bamber, Jan Light, Jon Moore. Minutes of the 19th Annual General Meeting were taken as read. There were no matters arising.

The Hon. Secretary's Report was presented by Ian Killeen and approved.

The Hon. Treasurer's Report was restricted to the Accounts sheet as published here, and approved.

The Hon. Editor's Report was presented by Shelagh Smith and approved. No separate report is published as the discussion is set out in Council News.

The following Office Bearers were re-elected:

Hon. Secretary	Ian Killeen
Hon. Treasurer	Jon Moore
Hon. Editor	Shelagh Smith

Wille Fowler retired from Council. The following Council Members were elected/re-elected:

Mike Bailey	Francis Dipper	Jan Light
Roger Bamber	Frank Evans	Ivor Rees
Susan Chambers	Helgi Gudmundsson	Ralph Robson
Dave Connor	Christine Howson	Martin Sheader
Mark Davis	Antony Jensen	Jeff Tang

The Hon. Auditor Nick Light was thanked for his work last year, and was re-elected for the coming year.

Future Meetings were announced and discussed by the Hon. Secretary. The next meeting is at Southampton Oceanography Centre, 6-7 September 1997, on "The Channel". The first circular is with this Newsletter.



**PORCUPINE
RECEIPTS AND PAYMENTS ACCOUNT
for the year ended 31 December 1996**

Year to 31.12.95			Year to 31.12.96
£	£		£
		RECEIPTS	
1335		Subscriptions- 1995 & Prior	34
24		1996	1372
8		1997	13
	1367		
	152	Bank Interest (net of tax)	110
	-	Sale of PN Back Numbers	34
	15	Advert in Porcupine News	-
		Total Receipts	
	1536		1563
		PAYMENTS	
641		Newsletter- Printing	648
197		Postage & Envelopes	207
		Total Newsletter Costs	855
838		Hon Sec/Treas Expenses	7
54			
	892		862
		SURPLUS BEFORE MEETINGS & DONATIONS	701
	644		
	38	MEETINGS - Costs	195
	-	DONATIONS - Cullercoats Marine Fauna	2500
	606	SURPLUS (DEFICIT) FOR THE YEAR	(1994)
		BALANCE BROUGHT FORWARD	4793
	4189		
		BALANCE CARRIED FORWARD	
		Current Account	1135
715		Deposit Account	1664
4078			
	4793		2799

Son Moore
.....
Hon Treasurer

N Lip w.
.....
Hon Auditor

5 March, 1997

COUNCIL NEWS

Many PORCUPINES may well ask what does the Council actually do? It may be perceived that a Few of us get together over a glass of something on the Saturday evening of each meeting and just socialise. Not so! We are continually discussing ideas for improving the profile of the Society through its meetings and publications, as well as the usual business. To this end I would like to inform the membership of some new ideas and to seek input from you.

The most important vehicle for maintaining contact with members is through PORCUPINE NEWSLETTER. We are acutely aware that over the last couple of years we have struggled to obtain sufficient copy for our desired level of science content. We are busy people and it is all too easy not to write anything if we do not have to. However, provision of copy cannot be the sole responsibility of the Editor and a committed few. PORCUPINE NEWSLETTER is the only publication of its type in the country. It has an ISBN number and is abstracted. It therefore provides an ideal vehicle for papers on our marine fauna and flora that might not meet the strict criteria now required for other refereed scientific journals (due to cost, space, etc.). We have therefore decided to revamp PORCUPINE NEWSLETTER to make it a more attractive publication in terms of production, layout and content. A change of name is even being considered: *Marine Natural History - the Newsletter of PORCUPINE* has been suggested. It is intended that the first issue of the new NEWSLETTER will appear in early 1998. We hope that members will take this opportunity to submit interesting articles, news of forthcoming events, etc., but many of you can also expect invitations to submit papers on aspects of your research.

There are many national conferences and events where it would be beneficial for PORCUPINE to have a presence, but where members might not necessarily be attending. Small black & white posters or membership leaflets do not have much impact, therefore we intend to produce an A1 full colour poster which can be sent to such events but does not require a PORCUPINE to be responsible for its carriage and display. Current computer and DTP technology allows colour posters to be produced on a one-off basis at relatively low cost. We are looking for a volunteer who has the necessary equipment and skills to produce a poster with support for Council, and also for members to supply ideas on content and layout.

We are intending to set up a WEB page on the internet as a means of publicising PORCUPINE and for disseminating information other than newsletter articles. Those surfers amongst you have probably noticed that there is very little information on marine biology this side of the Atlantic. We therefore have the opportunity to redress this at an early stage. Again ideas for content, etc. would be most welcome.

PORCUPINE is also able to offer small financial grants for pieces of research on marine biological projects. For example we have recently made a sizeable contribution towards production of the new Cullercoats Marine Fauna. PORCUPINE gains considerable publicity through such sponsorship and we wish to continue to support appropriate projects.

To enable PORCUPINE to survive and grow into the next century we need your full support, both in terms of participation and of continued membership. To enable us to fulfil our commitments outlined above we will need to make a small increase in the subscriptions in 1998 from £8 to £10. By the standards of other local and national societies our rates are very low and we will endeavour to maintain them as such. Without your support we cannot survive. I would welcome comments and offers of help on any of the above subjects.

Ian Killeen, Hon. Secretary

ON THE OLD OCEANOGRAPHERS (1)

By FRANK EVANS

15 Thirlmere Avenue, North Shields, NE30 3UQ, UK

I fancy I am better placed than most PORCUPINE members to take a view of the oceanographers and marine biologists of the mid-century because I have known many of them personally. In this proposed series of notes for "Porcupine Newsletter" I plan to write only of those I have known and will follow the rule of only mentioning those who are dead.

When I went to Queen Mary College, London, (now Queen Mary and Westfield) in 1949 after serving for seven years in the Merchant Navy there were some two dozen universities in the country. All the heads of the Zoology Departments of those universities had at some time or other worked on marine animals. Marine biology was a more prominent science then than it is now.

At QMC Gordon Newell had written, in conjunction with A. J. Grove, what was then the standard early learning textbook for zoology undergraduates, "*Animal Biology*". Newell was a marine biologist of wide interests. He is remembered for his invertebrate research but his PhD was on the rat-fish, *Chimaera*. He had been wounded as an army officer in the 1939 war; he stepped on a land mine in Italy and lost his right leg and when you shook hands with him you noticed that the little finger of his right hand was missing. He was fairly deaf in his right ear and had some sort of right eye injury. His principal interest was in polychaetes but he was something of a polymath. Nevertheless he divided the animal kingdom in his own personal classification into insects and interesting animals. He and his son, Richard, who I first knew when he was a boy, later produced that well-known and successful illustrated volume "*Marine Plankton*".

When Grove retired from the Zoology Chair at QMC in 1950, Eric Smith came from Cambridge to replace him and Newell and Smith began together to run Easter field courses at Whitstable in Kent. At first they were run from Newell's own house, where he lived with his wife, Babs, and the containers we used in our investigations were many of them pots from Babs's kitchen. Soon they began to build the Whitstable Marine Laboratory, at first a large prefabricated hut, but which later expanded into the premises of the defunct Oyster Company next door, with its holding tanks and running sea water. However, in due course Smith left to become Director at Plymouth (he surprised many by refusing at the same time the offer to succeed Sir James Gray in the Zoology Chair at Cambridge). Newell succeeded him at QMC and eventually retired. At this point the Whitstable lab began to fall into disuse. This was a serious misjudgement in that academic biology in an important estuary became neglected while London went into partnership with Glasgow University to take a share of Millport, hundreds of miles away.

Eric Smith was an authority on echinoderm nervous systems. He produced some fine work on nervous pathways, using a methylene blue staining technique. His papers were published in the Proceedings of the Royal Society, he was awarded his FRS and was knighted. Yet it is a sad fact that of all his large and erudite volume of research nothing now remains valid, all having been superseded by later work. Equally sadly, some years before he died he entirely lost his memory.

At mid-century there were four prominent marine biological knights. They were Sir Frederick Russell, FRS, Smith's predecessor at Plymouth, Professor Sir James Gray, FRS, of Cambridge, renowned for his studies on fish locomotion, Professor Sir Maurice (C. M.) Yonge, FRS, of Edinburgh, the malacologist who wrote "*The Sea Shore*" for the "New Naturalist" series and who later succumbed to Parkinson's disease, and Professor Sir Alistair Hardy, FRS, the planktonologist who devised the Continuous Plankton Recorder, still in use.

Hardy worked in the twenties for the Ministry of Agriculture and Fisheries, before joining the RRS "*Discovery*" for work in the Antarctic with the Falklands Islands Dependency Survey, later named the Discovery Investigations. It was here in the Antarctic that he first tested his Continuous Plankton Recorder, an instrument which has since been of inestimable value to marine biology, routinely

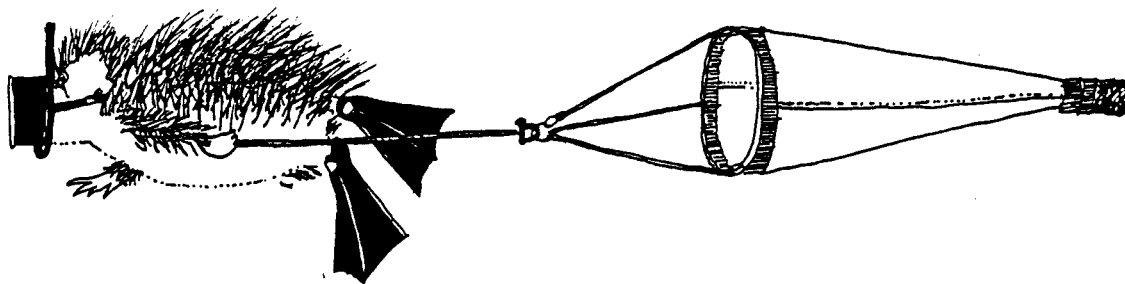
sampling just about the last remaining class of organisms in the world unaffected by man's activities. The early version was unstable because its body was round in section and the tailplane lay in the slipstream of the towing wire. It was subsequently successfully modified into a square cross section and the tailplane was raised. On Hardy's return to Britain he took up the first of a succession of academic appointments, at University College, Hull, moving subsequently to chairs in Aberdeen and then Oxford. At Hull he had suffered a hairy moment when a national newspaper, I think the Express, likened his fish-finding powers with the Continuous Plankton Recorder to those of Jesus Christ in the Sea of Galilee. That night he was on the phone to the editor, desperate until the last moment, before the item was altered.

His volume, *"The Open Sea: The World of Plankton"* (New Naturalist) is the best book on plankton ever written, although his subsequent volume, *"Fish and Fisheries"*, is less satisfactory since it was a subject he was less familiar with. He did not really understand, for instance, how a shipboard seine net works, with its couple of miles of rope, not a hundred yards of it as he supposed.

He had been a soldier bicyclist in the First War and continued his connection with old comrades at reunions at Ashington in Northumberland for the rest of his life. His last years at Oxford were devoted to studies of extra-sensory perception and of religious experiences. The deep-ocean biologist, Professor Freddie Marshall, FRS, of the Natural History Museum, and later Newell's successor at Queen Mary College, who worked with him at Hull, said he was always throwing off new ideas, mostly barmy but sometimes brilliant, and for these latter he is remembered. An example was his suggestion that we have an aquatic primate among our ancestors. You could always tell when something new was coming, said Freddie, because Hardy's eyes would gleam and he would repeatedly bounce the fingertips of his two hands together. Then the Hull team would know they must ready themselves to jump on him.

I met Hardy on several occasions when I was trying to raise money for my *"Petula"* transatlantic expedition. He was gently polite, but would not allow his name to be added to my list of eminent supporters (not sponsors, they were found elsewhere). This may have been because he had earlier been disappointed by Anthony Smith, an Oxford student, whom he had supported in his vain search for blind white fish in Persian caves, another apparently hare-brained undergraduate scheme. (Smith subsequently came to TV fame for his African balloon exploits, filming wild game from the air.) Gordon Newell, on the other hand was warmly encouraging. He and Babs allowed their house to be use as a store for the *"Petula's"* equipment and were endlessly kind. Subsequently Hardy was the external examiner for my PhD, the thesis being entitled *"The Crustacea of the "Petula" Transatlantic Expedition"*. Since his death I have not heard that any communication has been received from him from "the other side".

(To be continued)



THE FIRST SPERM WHALE IN THE FIRTH OF FORTH SINCE 1769

By ANDREW KITCHENER

Curator of Mammals and Birds

Department of Geology and Zoology, National Museums of Scotland,
Chambers Street, Edinburgh EH1 1JF, UK

The Sperm Whale, *Physeter catodon*, "Moby" stranded on mud flats at Airth, near the Kincardine Bridge, on 31st March 1997 after swimming around the Firth of Forth for the previous 12 days. Several attempts were made to drive him out to the North Sea, but these were unsuccessful. His skeleton has been recovered by the National museums of Scotland.

He was a sexually mature adult male, 15.2 metres long (few sperm whales now grow longer than 15.8 metres) and weighed a minimum of 38.5 tonnes. Adult males are usually solitary, only socialising with breeding females and their young when mating, so it is unlikely that he was accompanied by other sperm whales as suggested in the press. We believe he may be the first sperm whale to strand in the Firth of Forth since 1769.

A post mortem was not possible because, being a very large animal, his body retained heat which caused rapid decomposition. Post mortems can only be carried out successfully very soon after death. There were some pathological signs and injuries, but it is unclear at this stage if any of these caused Moby's stranding and death. After stranding on the mud, his large unsupported body would have crushed his lungs, causing suffocation. At this stage we can only speculate why he stranded; perhaps he had taken a wrong turning and ended up in the shallow waters of the North Sea and the Firth of Forth, where he was unable to find his normal food, or perhaps he was weakened by an unidentified disease and was unable to swim against the strong spring tides. Sperm whales do not usually occur in the North Sea and consequently they often strand when they do.

Moby's flippers were severely injured, possibly through fighting with other sperm whales or by attacks from killer whales, *Orcinus orca*, but these had healed some indeterminate time ago. It is highly unlikely that his shortened flippers were causing Moby any sort of problem. Similar injuries have been observed in sperm whales stranded last year in Denmark.

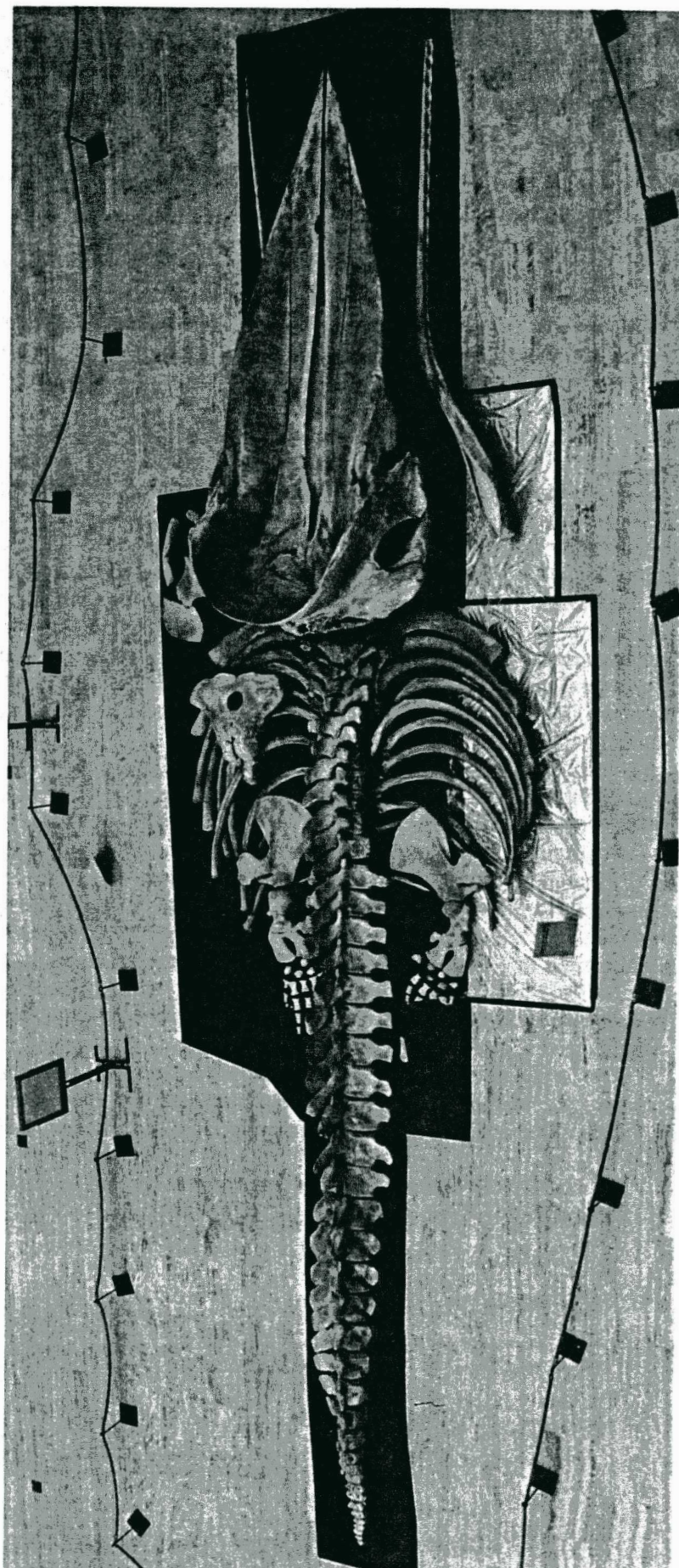
The right articulation at the back of the skull and the atlas vertebra to which it attached show evidence of a pathology. Further investigations to identify this pathology will be carried out by Tony Patterson and Bob Reid at the Scottish Agricultural College, Inverness, where the DOE's Scottish Strandings Scheme is based.

His stomach was empty, which showed that he had not fed for some time, but precisely how long is unknown. This is consistent with sperm whales not being able to find their normal food, squid, in the North Sea.

Samples were taken for research including:

1. Blubber samples to look at the levels of pollutants and for a lipid analysis to determine his nutritional status.
2. One of his teeth will be sectioned to count the number of growth rings in order to establish his age.
3. His teeth are also required for acoustic analysis as part of a study at the University of Wales at Bangor.
4. Some spermaceti oil from the huge spermaceti organ on his head was also taken for acoustical analysis.

Moby's skeleton was exhibited in the Main hall of the National Museums of Scotland 5th - 11th May 1997.



5. Some body parts were preserved in order to study their anatomy, including an eye, the penis and part of the heart.

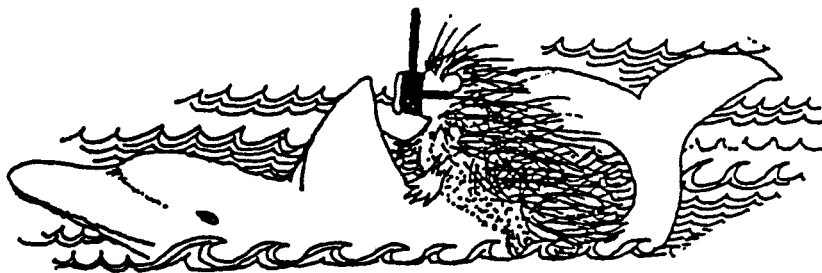
It is hoped that, by pooling information obtained from Moby with data obtained from other stranded sperm whales, that we can add considerably to our knowledge of this species, the world's largest toothed whale. The numbers of strandings of sperm whales have increased dramatically during the 20th century, particularly since the mid 1980s. This may represent an increase in numbers of sperm whales since commercial hunting ended in 1985.

From the 3rd April, it took an average of four NMS staff a total of six days to extract the skeleton at a landfill site near Grangemouth. The bones were transported to NMS's Research Centre at Granton where, in a new facility designed for skeletal preparation, they were macerated for up to 2-3 days at 60°C in large stainless steel tanks using biological washing powder to break down the soft tissues. The skull was too big for this (it weighed two tonnes when collected from the landfill site and is 4.7 metres long) and it has taken a lot of painstaking work to remove the soft tissues manually. The skeleton was finally put on display in the Main Hall at Chambers Street on 5th May, a little over one month from the beginning of the whole process. We hope that it may be a few more years before another large whale strands in the Forth!

NMS is most grateful to a number of organisations who have made it possible for us to acquire Moby's skeleton. The Department of the Environment's Scottish Strandings Coordinator, Bob Reid, of the Scottish Agricultural College Veterinary Service's Wildlife Unit, Inverness helped to coordinate the retrieval of Moby's body from Airth and provided considerable support for our efforts to extract his skeleton. The Receiver of Wrecks and Falkirk District Council worked closely with NMS to make it possible to extract every single bone for preservation. Lever Brothers provided 150kg of Persil Automatic Biological Washing Powder for cleaning Moby's bones. Bernard Hunter Ltd kindly transported Moby's skull between the Granton Research Centre and the Royal Museum of Scotland. Several members of the public very kindly made donations to NMS to help us cover some of the extra costs involved in preparing Moby's skeleton, including David and Dorothy Shannon, Mrs J. Springate and Mrs Margaret Jaquess.

NMS has added 1,000 stranded whales, dolphins and porpoises (mostly as skulls) to its collection in the last 5 years for research. We have initiated studies into sexual dimorphism, growth rates and geographical variation in porpoises, *Phocoena phocoena*, and common dolphins, *Delphinus delphis*. Researchers from Aberdeen to Rotterdam have used the collection to look at tooth spacing with respect to injuries found on dead porpoises in the Moray Firth, bone and dental pathologies in North Sea cetaceans and fluctuating asymmetry in skulls as an indicator of pollution levels. We have also recorded one new species to Scotland (the striped dolphin, *Stenella coeruleoalba*) and one species new to Britain (Blainville's beaked whale, *Mesoplodon densirostris*). This would not have been possible without the considerable support of the Department of the Environment's Stranding Schemes in Scotland and England and Wales. We are much indebted to the respective strandings coordinators, Bob Reid and Paul Jepson, who have ensured that this vast amount of research material is now available in Edinburgh. Moby's skeleton will join this important research collection, but the public will still be able to see it on our frequent open days at the Granton Research Centre.

We are actively seeking financial support and support in kind to assist us in our research on mammals and birds.



MARINE SITE CONSERVATION IN NORTHERN IRELAND

By RICHARD WEYL

Environment and Heritage Service, Commonwealth House,
35 Castle Street, Belfast BT1 1GU, UK

DIFFERENT TYPES OF STATUTORY DESIGNATIONS

Legislative provision to establish *Nature Reserves (NRs)* in Northern Ireland dates from 1965 with the first statutory Reserves established in 1970. Almost all of our current domestic statutory site designations including Nature Reserves arise from the Nature Conservation and Amenity Lands (NI) Order 1985 which provided for *National Nature Reserves (NNRs)*. The method of protection is quite simple. They are either owned by DOE(NI) and managed by Environment and Heritage Service (EHS) or are subject to a management agreement with nature conservation as the main aim.

There are 45 statutory NRs and they are mostly relatively small. Many Reserves are coastal and they extend down to Low Water Mark. One site, the Dorn NR in Strangford Lough, was the first UK Reserve to include seabed. A number of additional Reserves have a strong marine interest. These include Kibble on Rathlin Island and Granagh Bay and Cloghy Rocks in Strangford Lough.

Areas of Special Scientific Interest (ASSIs) form the main legislative basis for site protection on land down to low water. Like their GB equivalent SSSIs, ASSIs operate by regulation of activities which may damage the scientific interest of the site through a list of notifiable operations. EHS fills the equivalent that Country Agency in GB does for SSSIs. Where a notifiable operation is proposed and is not consented a management agreement is offered.

ASSIs include both biological and earth science features. For biological sites we have generally followed similar selection criteria to those published for GB. Several criteria including size, naturalness, diversity and rarity are used and applied to habitat types and species groups. ASSI selection guidelines for NI are currently being drafted and should be published by the end of this year, however the marine element will need to be developed. The NI Littoral Survey undertaken in the late 1980s still provides much of the contextual data for site assessment. It is envisaged that the participation in the Marine Nature Conservation Review and additional planned survey work will further help identify potential marine ASSIs.

EHS has set a target to complete its ASSI designation programme by 2001. Of the 123 ASSIs which have been designated in Northern Ireland by 31 May 1997 only 19 are coastal i.e. include areas below high water. These are shown on the map below (p 184).

The Nature Conservation and Amenity Lands (NI) Order 1985 also makes provision for the protection of marine areas as *Marine Nature Reserves (MNRs)*. These have the similar purposes to NNRS and ASSIs but they are different in the methods available to manage them. These methods involve reaching agreement with relevant bodies such as harbour authorities, the Fisheries Conservancy Board and District Councils and the consent of other parties involved. The facility to make bye-laws is also available. The declaration of an MNR is a difficult process requiring the agreement of many interests. Very extensive discussions were held before Strangford Lough MNR was designated in 1995. It is only the third MNR in the UK and, at 16,500 ha, by far the largest. The designation involved extensive data collation, liaison; the establishment of local fora and the production of a *Guide to Designation* which identified a series of management issues.

The information supporting the MNR designation and wide consultation process provide an excellent foundation for more recent designations and management initiatives. The basic site information included information provided by the NI Sub-littoral and Littoral surveys of the 1980s.

Coastal ASSIs in N.Ireland

184

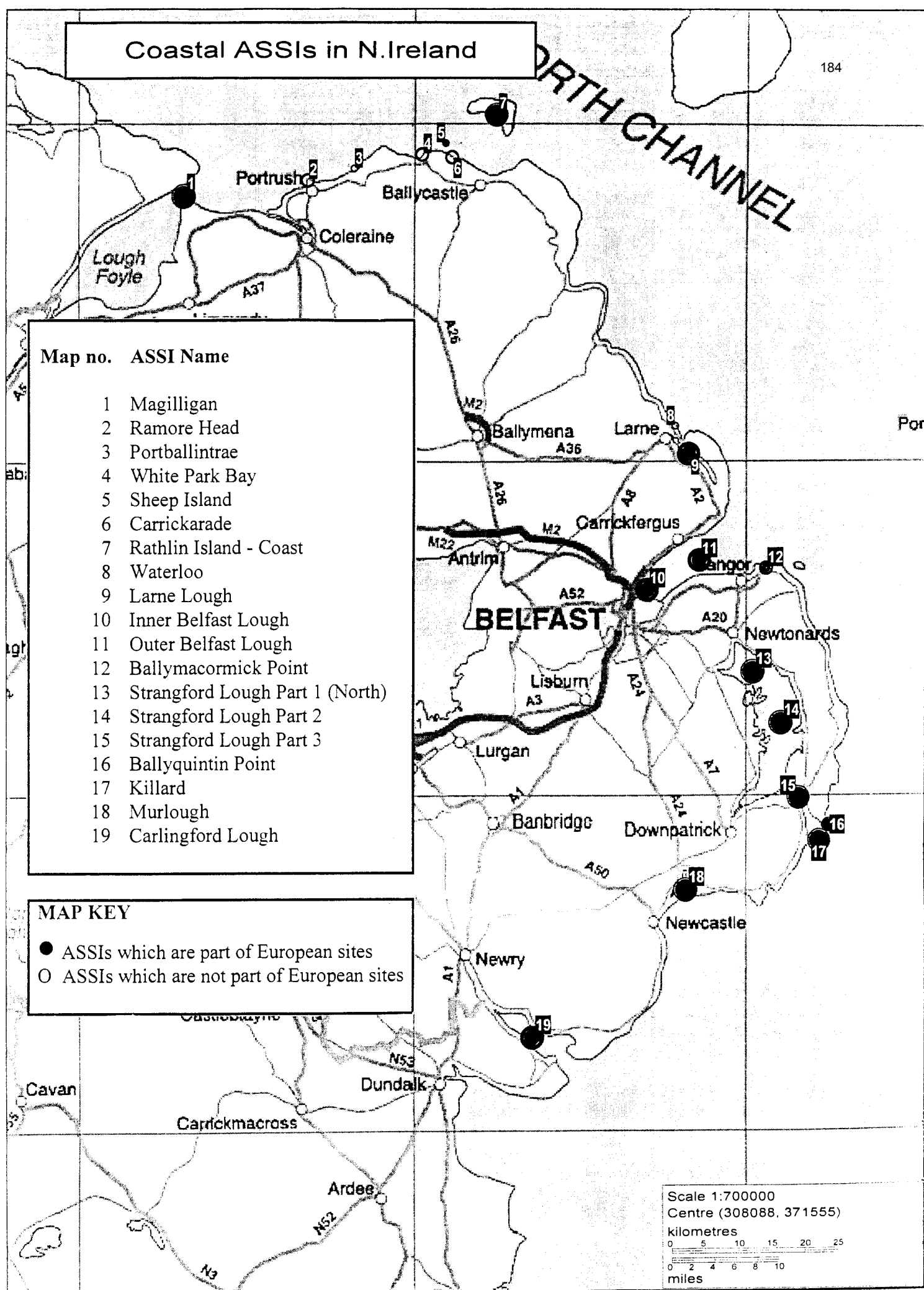
NORTH CHANNEL

Map no. ASSI Name

- 1 Magilligan
- 2 Ramore Head
- 3 Portballintrae
- 4 White Park Bay
- 5 Sheep Island
- 6 Carrickarde
- 7 Rathlin Island - Coast
- 8 Waterloo
- 9 Larne Lough
- 10 Inner Belfast Lough
- 11 Outer Belfast Lough
- 12 Ballymacormick Point
- 13 Strangford Lough Part 1 (North)
- 14 Strangford Lough Part 2
- 15 Strangford Lough Part 3
- 16 Ballyquintin Point
- 17 Killard
- 18 Murlough
- 19 Carlingford Lough

MAP KEY

- ASSIs which are part of European sites
- ASSIs which are not part of European sites



Scale 1:700000

Centre (308088, 371555)

kilometres

0 5 10 15 20 25

0 2 4 6 8 10

miles

There are three international conservation designations relevant to coastal and marine areas in Northern Ireland.

1. The Birds Directive of 1979 directs EC Member States to designate *Special Protection Areas (SPAs)* for listed threatened bird species and migratory birds. Four SPAs have been designated in NI and there is a commitment to complete the designation programme by 1998.
2. The Habitats Directive of 1992 directs EC Member States to designate *Special Areas of Conservation (SACs)* for listed threatened habitats and non-bird species. The Habitats Directive is much more prescriptive than the Birds Directive both with regard to site selection and management. Habitats and species should be managed to ensure that their conservation status is favourable i.e. maintained or enhanced. Of the 17 sites proposed in Northern Ireland one, Strangford Lough is marine. However, Rathlin Island is also being considered for proposal as a candidate SAC.
3. *Ramsar Site* applies to wetlands which are internationally important especially for their birds but also refers to wetland ecosystems. It includes water to a depth of 6m. When declared, the Government will be committed to its wise use and will have to report on any changes in its status. Of the four Ramsar sites designated in Northern Ireland only one, Larne Lough, is coastal, although it is planned to designate all the coastal wetland sites designated or proposed as SPAs or SACs.

The coastal ASSIs which are designated or proposed as European sites (SPAs or SACs) are shown on the map. Two additional proposed coastal SPAs, Lough Foyle and most of the Outer Ards, have yet to be declared as ASSIs. All of these (with the exception of Rathlin Island Coast and Sheep Island) are also proposed Ramsar sites.

MANAGEMENT OF DESIGNATED SITES

The main terrestrial site safeguard mechanism is the ASSI network. Since the onset of the Nature Conservation and Amenity Lands (NI) Order 1985 the designation rate of ASSIs has increased markedly (80,000 ha have now been designated). However, increasing criticism has been voiced over the lack of information on the conservation status of designated ASSIs. The need for conservation management plans for international designations was further specified with the advent of the EC Habitats Directive in 1992. The requirements of this Directive were much more explicit than the previous international agreements and legislation. It detailed how sites were to be selected and managed. The requirements for site management refer to all European sites including candidate SACs and SPAs.

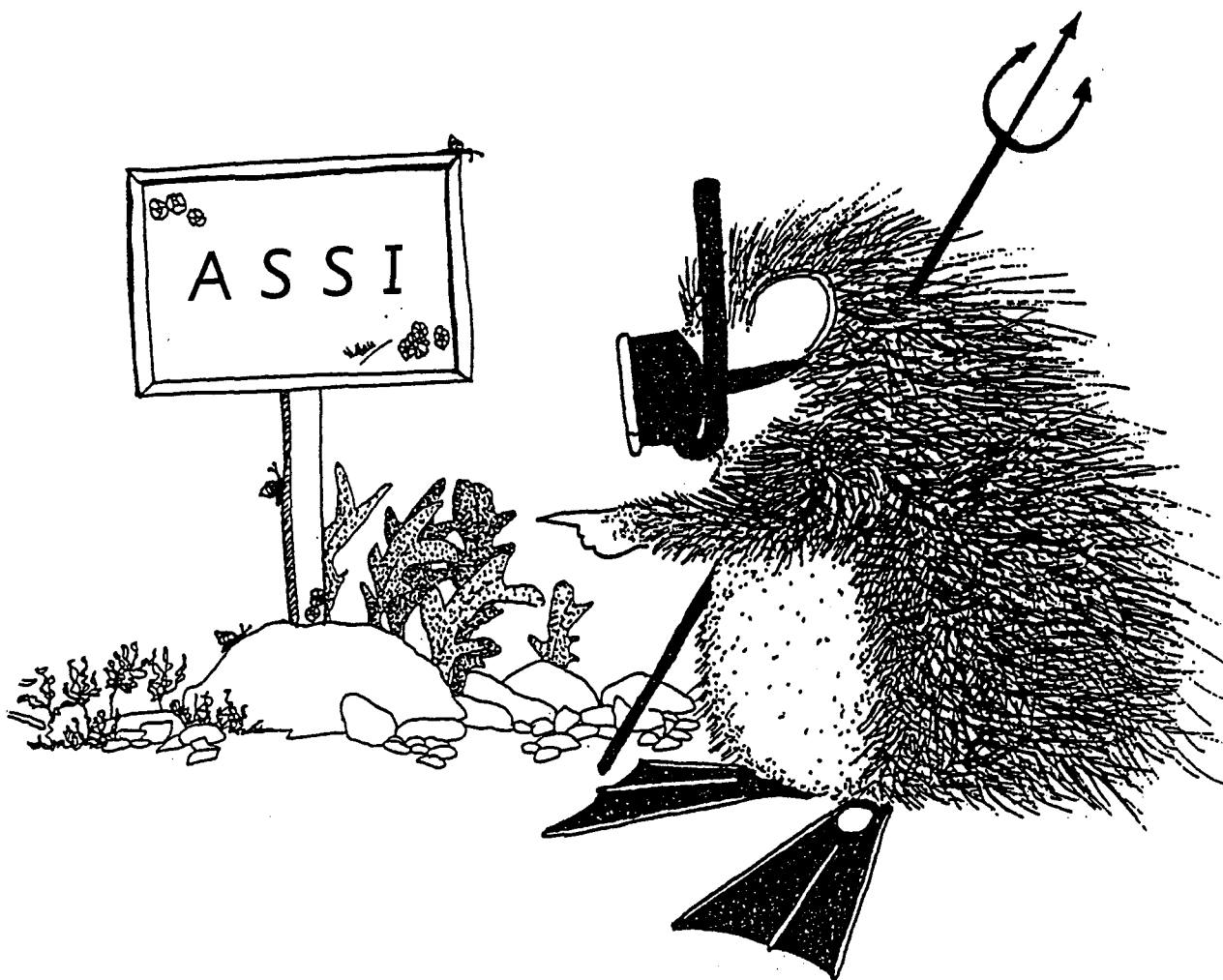
Taking these two factors into account it was concluded that a formalised system for managing all statutory nature conservation sites was required to plan and prioritise EHS work. To get the process moving in 1994 a contractor was engaged to draft Conservation Plans for all proposed SACs and SPAs. It was soon realised that the production of Conservation Plans would be of very great benefit in articulating the conservation aims of sites to landowners and other interested parties. The structure of Conservation Plans is based on the minimum management plan format of CMS (Countryside Management System) which is currently used for National Nature Reserves. In essence the plan is built on conserving features.

EHS is currently extending Conservation Plans to cover all ASSIs and also developing and consulting on selected Plans for European sites. These include Strangford Lough which has several internationally important features. The SAC feature is 'large shallow inlet or bay' which is a very broad marine habitat and is taken to include all littoral marine features of the ASSI and all littoral and sub-littoral marine features of the MNR. SPA features include breeding terns and wintering waterfowl. There are also has over 20 ASSI features found on the 6 ASSIs around Strangford Lough.

For Conservation Plans the first key element is to identify the features for which the site is eligible for designation. Objectives are set detailing the target or 'favourable condition' for each feature. These are made as measurable as possible, therefore providing an unequivocal target whose achievement can be monitored. The plan also identifies factors affecting features and projects to maintain the favourable condition of features. Central to these projects is the establishment of the measures of the favourable condition of individual features and monitoring.

Successful conservation of the features on Strangford Lough cannot be achieved by EHS alone. Marine areas in particular need the participation and co-operation of many groups. EHS consider it of crucial importance that the aims and objectives of the plan are understood and accepted by all those involved in the management of the Lough. Consulting with the Strangford Lough Management Committee started at an early stage in the drafting of Strangford Lough Conservation Plan.

The setting of management objectives for conserving features and management planning in marine environment are difficult. We will continue to shape the Conservation Plans in the light of developments in the UK. Strangford Lough is one of 12 pilot sites which are included in a UK EU funded LIFE project aimed at developing management schemes for marine SACs. In addition the Conservation Plan is part of a broader management strategy being currently developed for Strangford Lough.



PORTAFERRY SCIENTIFIC DIVERS

By PHIL HEATH

C-Mar, Queen's University Belfast, Marine Biology Laboratory,
Portaferry, Co Down, Northern Ireland, BT22 1PF, UK

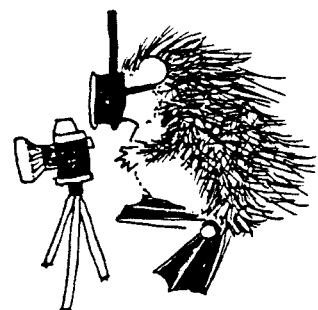
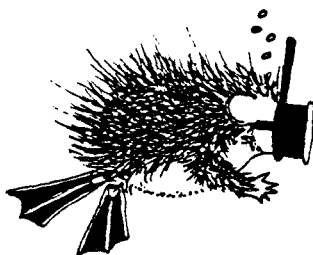
PORTAFERRY SCIENTIFIC DIVERS was formed in 1994 to provide an outlet for divers who wished to be involved in underwater science projects alongside their normal club diving activities. PSD is an open branch of the British Sub-Aqua Club and a member of the Northern Ireland Federation of Sub-Aqua Clubs. Based in Portaferry, at the southern end of Strangford Lough, the club aims to promote and undertake underwater exploration and conservation projects, providing opportunities for its members to participate in biological and archaeological surveys. PSD membership already includes a number of qualified marine biologists and scientific divers who offer supervision, training and support to those new to scientific diving and those wishing to develop their diving skills. On an individual level the club members have experience in benthic ecology, fisheries, aquaculture, management of nature reserves, ASSI monitoring, environmental impact assessments and biological data analysis.

As part of PSD's commitment to train divers in underwater biological survey techniques the club has run a number of marine life identification courses and an underwater photography course. The club has familiarised its members in the procedures of SEASEARCH. SEASEARCH, developed by the Joint Nature Conservation Committee, Scottish Natural Heritage and the Marine Conservation Society, allows sports divers to make useful and accurate observations of underwater habitats with minimal prior training. Such observations provide the framework for much of our understanding of marine ecology and forms a baseline of knowledge that is vital for the management of marine ecosystems.

In 1995 PSD hired a local charter boat and applied SEASEARCH procedures, on an experimental basis, to survey some sites within Strangford Lough. Divers with varying degrees of biological knowledge were asked to complete SEASEARCH forms following each dive. It was found that the SEASEARCH form could be completed with only limited biological knowledge and PSD have subsequently run a training course for its membership to help ensure that all members have the skills required to effectively undertake such surveys in the future. In addition the club is currently developing a card that can be used underwater to allow SEASEARCH forms to be completed more easily. The information gathered by the club will be compiled on a computer database and will be freely available to interested parties and may be used to help in the management of Strangford Lough.

PSD is now planning to extend its survey of Strangford Lough in an attempt to accurately locate and identify habitat types within the Lough and provide baseline information to allow monitoring of these habitats in the future. The club is also involved in specific surveys, such as surveying oyster (*Ostrea edulis*) beds within Strangford Lough. Over a number of years, these surveys will be used to build up a habitat directory of Strangford Lough, adding to and enhancing existing knowledge.

The club is currently expanding and continuing its commitment to training in underwater science for divers.



MARINE EDUCATION - INVESTING IN THE FUTURE

by SARAH WELTON

(Education officer for the Marine Conservation Society)

9 Gloucester Road, Ross-on-Wye, Herefordshire HR9 5BU, UK

The Marine Conservation Society (MCS) has always recognised the importance of education throughout its work. Education is certainly a tool which helps us achieve all our conservation goals.

When we use the word "education" (I would prefer to be called Marine Awareness Officer) people always think of the classroom situation. There is no doubt that education of our young people to appreciate and understand the marine environment and the need for its conservation should be a priority, if we are to look to the future. Kids educate grown-ups, when it comes to conservation, not the other way around. When I look at a class of primary school children, I always remind myself that I am certainly looking at consumers of the future who will use the coast for recreational activities - even more than we do at present - in addition to all the less obvious uses, transport, waste disposal, food etc., and I might be looking at tomorrow's "decision-makers": coastal planners, engineers, tourism officers or even the Prime Minister (they seem to get younger all the time!)

There is still a long way to go in marine education, though. In schools, marine is still the poor relation of terrestrial environmental education. It is not enough to provide resources, tailored to the curriculum - we must give teachers the confidence to use them. The "slimmed down" National Curriculum in England and Wales has freed up more time for environmental studies, but there is no longer the requirement to do it. In Northern Ireland, a whole school approach to environmental education is encouraged through the formal curriculum and through extra-curricular activities and in Scotland, environmental study is a requirement throughout the 5 - 14 curriculum but it is so often easier to stick to the familiar terrestrial environment for case studies and examples.

THE VOLUNTARY APPROACH

Out on the coast there are some really exciting things happening in the world of marine interpretation. When I first started working on the coast, nearly 20 years ago, I never dreamt that I would see "state of the Art" marine interpretative centres, aquaria, real-time video with surface to diver communication, hydrophones, audio-visual and interactive displays. It is all happening now. Many of these initiatives are focused on Voluntary Marine Conservation Areas (V.M.C.As). There are a number of V.M.C.As in England, Scotland and Wales, the initiative coming from the local community. With no legislation to back up these voluntary initiatives (the only controls which can be applied are existing bye-laws and the control of access by the land-owner), these areas rely on voluntary co-operation to achieve their aims. This co-operative approach has proved to be the greatest strength of these areas as users are drawn in to help with the management of "their" V.M.C.A - a true "grass roots" community project.

EXAMPLES

St. Abbs and Eyemouth Voluntary Marine Reserve on the south-east coast of Scotland is an extremely popular dive location in addition to supporting an active fishing industry. Its main achievements have included promotion of a voluntary divers code of conduct, various diving projects, underwater photographic competitions and arm chair dives.

St. Marys Island Voluntary Marine Conservation Area, Tyne and Wear is a small accessible site attached to the Tyneside conurbation, interpreting the marine environment (including local wrecks) to the public and visiting school groups.

Durlston Marine Research Area on the Purbeck Coast in Dorset operates a cetacean recording scheme using local volunteers watching from the clifftop. A fixed hydrophone on the seabed carries out acoustic monitoring, providing information on the area e.g. cetaceans and seismic activity, and offering an innovative interpretive tool. A remote-controlled video camera on the cliff face gives visitors and ornithologists alike a close-up view of nesting guillemots.

Purbeck Marine Wildlife Reserve, also on the Purbeck Coast, was the first mainland V.M.C.A. It focuses on marine education and interpretation, and techniques include a seabed video camera, beaming real-time video to the visitor centre. A Limpet Protection Zone on the beach has been successful in reducing disturbance and damage.

Helford Voluntary Marine Conservation Area. The Helford River in Cornwall is a small isolated ria with a wide variety of habitats and species. Uses included oyster farming and fishing. The Conservation Area came about because of concern over pressures on the area, although many needed to be convinced that there was a problem. Much survey work is carried out and information provided. Fishermen have become involved.

COASTLINK - WORKING TOGETHER

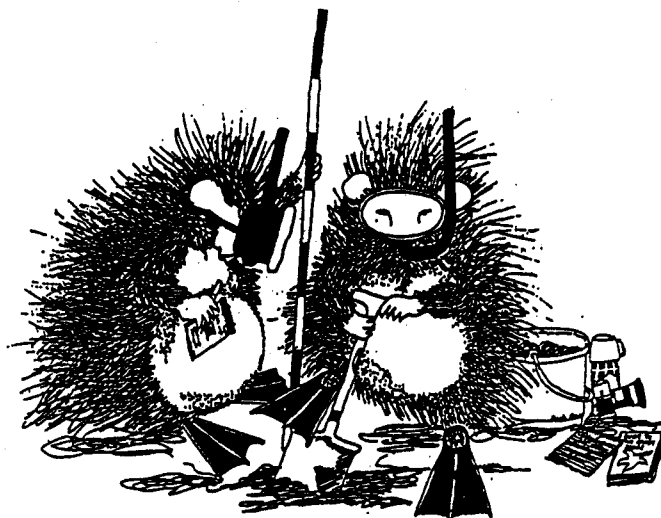
Voluntary initiatives in Dorset, Devon and Cornwall are working together through Coastlink groups to co-ordinate their educational and interpretive activities, seek joint promotion of events and funding opportunities and to increase their research and monitoring effort.

BRIDGING THE GAP BETWEEN SCIENCE AND EDUCATION

Few PORCUPINE members would argue that we need more knowledge and information about the marine environment but we also need to use that information to increase awareness. In areas where coastal zone management strategies and plans are being prepared, it is becoming apparent that although much information might be available - university research programmes, environmental records centres etc. - those who need that information are often unaware that it exists. How many Shoreline Management Plans contain detailed sources of offshore environmental information?

Marine research establishments and projects, rather than distancing themselves from the local community, are in a perfect position to bridge the gap and allow non-divers of all ages to realise what they have on their doorstep. Simple techniques such as posters, library displays, presentations and school visits can achieve so much.

In the coming years, as marine Special Areas of Conservation are designated and management schemes are implemented, the local community's understanding and involvement in their own special marine area will have an important part to play. We should be starting NOW.

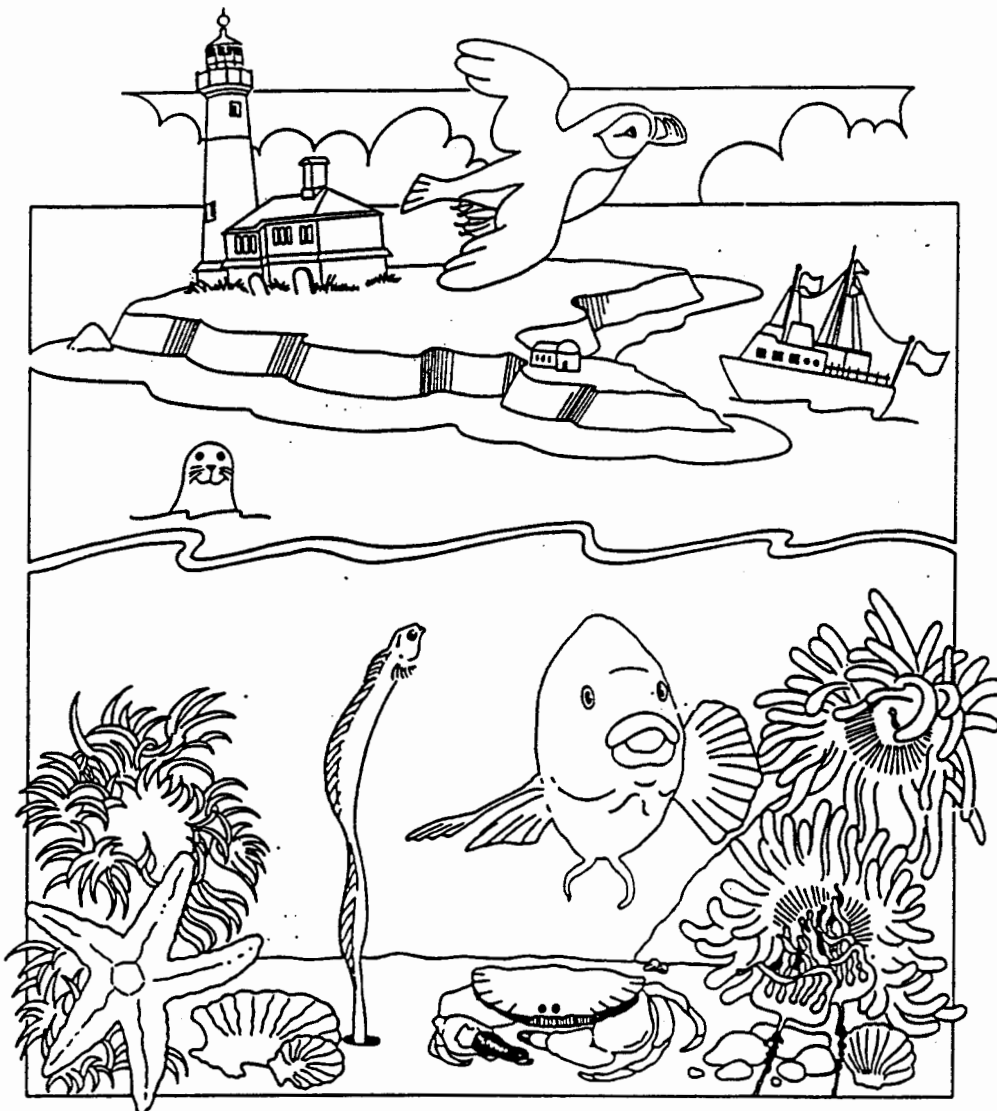


LUNDY MARINE NATURE RESERVE

By PAUL GILLILAND

Marine Protected Areas Officer, Maritime Team, English Nature,
Northminster House, Peterborough, PE1 1UA, UK

This is a fairly rapid overview of how things have gone, and are going, at Lundy Marine Nature Reserve the first such reserve in the UK. It touches on a variety of issues relating to establishing and "managing" a Marine Protected Area and, to put some of these in context, will also cover some of the reserve's history to explain how the reserve arose. I will also consider Lundy's importance in the wider sense.



Lundy is located at the entrance to the Bristol Channel about 18km NNW of Hartland Point. The island is just under 5km long and only 1.3km at its widest point. The island is largely composed of granite, rising steadily on all sides to a plain, but with an area of slates in the southeast corner. Being offshore, Lundy is relatively free of land-based pollution and it is influenced by warm water currents from both the Atlantic and the Mediterranean which thus affect the marine communities. The east and west coasts differ largely because the latter is subject to the prevailing weather and all that wind and waves can throw at it.

Lundy has quite a long and colourful history and is currently owned by the National Trust but leased to a charity called the Landmark Trust. It is a SSSI, known for its terrestrial nature conservation interests, eg the Lundy Cabbage.

However, the history of knowledge of its marine interest and of the marine reserve really began with the advent and growth of sports diving in the mid 1960s when a dive centre was established. There is certainly much for divers and marine biologists to see. The diversity of habitats means a diversity of communities and species. Under water the wealth of life, particularly on animal-dominated rocky habitats, is immediately evident. There are over 300 species of algae alone with a number of rarities and southern species such as *Bifurcaria bifurcata*. The sea fan *Eunicella verrucosa*, another southern species is quite common. There are plenty of photographic opportunities with animals carpeting the rocks, such as *Parazoanthus axinellae*. There are also a variety of solitary corals including the widespread Devonshire Cup Coral but also other rarities including the Sunset Coral *Leptosammia pruvoti*, for which Lundy is at the northern limit of its world distribution. Amongst other delights are a variety of fish including the redband fish *Cepola rubescens* which caused quite a stir when first found because it had not been observed as such shallow depths before. Lundy also supports a regionally important population of seals. Divers are also attracted by the many wrecks around the island.

As ever, it is not easy to keep a good thing secret, and Lundy soon became a popular dive spot. Perhaps too much so, as concern arose over possible effects on the wildlife, such as from souvenir collecting. Talk of some kind of reserve began as early as 1969. the idea for a voluntary reserve was taken forward by Keith Hiscock and others with published proposals in 1971. This, not coincidentally, tied in with growing general discussion marine reserves in the UK. After a couple of years of various discussions and meetings Lundy Voluntary Reserve was declared in 1973.

This led to a variety of development including the drawing up of some management policies and a Code of Conduct which was later adopted in relation to the Statutory Reserve. In addition, a programme of survey was undertaken around the island to describe the marine biota and ecology, particularly of the sublittoral. There was also a pilot project in 1978 to assess the need for a marine warden.

The possibility for statutory marine nature reserves came in with the 1981 Wildlife and Countryside Act. the Nature Conservancy Council and others soon identified a list if possible sites including, not surprisingly, Lundy. There were various reasons for recognising Lundy in statute, not least of which was to ensure the provision of a warden, as well as the greater recognition that would accrue.

Despite the relatively long history of marine work at Lundy and its status as a voluntary reserve, it still took some time and effort to move to statutory status, which proved, I think, a salutary lesson for the NCC. Much of the delay revolved around concerns from local fishermen and from initial reticence on the part of the Devon Sea Fisheries Commission - at one stage they were not prepared to consider many of the bylaws in relation to the reserve and objected even to spear fishing being banned. As a result of their involvement over the MNR, however, DSFC became one of the more environmentally aware of the Commissions at an early stage. In order to further the already good local support and understanding for the MNR proposal a liaison officer was appointed, Robert Irving, which has proved to be a long-standing association. A Consultation Group was also established which has proved beneficial as this continues in a different guise today. So, whilst the process was quite involved, it did bring spinoff benefits as well as formal recognition of the MNR with its designation on 21 November 1986.

In conjunction with activity on the designation front, the NCC began a programme of research and monitoring in the early 1980s aimed not simply at describing the marine communities but also gathering information of relevance to possible management. This involved a number of projects but particularly assessing some of the Mediterranean-Atlantic species about which little was known. For example, making measurements of the growth rates of seafans and establishing monitoring sites to get fixed views of cliff faces with corals from which we can map and record numbers of species year on year.

Such monitoring continued every year through to 1990-91 and ceased thereafter on a formal basis

largely because the questions posed has been answered, ie that the species are extremely slow-growing, recruit very little and are therefore very sensitive. This obviously is informative from a management point of view. It is for such reasons that there is a no potting area around the Knoll Pins - one of the prime sites for southern species.

We also began to consider that other aspects of managing the reserve needed some attention. This coincided with the split of the NCC into country agencies, including English Nature, and the cultural change this brought with it included placing an increasing emphasis on aspects of nature conservation other than science. We set out our marine strategy in 1993 and in this placed Lundy clearly at the centre of our work as a "flagship" and recognised the need to consider the profile of, and work at, Lundy as a whole.

The first of these developments was to look more critically at the management set up for the MNR. English Nature had continued the funding provided by the NCC for the employment of a warden by the Landmark trust which had begun in 1986. However, there was a need to establish a better-structured work programme for the warden and to revise the contract. This was really crucial to the future success of the reserve. As a result of these deliberations a new Management Plan was drafted in 1993 (new because one had been drafted in the early 1980s but did not go beyond draft stage and sat on the shelf) and consulted on widely. This plan, published in 1994 and signed up to by four bodies responsible for management, English Nature, Devon Sea Fisheries Commission, the Landmark Trust and the National Trust, sets out formal objectives for the reserve and perhaps, more importantly, provides a register of projects on which the wardens' work plan can be based so that they know where they stand with what they should be doing, when, and how much time to allocate. The recommendation for a more formal management structure was effected almost immediately with the Management Group, as above, linking well with an Advisory Group formed out of the previous Consultation Group. Both meet twice a year and the arrangement seems satisfactory to all concerned (so much so that DoE took note of this structure in their Guidance document for marine SACs). A more practical outcome for the warden is that there now is, for the first time, a RIB for use in the MNR.

In association with the plan we took the idea of using Lundy as a flagship to trial a management tool pioneered abroad for summarising bylaws and a wealth of other sometimes confusing management information in an easy to understand way. The information is interpreted as an overlay on a navigation chart making effective use of colour to indicate differing levels of protection or regulation, to produce a zoning scheme. Note that this summarises the existing situation rather than introducing new regulations. The Sanctuary Zone, for example, is largely based on an existing voluntary no-potting zone. The scheme, which was consulted on, generated a lot of interest, nationally as well as locally. The idea of such schemes has been considered further elsewhere in the UK, and the idea has been effectively sold back to whence it came with the Director of the Great Barrier Marine Park Committee expressing a great deal of interest in it. Skomer MNR now has a similar scheme. The scheme has proved useful locally although more could have been done to disseminate it.

Interpretation/promotion was the other main new area to be considered when work in the MNR was re-evaluated. To this end English Nature commissioned an Interpretative Review to assess the effectiveness of existing facilities in terms of knowledge of the reserve and through it of marine conservation, using some market research on the 20,000 (annually) day visitors to the island. It was clear that much could be and needed to be done. One of the most alarming facts was that over half the visitors did not know that this was England's only MNR and about 20% still did not know after their visit. As a result a number of projects were initiated. We replaced the old signs at the departure points in Ilfracombe and Bideford which were rather unfriendly and just listed the bylaws (and did not show the boundary of the reserve) with, right at the start of peoples' journey, a more colourful and informative vision of why Lundy is a special marine site. We produced a series of new, colourful leaflets on various aspects of the island, including several marine subjects, available on the ferries and on the island. An interesting measure of their success was that the warden found very few of

them discarded compared to previous leaflets. On the island there is now more information. There is a display board in the church and we put two new panels about different habitats there.

One of the main ideas from the Review was to produce a video. There is a captive audience on the ferry for nearly two hours, most people don't go diving. With the help of several individuals "*Lundy Marine Reserve - A Special Place*" was conceived in late 1994. The video has gone down very well with the visitors and the ferry crews. We were also keen to highlight this idea for the promotion of other MPAs and to demonstrate that it can be done relatively cheaply with a little help from your friends. It also had a number of enormous spinoff benefits, footage has been used quite often on local, national and even European TV.

All of these are largely about helping the visitors help themselves to find out about the reserve and marine wildlife and to get more out of their visits. Of course the prime facility for interpretation is the warden, providing advice and information and leading shore rambles which can be quite boisterous. A snorkel trail was also established in a sheltered part of the island, so that, by hiring the kit we have provided, non-diving visitors have a wonderful opportunity to glimpse some of Lundy's underwater world, for which we have provided a waterproof leaflet.

Thus there has been quite a burst of activity on promotion. This has wound down for now although there are a couple of projects currently going through. We think all of this has had a positive impact. We did a little follow-up market research with mixed results, for example a greater percentage of visitors now know about the MNR, although there are more who were aware of it before their visit. Where we do need to consider further work is in targeting particular groups better, including divers.

We have been exploring different ways of undertaking survey and monitoring including some of that which NCC had wound down. For instance the Marine Conservation Society have undertaken a number of projects for the last couple of years, led by Robert Irving. Lundy got caught up in the Sea Empress spill but only suffered very light oiling on the shore, with a few bird casualties and follow-up monitoring showed a clean bill of health. However, such events always focus the mind on what further work could be done. Lundy's proposal as a candidate SAC for its reefs has also added impetus both specifically in terms of how we report on and monitor reefs but also more generally in terms of what we can learn about monitoring marine SACs in general. There are also possible concerns about the sunset coral population. From 1983 to 1990 there was a slight steady decline at the monitoring sites of just over 1% per year. Recent observations suggest that latterly this has risen to 2.5% per year. We therefore have new questions to address about this species which may lead to new work.

All of this has led to a review of monitoring and survey. We felt it important to put all of this work on a more formal footing, identifying priorities and ways of achieving various projects. We did this in the latter part of last year, producing what is essentially an Annex to the Management Plan.

One recent proposal relates to the distribution of habitats. Although we knew what habitats and communities occurred in the MNR we did not have a good map of their distribution. Recent developments in acoustic surveying techniques meant that this was now feasible. The BIOMAR team, as was, at Newcastle University, undertook such a survey of the whole reserve. We also enlisted the help of Scottish Natural Heritage who have a sophisticated ROV which was better than a towed video given some of the fragile species on Lundy. Apart from finding new sites for sunset corals on the west coast and having basking sharks with us all week, a distribution map of the main seabed habitat types within the reserve, actually mapped

on the level of "lifeform", was produced. This did not yield any surprises but we now have a better idea of the distribution of the reefs, which extend further offshore on the west than on the east coast. We also got results which included the first 3D impression of the seabed.

The review of monitoring covers not just monitoring of physical parameters and biological features but also the use of the reserve. The main commercial use, *per se*, of the reserve is potting. This has always been known, but there is no clear picture of the level of potting and where it occurred. Obviously, if management is to address any real issues related to potting, such as revision of the no potting zone, we need to have accurate information on this, linked to data from elsewhere. The warden began to tackle this with recording of pot location from the cliff top, but this was not ideal and the DSFC are now working on the subject through direct contact with the fishermen.

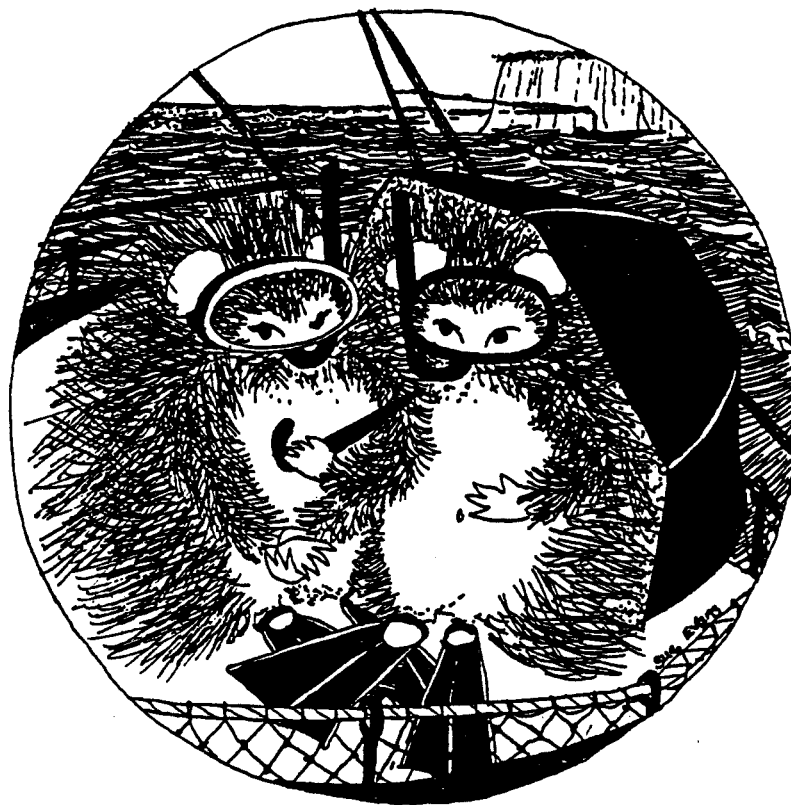
Diving is the most common/frequent activity in the MNR. Based solely on dive charter figures the warden estimated that during last summer alone there were in excess of 2500 diver days spent in the reserve. This provide both management challenges and opportunities. We need to have a better idea of the nature of the diving activity, for example which sites are most heavily dived, but there is also a great potential for divers to contribute to the management of the reserve since they can make numerous observations, from records of species to turbidity conditions to incidences of litter. As a result we have produced a questionnaire which we hope will facilitate collecting such information and are working with dive charter skippers as a conduit for giving and receiving information. There are other benefits to working with divers such as loan of slides and material for the video.

We are continuing to develop as well as maintain, the management work at Lundy. New challenges and opportunities continue to arise. We recently had an exchange visit with Blaise Bullimore and colleagues at Skomer MNR, particularly for the benefit of the warden, but it proved useful all round for sharing of information. Perhaps there should be more of this kind of contact around the UK. There may be a voluntary summer assistant marine warden. The Landmark Trust may secure substantial funding to improve the infrastructure of the island, with possible spinoff benefits in the interpretation side. Lundy MNR now has a site on the internet - bigweb.castlelink.co.uk/gratton/ilfsac/lundy.htm.

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PEMBROKESHIRE AND ITS ISLANDS: PROTECTION OR EXPLOITATION

By DALE ROSTRON

SubSea Survey, 13-14 Merlin's Cross, Lower Lamphey Road, Pembroke,
Pembrokeshire SA71 4AG, UK

INTRODUCTION AND SITES OF SPECIAL SCIENTIFIC INTEREST

Marine conservation in the UK has a short but complicated history. The 1949 National Parks and Access to the Countryside Act was the first piece of wildlife legislation to incorporate the idea of SSSIs and this was done by giving the then Nature Conservancy Council a remit to identify special areas and to notify local authorities of their presence. SSSIs are generally seen as the principle legal means of protecting the most important areas of the country for their wild plants, animals and their habitats and in some cases for geological and other merits. Criteria for site selection include features such as size, diversity, naturalness, rarity, fragility (or vulnerability) and typicalness, with additional secondary features such as recorded history, position in an ecological/geographical unit, intrinsic appeal. Obviously such a system could not be applied to areas beneath the sea, but could and was applied down to low water mark, the limit of planning jurisdiction.

As a result of the 1981 Wildlife and Countryside Act the NCC had to re-notify all SSSIs, which involved the re-survey and re-assessment of the scientific information for each site to provide more background as to why the site was designated. Guidance notes were produced to help with this evaluation of sites (NCC, 1983), but in the 1983 Operational Guidelines it was stated that they "*did not cover intertidal areas other than those supporting higher plants and the feeding grounds for waders and wildfowl*".

In the most recent Guidelines (NCC, 1989) for the selection of biological SSSIs, there was still no advice on assessing the marine biological interest of intertidal areas, with the statement that "*the nature conservation importance (of intertidal flats) is mainly as the feeding habitat of shore birds*". No mention at all was made of intertidal rocky shore communities or their marine biological interest until last year, when the marine supplement to the 1989 Guidelines was produced (JNCC, 1996). There is a good deal of biological information included in the supplement which has resulted from the Marine Nature Conservation Review, a major research programme started by the Nature Conservancy Council as early as 1974 and now nearing completion.

Currently, in Wales, a team of shore workers employed by the Countryside Commission for Wales is busy mapping biotopes over large intertidal areas in order to identify the best sites for designation as SSSIs. (Biotopes are basically coded marine community types). There is an intensive SSSI notification programme associated with the selection of Special Areas of Conservation and in 1997 the team hopes to cover parts of north Pembrokeshire, although the south Pembrokeshire survey has been deferred due to the oil spillage in 1996 (G Moffett, *pers. comm.*) Some beaches, such as the spectacular and interesting limestone beaches on the exposed south Pembrokeshire coast, fall outside the boundaries of the proposed SAC. They have, however, got lovely exposed kelp forests, thick coralline crusts and interesting pool algae including species like *Bifurcaria bifurcata*, *Mesophyllum lichenoides*, *Pterocladia capillacea* and *Calliblepharis jubata*. Areas such as these need to be recognised.

The team from CCW is also attempting to classify sediment shores, an altogether more difficult task. Although hoping to use some surface features, such as burrows, tubes and marks, they are going to face a daunting task and end up with rather broad categories. Perhaps bird feeding is a good indicator after all!

The sad fact is that even though a SSSI is declared, as was the Gann Estuary at Dale in 1986, this does not in any way protect the area from the attentions of people. The Gann Flats are a fully saline, sheltered, mixed sediment, rich in both marine and bird life. However, the habitat is increasingly ravaged and change by the search for *Nereis virens*. The whole shore is full of soft pits and the fine sediments are being winnowed away. Species intolerant of such disturbances, such as *Sabella pavonina*, can now only be found at extreme low water.

Several other SSSI areas, particularly within the Milford Haven waterway, are also under threat.

THE SKOMER MARINE NATURE RESERVE

Whilst the 1949 National Parks and Access to the Countryside Act enabled the NCC to declare as National Nature Reserves those sites that it was in the national interest to manage, none of the reserve boundaries could extend below low water mark. The idea of applying the nature reserve concept to the marine environment was very slow to gain acceptance, and more often was actively opposed.

The first Working Party Report to make a preliminary assessment of the need for marine nature conservation measures came out in 1973 (Marine Wildlife Conservation, NERC). Basically the need for marine conservation was not established. Legal barriers were seen to be a major obstacle in the creation of sublittoral reserves and in addition at this time there was a paucity of available biological information.

In 1975 there was a further more wide-ranging review of the need for marine conservation and the report was published in 1979. At this time the Department of the Environment was already working on the details of the Wildlife and Countryside Act, so the NCC took the opportunity to prepare draft legislation for consideration by an Interdepartmental Working Party on Marine Reserves. It was rejected, and it took pressure from voluntary bodies to finally allow the inclusion of powers for the establishment of statutory marine nature reserves in the 1981 Act. But the NCC's powers for establishing such reserves were very weak and had to take account of all vested interests. There were many problems.

Skomer had been a voluntary reserve since 1976, and by February 1982 the NCC decided to proceed with official designation. There were major conflicts with the South Wales Sea Fisheries Commission over scallop dredging and with other groups, notably divers, because of the sweeping measures proposed to impose prohibited areas around much of the reserve for the protection of birds and seals on land. This was considered to be a misuse of the legislation. In addition, divers were concerned that whilst they could be banned from the removal of any food or other item from the reserve, potting, angling and netting could proceed willy nilly. Since divers had carried out much of the work leading up to the designation, their complaints appeared to be justified.

After much consultation and compromise, the reserve was finally declared official in July 1990, since which time it has become a focus of scientific research, recreational diving and environmental monitoring activity. Skomer Marine Nature Reserve is managed from a small office at Martins Haven and it is this on-site base which has facilitated continual environmental monitoring, using such things as wave rider buoys, sediment traps, sea thermometers, diving and video.

The reserve itself has much to offer visitors with spectacular much photographed scenery and a selection of rare and/or southern species. Research work has included studies on *Pentapora foliacea*, *Eunicella verrucosa* and *Zostera marina*. Of course, a wide range of non-exotic species is present and the sedimentary as well as rocky communities are very interesting.

The reserve area, although better protected than SSSIs, is quite small and must suffer the consequences of other activities in the wider environment. One of the major unknowns is the effect of siltation/sediment deposition on the diverse communities. Large silt plume and heavy deposits have been noticed on several occasions and may be related to dredging, spoil dumping or even the second Severn crossing.

The fact that the reserve is quite small also means that in the area there are many species and habitats which are unprotected. Nab Head in St Brides Bay, for example, supports slightly different communities, including large clumps of *Stolinica socialis*, plus many *Maja squinado* and *Palaemon serratus*. Other areas here are grazed by *Echinus esculentus*, leaving a sort of moonscape. Stack Rocks are nearby, covered with beds of *Antedon bifida*, with groups of *Anemonia viridis* in the shallows, and numerous fish and other starfish. The Handmarks, a small subtidal outcrop, is just outside the reserve boundary but has a very rich and diverse fauna with *Ophiothrix fragilis* beds, fish and occasional large *Tritonia hombergii*. the rocky reefs of north Pembrokeshire, such as Bola Bleiddyn, Llechganol, etc., are rich in sponges, plus additional southern species like *Gymnangium montagui* and *Parazoanthus axinellae*.

None of these areas are protected.

SPECIAL AREAS OF CONSERVATION

Marine conservation is patchy to say the least and all of it is small scale. But now, in Pembrokeshire, there is a chance of a much broader range of marine conservation measures. Such a possibility arose as a direct result of the European Habitats Directive (Council Directive 92/43/EEC on the conservation of natural habitats and of wild flora and fauna). This goes hand in hand with the Birds Directive of 1979 and together they establish a legislative framework for protection and conserving Europe's wildlife and habitats.

At the centre of this policy is the creation of a coherent ecological network of protected areas across the European Union - known as NATURE 2000. This will be made up of SPAs for birds and SACs to conserve the 253 habitat types, 200 animal and 434 plant species currently listed in the Habitats Directive. Some marine species and some marine habitats of importance are missing from the list.

One of the proposed SAC sites is Pembrokeshire Islands. The area is being considered because it supports exceptionally high quality examples of a wide range of habitats, particularly reefs, inlets, bays and estuaries, plus the largest colonies of grey seals in southern Britain. (Although smaller than the Scottish population, the Pembrokeshire Islands population is important because it is the most southerly in Europe of any size and isolated from others in Britain). There are, as reported above, extensive areas of sublittoral rocky reefs offshore, much of it igneous rock. Communities are very diverse, with many rare species present. The flooded quarry at Abereiddy is unique in southern Britain and contains interesting fauna. As an addition to the importance of the region, Skomer, Skokholm and Grassholm islands are SPAs, designated for their importance as seabird breeding colonies are regularly recorded and cetaceans are sighted.

However, the Pembrokeshire Islands SAC proposal has not yet been forwarded to Europe. The application cannot proceed because of objections from the Milford Haven Port Authority, and 1998 is the deadline date. The Milford Haven Waterway is the problem as the Port Authority feels that SAC status will impede future development in the central reaches of the waterway. This situation must be resolved. There are very interesting communities in the waterway, such as Dockyard Bank, a subtidal area around which the Ireland ferry carries out a U-turn. the sponges here are magnificent, especially *Raspailia ramosa*, and the *Polymastia mamillaris* specimens are very large. The whole bank is packed with life, there are a few unusual growth forms such as an elongated (1.2m) long *Botryllus schlosseri*. Dredging has recently taken place alongside this bank for an even bigger ferry and the effects on the Bank are as yet unknown.

Other potential threats are new marinas and industry. Pembroke River is the proposed site for a new marina with 500 berths, housing and a new sewer pipe. On the opposite side, Pembroke Power Station has plans to expand jetty facilities for the import of the bitumen fuel, orimulsion. Both schemes involve works on the intertidal SSSI along with dredging in the shallow subtidal (unprotected) entrance, where again communities are rich, with hydroids, sponges and occasional *Ostrea edulis* and *Pecten maximus*. Also this area is particularly rich in small filamentous red algae, including Nationally Rare Species such as *Aglaothamnion feldmaniae* and *A. trispinnatum*.

The chemical pollution threat affects all reaches of the waterway, including the distinctive communities at Castle Reach, well up-river in an euryhaline environment.

FISHERIES

Finally, there is the treat of unregulated fisheries all around the coast of Pembrokeshire. The SWSFC is in jeopardy due to a disagreement over funding by the new unitary authorities, and so therefore threatened are sea bass, lobster, spider crab, edible crab, whelk, dogfish and other species. Even trapped wrasse are killed for bait, and tangle netting is becoming an increasing hazard and a fisheries problem. The latest news is that the committee is partially funded by an emergency order from the Welsh Office, but still faces the loss of their fisheries protection vessel along with several jobs. More details are available in leaflets provided by the SWSFC at Queens Buildings, Cambrian Place, Swansea SA1 1TW (phone 01792 654466, fax 10792 645987, e-mail SWSFCcyberstop.net.).

Ideally it would be nice to see the SWSFC restored to health and the concern for marine environmental protection extended outwards from the established base at the Skomer Marine Nature Reserve. Even if not all habitats can be preserved, it is important that they are at least recognised. It seems inconceivable, but we could lose this chance to become part of the European Biodiversity Network, in spite of all that Pembrokeshire and its Islands have to offer.

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