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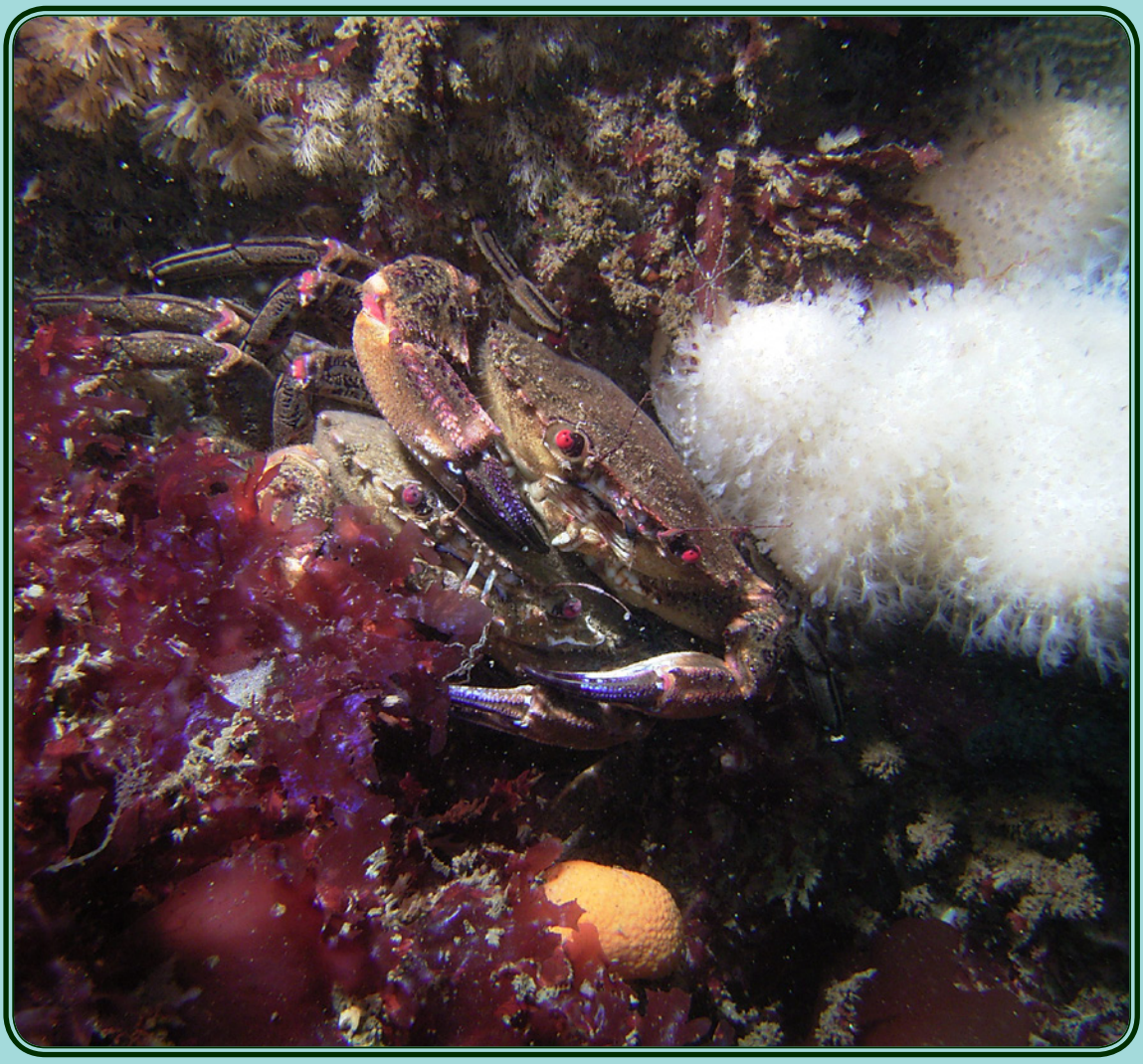
BULLETIN of the PORCUPINE MARINE NATURAL HISTORY SOCIETY

Spring 2016 — Number 5



Bulletin of the

Porcupine Marine Natural History Society

No. 5 Spring 2016

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Porcupine MNHS welcomes new members- scientists, students, divers, naturalists and lay people.
We are an informal society interested in marine natural history and recording particularly in the North Atlantic and 'Porcupine Bight'.
Members receive 2 Bulletins per year which include proceedings from scientific meetings, plus regular news bulletins.

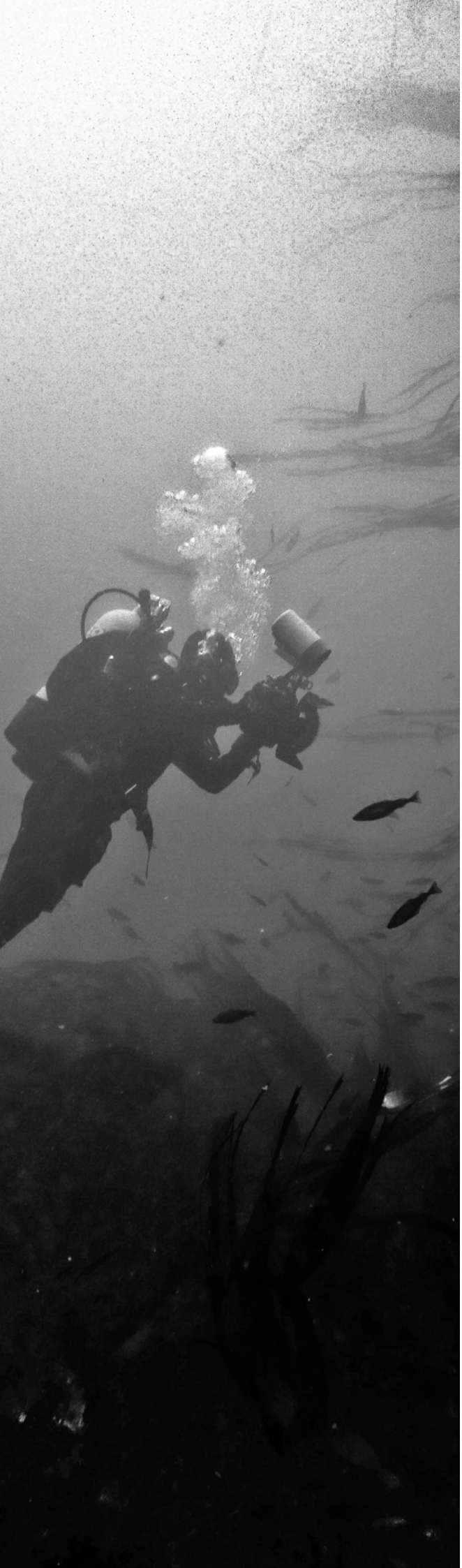
Membership fees: Individual £18 Student £10

www.pmnhs.co.uk

http://www.facebook.com/groups/190053525989

@PorcupineMNHS

*Cover Image: Image of velvet swimming crabs (*Necora puber*) and dead man's fingers (*Alcyonium digitatum*) taken during a Seasearch dive in Pembrokeshire— Vicki Howe*



Editorial

I have recently been musing about why Porcupine is important to me. In the typical way my brain works I went off on all sorts of tangents; from learning more about a subject I love, to meeting people, to hearing and reading about all sorts of interesting research projects. What I then realised was that Porcupine provides opportunity. Over the past 10 years Porcupine has provided me with many opportunities, some quite unexpected too, such as a trip to Millport this year and in previous years to go "behind the scenes" in both National Museum Wales and the Natural History Museum London, fuelling a passion and curiosity for all things pickled.

In 2016 there is a chance for members to join old and new friends on field trips to Staffa, Inner Hebrides and Aberystwyth, mid Wales and, as always, there is the continued opportunity to publish in the Bulletin. Sometimes we are almost overwhelmed with copy for the Bulletin and often this is on the back of the Porcupine Conference with many varied articles based on conference presentations. The spring issue can be more of a challenge and it is with great interest that, as articles were submitted, a theme emerged highlighting the growing "citizen science movement". The new Capturing our Coast project is outlined by Jacqui Pocklington and there are two articles extolling the virtues of diving in Scottish waters recording marine life using Seasearch methodology; "Seaweed, skuas and seasickness" by Becky Hitchin and "Jumping in with both feet" by Penny Martin. Such projects provide opportunity and training for professionals and non-professionals and this in turn leads to interesting and informative articles for the Porcupine Bulletin. I hope that on reading this Spring issue of the Bulletin you might feel inspired to write about your adventures, explorations, investigations and will take the opportunity to send us your writing so we can share it with other Porcupines.

Vicki Howe

Hon. Editor

Photo: Diver surveying a wall on North Rona – Peter Bardsley

ANNOUNCEMENTS

Marine Events in 2016

SeaSearch Courses & Training

Seasearch is a project for volunteer sports divers who have an interest in what they're seeing underwater, want to learn more and want to help protect the marine environment around the coasts of Britain and Ireland. They offer training courses in marine identification and recording for all levels.

SeaSearch has already announced dates for several Observer courses from March-June 2016 See their website at http://www.seasearch.org.uk/training.htm for details.

Marine courses with FSC

Environmental charity Field Studies Council (FSC) have just launched their programme of 2016 marine courses.

The courses cover many aspects of marine life including seaweeds, sponges, invertebrates, plankton and marine mammals as well as techniques in sampling, recording and microbiology. They are led by expert tutors with an in-depth knowledge and real passion for their subject.

Most of the marine courses are based at FSC Millport and FSC Dale Fort – both are located just metres from the sea and are fully equipped residential centres. Millport is on the Isle of Cumbrae off the coast of Scotland, just an hour from Glasgow. Dale Fort is on the striking Pembrokeshire coastline in south west Wales.

These courses form part of FSC's established and respected natural history programme, which has a huge range of opportunities to learn about all aspects of the natural world at its network of UK centres.

To find out more visit www.field-studies-council.org/habitats or contact Field Studies Council on 01743 852100.

Course	2016 Dates	Centre
Marine Sponge Identification	08 Mar-12 Mar	Dale Fort
Recording Invertebrates of the Strandline	18 Mar-21 Mar	Millport
Marine Biological Sampling	26 Mar-01 Apr	Millport
Identifying Coastal Plants	20 May-23 May	Dale Fort
Marine Plankton	27 May-30 May	Millport
Identifying Marine Species and Habitats: the Biotope Approach	27 May-30 May	Millport
Non-Native Seaweeds	05 Jul-08 Jul	Millport
Introduction to Seaweeds	08 Jul-11 Jul	Millport
Marine Microbiology	18 Jul-22 Jul	Millport
Rocky Shore Invertebrates	20 Jul-23 Jul	Dale Fort
An 'Immersion' into Marine Biology	31 Jul-05 Aug	Millport
Marine Mammal and Bird Survey Techniques	07 Aug-13 Aug	Millport

Participants on an FSC field course

13th MBA Postgraduate Conference

Institute of Marine Sciences, Portsmouth University
16th – 20th May 2016

The *Marine Biological Association Postgraduate Conference* is an annual scientific gathering of postgraduate students undertaking research in marine biology and related fields. The event serves as an invaluable opportunity for early career scientists to present their research to fellow students and marine biologists in a friendly, yet rigorous, environment.

For information on the conference visit http://www.mba.ac.uk/membership-2/mba-postgraduate-workshops/

Durham Coast Bioblitz 2016

Sunday 22nd May 2016

The National Trust are holding a Bioblitz day at Hawthorn Dene on the Durham coast on Sunday 22nd May. They will be surveying various habitats and species including rock pools, fresh water, grassland, woodland, insects, birds, bats, moths, mammals. For further details visit http://www.nationaltrust.org.uk/events/07d4ae68-dca7-4e09-8aed-36eb541ab8a1/pages/details

World Oceans Day: 8th June 2015

The theme for 2015-16 is **Healthy oceans, healthy planet**, focussing particularly on plastic pollution. Visit WorldOceansDay.org for more information and resources. Information on events will be posted from mid-February 2016 onwards.

12th International Polychaete Conference

Amgueddfa Cymru-National Museum Wales, Cardiff, 31st July - 5th August

This international conference promotes all aspects of polychaete research through talks, posters and discussion. Visit www.museumwales.ac.uk/ipc2016 for details and to register. Discounted registration is available for students.

In conjunction with the conference, a new, free exhibition showcasing not just polychaetes but all worms, using fantastic imagery, models and specimens, opens at National Museum Wales in June 2016.

Unknown Wales 2016

A conference to celebrate Welsh wildlife

Amgueddfa Cymru-National Museum Wales, Cardiff, Saturday 8th October

Now in its 6th year, this conference celebrates Welsh wildlife, from the latest breakthroughs in scientific research to habitat management for species. The conference highlights the icons as well as the less well known flora and fauna, showcasing new discoveries and new thinking on nature in Wales, whether on land or in the sea, through a series of short talks.

Further details of the conference will be uploaded as they are available on the Welsh Wildlife Trust's website: http://www.welshwildlife.org

Annual Field Trip Meeting 2016
The Staffa Archipelago – Inner Hebrides
Friday 16th – Tuesday 20th September 2016

The field trip will be located in the magnificent Staffa archipelago to the west of the Isle of Mull, Inner Hebrides. The archipelago includes Staffa, the Treshnish Isles, Little Colonsay, Gometra, Ulva, Eorsa and Inch Kenneth. Many species of conservation importance are found here, including a number of cetacean species and rare and vulnerable invertebrates and a number of seabird species nest along the varied coastline. There are also rare and important habitats such as maërl and seagrass beds, as well as excellent examples of broad-scale habitats representative of the UK seas, such as submerged rocky reefs supporting rich epifaunal communities and sublittoral muds.

Maërl beach on the Ulva islets looking towards Ben Moore, Isle of Mull.

Travel is to the Isle of Mull by ferry on Friday 16th September from where we will be transported to one of 4 islands; Gometra, Inch Kenneth, Little Colonsay and Ulva. Survey activities will be planned for the following 4 days, covering some of the lowest tides of the year, leaving on Tuesday 20th September. Each day we will visit a different shore. Diving is also on offer on three of the days and you have the option of doing a combination of shore and boat dives.

The Isle of Little Colonsay with the Ulva Islets and the Isle of Ulva behind.

Accommodation

Accommodation will be free of charge on the islands of Inch Kenneth, Little Colonsay and Gometra, as will basic meals each day. These islands are very remote and there are no shops, no wifi, limited phone signal and little opportunity to leave the islands during the field meeting. Places are strictly limited to the first 25 applicants. The accommodation on IC and LC will be comfortable with all attendees sharing facilities. Bedrooms will be shared and single sex and all attendees are expected to muck in and help out with daily chores. On Gometra accommodation will be in a bothy, more akin to indoor camping despite having a roof over your head. See http://www.gometra.org/bothy.html for a better idea of what to expect. You will need to bring a sleeping bag for your stay and for Gometra it is recommended that you also bring an airbed or similar to sleep upon.

Optional diving

The Staffa archipelago has some fantastic dive sites, many of which have not been dived before. Seasearch survey dives will be conducted to map maerl, *Zostera* and native oyster beds within the islands, and to collect specimens for our shore based colleagues.

There will be a RIB and a maximum of two dives per day for three days. A maximum of 6 people will dive each day and places will be allocated on a first come, first served basis. Please indicate on the booking form if you are interested in diving.

NB. There is the opportunity to extend your stay on the Staffa archipelago staying on Gometra and or Ulva until the following weekend. To do this you will need to be totally self-sufficient (food, fuel, sleeping bag). You can get a ferry from Ulva to Mull at a cost of £6 per person and it is possible to get a taxi or bus from Ulva ferry port on Mull to Craignure where the Calmac ferry will transport you back to the mainland.

Please email rayner.piper@ahtigroup.co.uk for more information and booking form.

Porcupine Marine Natural History Society

Autumn field meeting

Aberystwyth, mid Wales

Fri 14th – 16th October 2016

An intertidal field meeting will take place on the weekend of 14th-16th October at Aberystwyth, where the University will provide wet lab bench space to support the meeting.

Within easy reach of Aberystwyth town, there are open coast rocky and sediment shores, with dense growths of honeycomb reef, bedrock platform, sandy and muddy habitats. The Rheidol estuary provides accessible estuarine sand and mud flats and it may be possible, to gain access to the marina pontoons.

The spring low water occurs in early afternoon, making for convenient field recording and collecting from Friday afternoon to Sunday afternoon.

Aberystwyth University can offer bench space, as well as seawater, sorting trays, microscopes and some taxonomic keys, should they be required, capably organised by Pippa Moore.

A shortlist of accommodation will be made available to those attending the field meeting.

For further details and booking, please contact Paul Brazier on braz1er@btinternet.com or 01248 600963.

OBITUARY

Dr Bill Ballantine QSO MBE

1937 – 2015

Keith Hiscock

Bill Ballantine's greatest 'claim to fame' amongst budding marine biologists in Britain would have been his biologically defined wave exposure scale for rocky shores, published in 1961. But, worldwide, he became a leading light in the field of marine conservation and especially the scourge of weak-willed and no-can-do bureaucrats.

His early days were spent studying limpets for his PhD which, although based at Queen Mary College, meant that he had to spend significant time at Dale Fort Field Centre in Pembrokeshire and at the Marine Biological Association laboratory in Plymouth. At Dale Fort, he would doubtless have benefited from the knowledge and experience of the then warden, John Barrett, co-author of *Collins Pocket Guide to the Seashore*. He left for New Zealand in 1964 to take-up the post of Director of the Leigh Marine Laboratory north of Auckland where he realised that he and his staff needed marine habitats to study that were as close as possible to natural. It was in 1965 that the proposal for a marine reserve at Leigh was first published and it was established in 1977. In the Leigh reserve and in others established subsequently in New Zealand, the ecology did change. Although often taking a long time, those changes could be spectacular. At Leigh, what had been urchin barrens became (once the previously exploited snappers and lobsters had re-established their dominant role) rich kelp forest habitats. The benefits for the local economy were also obvious.

Bill returned to Britain occasionally to continue his studies of limpets and, in recent years, to encourage relevant activists to get on with establishing no-take reserves. His knowledge and experience, his appreciation of different viewpoints and his straight talking were influential, consequently his legacy is worldwide.

Bill Ballantine died on 1st November 2015.

Magic moments: capturing marine animal behaviour with underwater photography

Paul Naylor

e-mail: paul@marinephoto.co.uk

Introduction

SCUBA diving and snorkeling allow us wonderful opportunities to glimpse the undersea world. Habitats can be observed with minimal disturbance so the presence and abundance of many organisms can be determined without using more disruptive sampling methods such as trawling and grabs. For me, the biggest appeal of being underwater is being able to watch animals going about their lives. While snorkeling on the Norfolk coast as a teenager, it was the fascinating sight of shore crabs scurrying across the seabed, seeking and devouring prey, battling each other and mating that drew me into marine biology. Observing and capturing animal behaviour through underwater photography is now the main reason I dive. The behaviour that I am very keen to record tends to fall into three categories:

Fig. 1: Female shore crab emerging from her old exoskeleton while guarded by male.

1) Common but difficult to capture aspects of behaviour

Perhaps the best example of common but rarely seen or photographed behaviour in the natural

Fig. 2: Commensal ragworm appearing to grab food from its hermit crab host's mouthparts.

Fig. 3: Sequence of photographs showing a cuttlefish changing colour and skin texture before extending its tentacles to grasp a goby (fourth photograph).

environment is crab ecdysis or moulting. A common shore crab, *Carcinus maenas*, will typically shed its exoskeleton around 18 times during its life (Crothers 1967) so, given their abundance, it is a very frequent event! Because of the newly moulted crab's vulnerability, ecdysis normally occurs well removed from prying eyes and I have only seen it once in the wild in over 40 years of observation. This was when a female *C. maenas*, (females are only receptive for mating immediately after a moult), was just starting the process while guarded by a male. I was able to capture a sequence of photographs over 75 minutes showing her emerging from the old exoskeleton and the subsequent mating. A key moment is shown in Figure 1. Further photographs from the sequence can be seen at: http://www.marinephoto.co.uk/pages/behaviour-observations/crab-moulting.php where there are also further sets of photographs showing marine animal behaviour.

Another example of well-known behaviour is the feeding of the commensal ragworm, *Neanthes fucata*, with hermit crabs; a relationship even illustrated in a wonderful children's book (Donaldson 2005). *Neanthes fucata* occurs frequently with *P. bernhardus* (less so with other, smaller species) in the Plymouth area (Gilpin-Brown 1969) but, despite watching the feeding activities of many hermit crabs around Devon, I have only seen a worm emerge on two occasions, both in Torbay. Figure 2 shows a commensal worm darting among its host's mouthparts, photographed at Brixham.

2) Recorded but less well known behaviour

Other aspects of behaviour, which I tend to regard as being in a second category, are those that are described in the scientific literature but are less generally well known. An example is the use by cuttlefish of colour and texture changes to divert the attention of prey animals from their approaching tentacles as reviewed by Hanlon & Messenger (1996). It is wonderful to see and graphically demonstrates how these intriguing animals use control of patterning for so much more than simple camouflage against their background. A group of cuttlefish, *Sepia officinalis* that I encountered at Porthkerris in Cornwall seemed to largely ignore the approach of divers and continued to hunt while using a variety of colour changes just before reaching out to grasp two-spotted gobies, *Gobiusculus flavescens* (see Figure 3).

Molluscs regarded as much less sophisticated than the cuttlefish can also be full of surprises. While diving over the intertidal zone at high water, I regularly see interactions between pairs of limpets, *Patella* spp.. One pushes the other with its shell or even moves its shell upwards as if attempting to lever up the rim

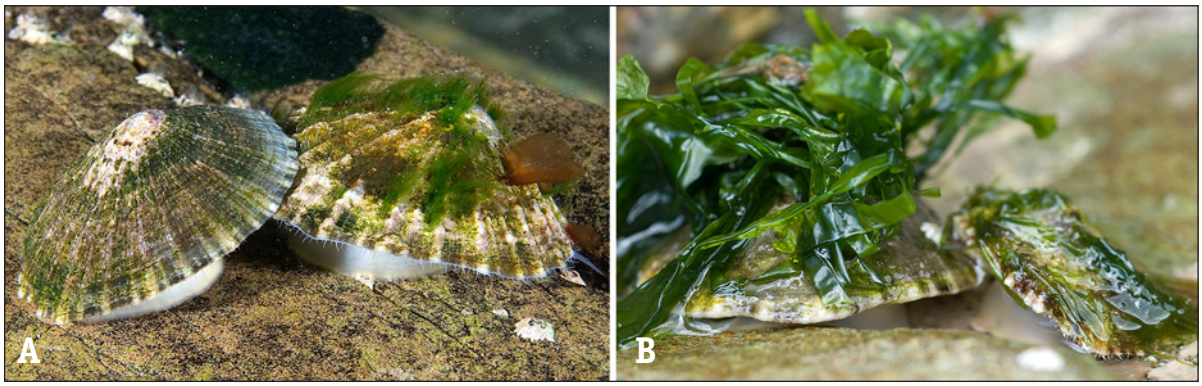


Fig. 4: Aggression between limpets at high water (A) and while exposed at low water (B).

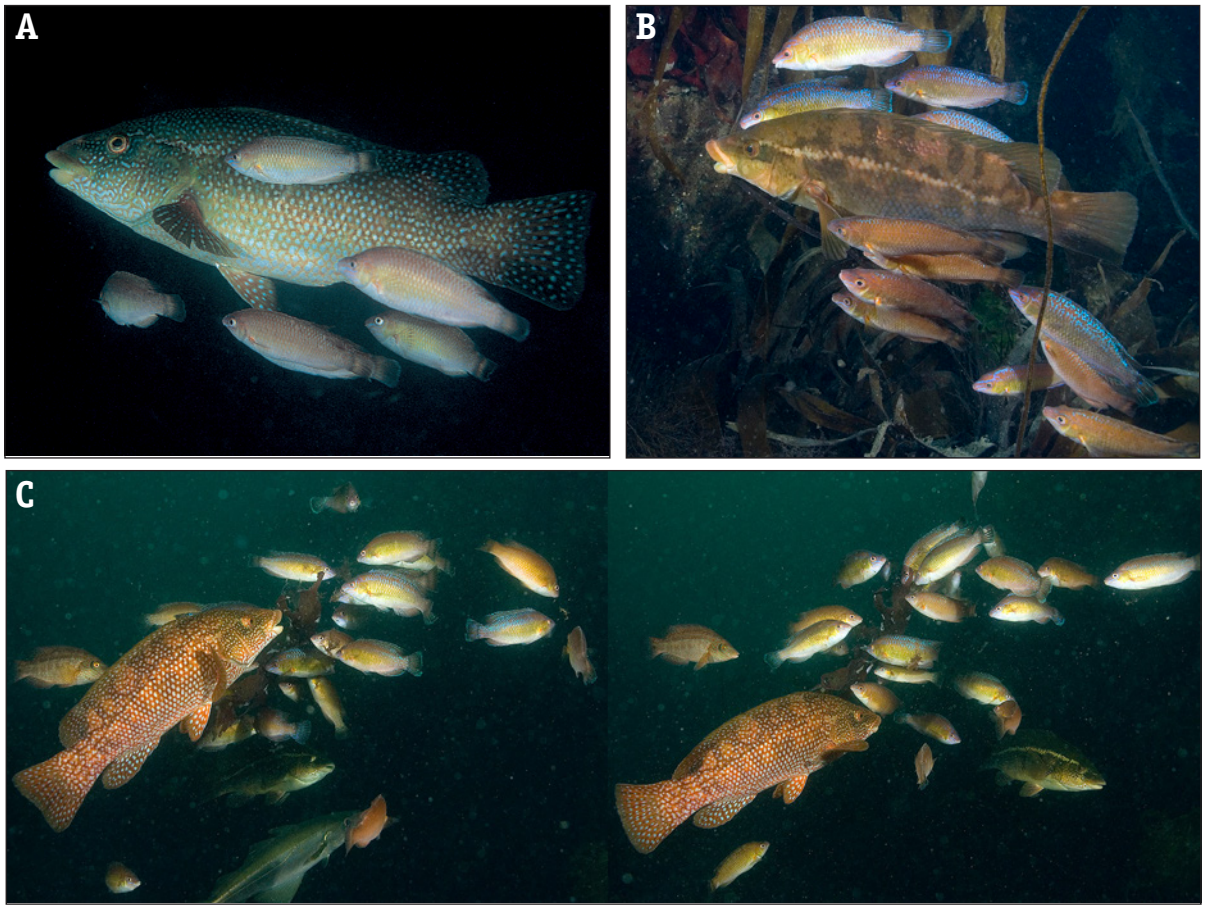


Fig. 5: Interactions between rock cooks and ballan wrasse. A: cleaning. B: following. C: two photographs showing the ballan wrasse releasing a piece of kelp, then swimming away

of its rival's shell away from the rock surface (Figure 4a). The most surprising encounter I have seen was on an exposed rock at low tide; there was only a very thin film of water but the risk of desiccation did not appear to inhibit the dueling duo (Figure 4b). Aggression between limpets is reviewed by Branch (1981) as resulting from competition over food or defence of a home scar. Nevertheless, it astonishes many people, even some marine enthusiasts, that these unassuming grazers have a battling side.

3) Previously unrecorded behaviour

Further aspects of behaviour appear not to be recorded in the scientific or natural history literature and a few examples are given here:

Co-operative feeding among wrasse.

The 'cleaning' (parasite removal) of larger fish by smaller wrasse species in UK waters is well known (Potts 1973) and several small wrasse species have been proposed and used as cleaners of farmed salmon (Bjordal 1991, Skiftesvik *et al.* 2014). The only cleaning I have seen and the only type observed in the wild by Potts (1973) is of ballan wrasse (*Labrus bergylta*) by rock cooks (*Centrolabrus exoletus*), as shown in Figure 5a. Intriguingly, there also appears to be further unrecorded cooperation between these two species. Groups of rock cooks can be observed following large ballan wrasse (Figure 5b) and appear to benefit from them disturbing the seabed in their quest for food. More remarkably, this is often accompanied by a ballan wrasse picking up a piece of alga (such as kelp) in its mouth, swimming up 1 to 2 metres above the seabed and releasing the kelp. The rock cooks then rapidly converge on the slowly sinking piece of kelp and appear to feed on material (presumably small animals) disturbed during this process (Figure 5c). The ballan wrasse does not seem to participate in this feeding activity and swims away. Is this apparent co-operation linked to the cleaning service provided by the rock cooks? I have seen behaviour like this at Wembury (Devon) and Porthkerris (Cornwall) but usually only at

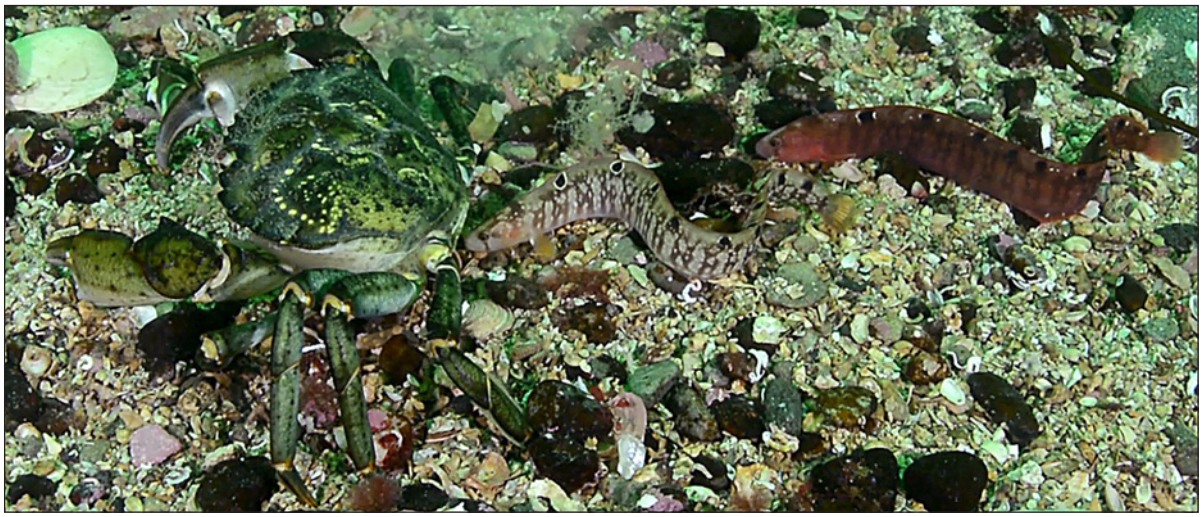


Fig. 6: Two butterfish following a shore crab (still from video).

a distance very near the limit of visibility, so it is difficult to photograph. The photographs shown here were from a rare instance at Porthkerris when it occurred close enough for me to capture.

Crab following by butterfish

The hunting activities of butterfish (*Pholis gunnellus*) are a captivating sight as they move, snake-like, across the seabed and inspect every small recess for potential prey. My attention was first drawn to an extra aspect of their behaviour by seeing a butterfish approaching a velvet swimming crab (*Necora puber*) that was eating a flame shell (*Limaria hians*). Since then, I have observed butterfish homing in on and then following shore crabs (*Carcinus maenas*) and velvet swimming crabs as they walked across the seabed. The butterfish stayed very close, darting underneath the crabs' bodies and appearing to look for any animals disturbed from the seabed by the crabs' legs or their digging activities. On several occasions, the leg of a crab struck a butterfish but the interloper did not appear to be distracted from its quest. There is little detailed information available on the diet of *P. gunnellus* but general agreement that they consume small crustaceans, worms and molluscs (e.g. Vallis 2004, Maitland & Herdson 2009). References of their importance as food for larger predators such as guillemots (Ewins 1990) and otters (Watt 1995) are easier to find. Foraging associations, including the following of one fish species by another, is widespread in coral reef ecosystems (Lukoschek & McCormick 2000), with seabed disturbance an important factor. Sazima *et al* (2007), Sampaio *et al* (2008) and Pereira *et al* (2011) report examples where fish follow invertebrates such as hermit crabs and octopus, although this is much less common.

Fig. 7: Three sand stars spawning, each with a different sized protuberance or 'bump'.

Fig. 8: A small hermit crab 'riding' on a whelk.

Spawning in the sand star Astropecten irregularis

I have regularly seen release of spawn by *Asterias rubens, Marthasterias glacialis* and, less often, by *Crossaster papposus*. Individuals raise themselves up on the tips of their arms, often in an elevated position such as the top of a rock or large kelp frond and release a cloud or wisps of milky material (distinct individual larger orange eggs in the case of female *C. papposus*). On only one occasion, I observed spawning in *Astropecten irregularis*. This was in shallow water (approximately 10m) in Loch Kishorn in July 2008. Several sand stars were standing up on their arms and releasing material. In itself this was not unexpected but it was remarkable to see the large protuberances or 'bumps' from which the spawn appeared to be emerging and the apparently emaciated condition of some of the spawning starfish. Moreover, there seemed to be a correlation between the extent of poor condition and the size of the 'bump'. Individuals with small 'bumps' appeared healthy and plump while those with the largest 'bumps' were noticeably emaciated with distal parts of their arms missing. Spawning by *A. irregularis* in the summer is noted by Grant and Tyler (1986) and Freeman *et al.* (2001) but there is no mention of spawning protuberances. Indeed, the former authors describe the gonads in ripe animals of both sexes as 'rather small'. It cannot be confirmed, based solely on underwater observation, that the protuberances were related to spawn production but this is certainly how it appeared. Further observations on the appearance of this species spawning in nature would therefore be very interesting.

Some underwater observations are highly speculative. An example is where small hermit crabs (*Pagurus bernhardus*) can be seen 'riding' on top of the shells of large whelks (*Buccinum undatum*) as they glide across the seabed.

Small hermit crabs often occupy elevated positions, such as the tops of rocks, seaweed or clusters of serpulid worm tubes so this may well be coincidental. However, given that whelks can detect carrion by olfaction from considerable distances (Fish & Fish 2011), this would be an excellent way for a hermit crab to 'hitch a lift' to its next meal!

Conclusions

Underwater observations yield fascinating insights into the behaviour of marine animals. Capturing them photographically is valuable because the results can then be shared with a wider audience. I find 'life stories' are the best way of engaging people with marine life and are an excellent way of demonstrating the fascination and complexity of the marine habitats 'on our doorstep' and, following on from this, the importance of caring for them. Where the animals' activities are bizarre or surprising, the impact of these stories is particularly strong.

In addition, chance observations and photographs of unrecorded behaviour provide prompts for further study and analysis. I hope that the 'morsels' presented here may stimulate further attention on these amazing animals.

Meanwhile, the behaviour of territorial species, such as the tompot blenny, *Parablennius gattorugine*, can lend itself to more systematic study and I am currently compiling information for publication.

Acknowledgements

I am most grateful to Teresa Naylor for all her support, especially for being equally entranced by animal behaviour and therefore an extremely patient dive buddy.

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Jumping in with both feet.... A novice's view of a week of seasearching

Penny Martin

In March 2015 I had an e-mail inviting me to a Seasearch week diving in Scapa Flow in October.

As an enthusiastic but novice diver and keen to learn more about marine wildlife, I responded positively. I paid a deposit and forgot all about it until an e-mail came from Georgia Conolly, Seasearch co-ordinator for Scotland with details of when and where to meet and a reminder to pay the balance. I had done Seasearch Observer and Surveyor courses but not really had the confidence in my marine identification to complete forms.

Armed with a cake, my dive kit and a second hand compact camera and housing, I joined our dive boat, the Halton on the Saturday evening. I quickly realised that I was among very knowledgeable company, some familiar with Scapa Flow, others diving here for the first time.

Filling in the initial course forms, I noted that my tally of just under 100 dives was very small compared with the thousands done by the others and my basic knowledge of marine identification was at odds with their expertise. Several were professional marine biologists or professors, others had written marine identification books or ran identification web sites. I was an enthusiastic novice.

By this time, I was more than a little nervous about whether I would fit in or contribute anything to the week although everyone was very friendly. That evening, after saying hello, I sat quietly absorbing the atmosphere and listening to ideas and plans for the week and hearing about cameras and strobes.

Up and off early the next morning, we headed for the first dive site, a double pinnacle of rock at 30 m off the west coast of Hoy. Its exposed location meant it could only be dived in calm weather. Jo Porter's briefing outlined details of the site and particular areas which needed surveying and informal discussions around who might do what.

Paired up with buddies, we donned and checked our kit then jumped into the water. A fabulous dive followed.... 20 m + visibility and lots of gullies and walls to explore, cracks and crevices held a great variety of life: crabs, squat lobsters, squirts, anemones, starfish, urchins, hydroids, bryozoans, nudibranchs and a wall covered in jewel anemones.

Back on the boat, with tea, coffee and cake, we compared and discussed photos, and started completing surveyor forms. I felt very much part of the group with my tentative contributions and questions welcomed. Jim Anderson started a nudibranch list for the week. I was familiar with his Scottish Nudibranch web site and was thrilled to meet him and learn from his amazing enthusiasm and knowledge of nudibranchs. Photographs were examined and friendly discussions around details of identification of various marine organisms taught me so much.

The next dive was on the *Tabarka*, a block ship sunk in 1944 in the strong currents of Burra Sound. The strong tidal flow nourishes the marine life that is on every surface in and outside the wreck. The cargo holds are pierced with holes that let the current and light flow through. A thick turf of anemones, hydroids and squirts covered the wreck; many fishes swam round us; a large conger peeped from a dark hole; lobsters lurked in the shadows under the boat. George and Jim pointed out nudibranchs that I would have missed.

More discussions followed when back on deck. The nudibranch count was increased, more photos examined and discussed. The enthusiasm and sharing of knowledge was stimulating and I learnt how much my novice eyes had missed. We talked about UK Priority habitats and learnt that the plan for the week was to survey some of the different habitats in Scapa Flow namely horse mussel, flame shell (*Limaria*) beds and maerl.

The next day, we looked unsuccessfully for reported horse mussel beds and started surveying a large maerl bed near the Hurdles, an anti submarine barrier. The whole site was teeming with life, the broken down steel structure was covered in red encrusting algae, mussels, giant barnacles, anemones and hydroids that provided cover for much marine life.

Out to either side stretched pink "waves" of maerl, I saw reticulated dragonets for the first time, several species of nudibranchs, many molluscs, crabs of all shapes and sizes and various species of echinoderms. The dive plan was for two teams to swim in opposite directions and surface at the end of the maerl but neither team found where it ended.

We dived the maerl bed again the following day and still did not find its full extent. But we made slow progress as maerl is beautiful and fascinating, full of marine life and so obviously fragile. I recognised so much more from the previous day's discussions, photos and form filling.

Next we dived a steam pinnace wreck which was surrounded by flame shell nests, again a new species for me. The "mattress" created by the flame shells out of algae, shells, pebbles and other debris held together by byssus provided habitat for many different marine species. We found a few flame shells out on the surface and marvelled at the vibrant orange tentacles and their "jet propelled" movements.

Back on the boat, I became engrossed in putting my improving identification skills to work in completing the Surveyor forms.

The second dive was on a "Mystery Block" that had recently been discovered near to the Lyness ferry port, again there were lots of flame shell nests in the area along with crabs, scallops, bootlace worms, echinoderms and molluscs.

The next day was wild and windy and the boat tied up safely in port. I decided not to dive with the hardy divers who braved a shore dive at Tingwall on maerl and eel grass and we retired to the local cafe to chat about Seasearch, marine life and diving, fortified by good coffee and cake. I asked questions about how Seasearch information would be used and tentatively described some possible low key projects that we might do locally in 2016 to find out if these ideas were at all useful and enquired how snorkelling fitted in with Seasearch. My interest and confidence were growing now that I knew that even a novice like me could contribute so much.

We started planning a survey of the "Mystery Block" and the extent of the flame shell beds around it. A discussion about techniques of measuring and observations ensued with various opinions and much drawing on paper napkins. This was my first experience of specific underwater survey work and I realised that all members of the survey team needed to be clear on the big picture and their roles because communication is much more challenging underwater.

Carrying 40m tape measures, waterproof slates and compasses, we entered the water next day and George duly marked "Corner one". The teams split up in all directions to complete their individual tasks and measurements without getting in each other's way. I enthusiastically swam off in the wrong direction and Jim had a hard job correcting me with sign language. I hadn't learnt those hand signals in my PADI training! After completing measurements of the block, we took a bearing from the "our corner" and we swam out 40 m with the tape measure and marked abundance of flame shell nests at intervals on the way back.

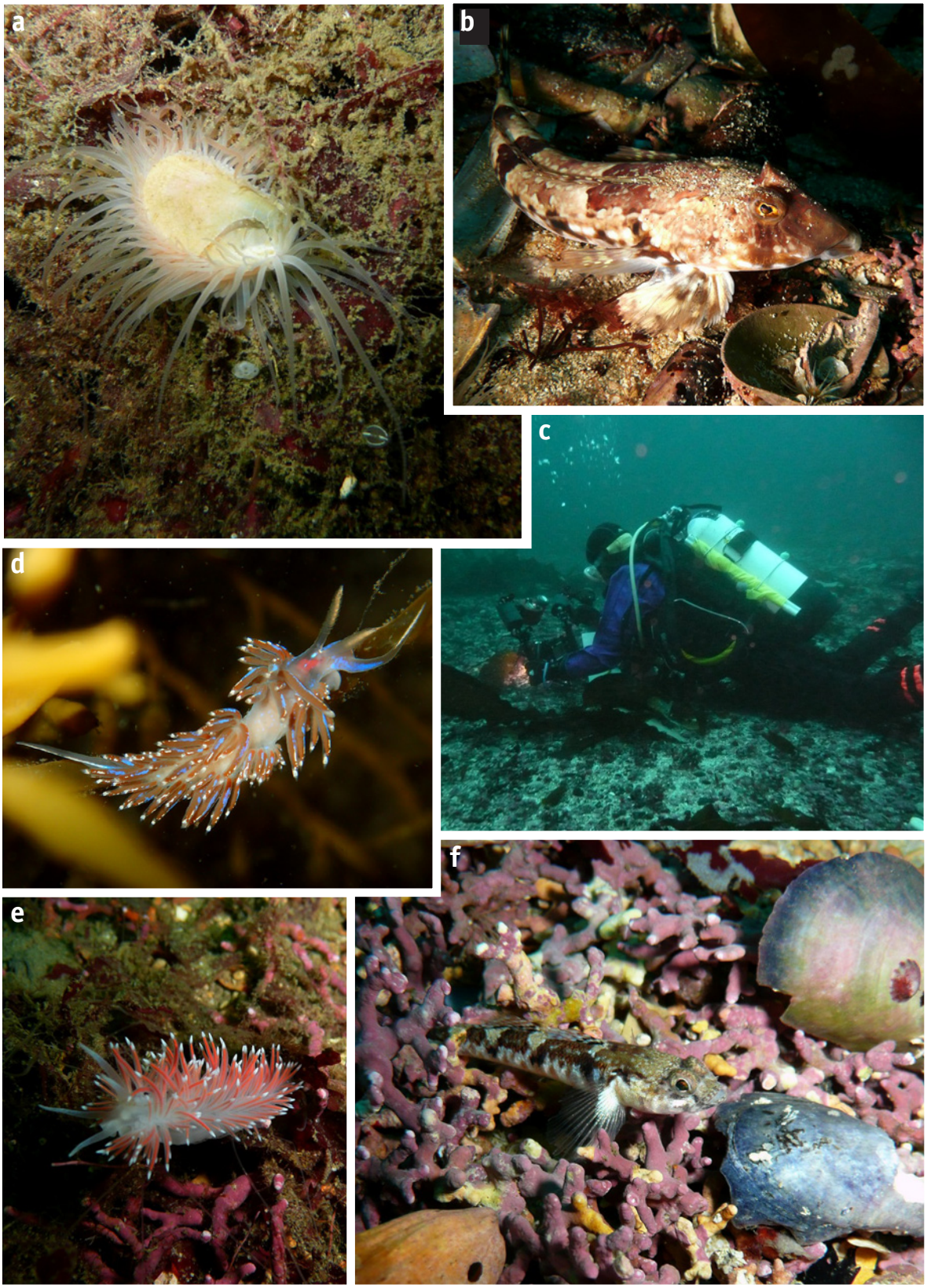
Back on board, the information was combined to produce a detailed plan of the block and seabed around. We had some laughs about the challenges of communicating a plan underwater and I began to realise the skills of underwater surveying and teamwork. Some folk had much experience at survey work and I felt privileged to learn from them and experience a survey. I will certainly be better when I do it again.

The final dive was on another reported horse mussel bed. Again we found few mussels but searched for feather star shrimps, and observed flame shell nests, nudibranchs, crustaceans, echinoderms, hydroids, bryozoans and fish.

What a great week. Seasearch added much to some very enjoyable diving experiences.

My identification skills and diving felt so much improved and I very much enjoyed the experience of diving with a purpose. Even my basic photography skills had improved. I realised that even a novice can contribute and learn with each survey form completed and it has given me a much better appreciation of UK waters. I recommend any diver to join a Seasearch survey trip.

Come on in ... the water's lovely!



a. Flame shell, Limaria *sp.*

b. Reticulated dragonet

c. Diver with camera

d. Nudibranch, Facelina auricula

e. Nudibranch on maerl

f. Goby on maerl

Capturing Our Coast: Taking marine citizen science to the next level

Dr Jacqui Pocklington

National Coordinator, University of Newcastle

Training day at Church Island, Menai Straits

Following the success of the north-east based Big Sea Survey that ran from 2010-2013, Capturing Our Coast has secured Heritage Lottery Funding to log flora and fauna across England, Wales and the south-west of Scotland.

The project will train over 3,000 volunteers – making it the largest experimental marine citizen science project ever undertaken in the UK. The volunteers will collect data around key species and help fill gaps in distribution records, as well as informing future policy and conservation strategies.

The project is led by Newcastle University's Dove Marine Laboratory and involves the universities of Hull, Portsmouth, Bangor and the Scottish Association for Marine Science. It also involves a number of organisations including the Marine Biological Association in Plymouth, the Marine Conservation Society, Earthwatch Institute, the Natural History Museum, Northumberland Wildlife Trust, Cefas, Durham Heritage Coast, Thanet Coast and the North West Coastal Forum.

Volunteers will undertake training provided by marine experts and be given ongoing support to keep their skills and the data they collect to a high quality. Rather than choosing from a large list of species, a priority list has been created and several packs with mixtures of these species can be adopted so that data is collected consistently. The priority list includes species that could be expanding their range northward due to warming waters, invasive species that may be expanding their range, as well as common grazers, bioindicators and habitat formers. Each site will have quantitative data collected at both the low and mid shore zones giving us the power to directly compare shores across much of the UK.

In addition to recording species data, volunteers will have the opportunity to assist with experiments being undertaken by each of the 7 hubs (Newcastle, Hull, Portsmouth, MBA, MCS, Bangor, SAMS) which seek to answer a range of questions about species interactions and impacts on the marine environment across latitudes and environmental conditions.

Capturing our Coast will also be available to those who can't get out to the shore, with the establishment of web-based citizen science options such as those found on Zooniverse.

Volunteer recruitment launched in January (2016) and is currently open for volunteers wanting to take part.

For more information please see our website www.capturingourcoast.co.uk
Twitter @CapturingRCoast

Not just a drop in the ocean! Seasearch and the role of local coordinators

Paula Lightfoot

Seasearch Coordinator for northeast England

I was invited to speak at the 15th annual National Biodiversity Network (NBN) conference which was held in York on the 19th-20th November 2015 on the theme "From global to local – building the NBN partnership". The NBN is a network of organisations involved in collecting, managing, sharing and using biodiversity data. Formed in 2000, the NBN facilitates collaboration to increase the accessibility and use of high quality biodiversity data for education, research and environmental decision-making. I first heard of the NBN when I attended a Seasearch course in 2007. I went on to work for the NBN Trust as Data Access Officer from 2010 to 2014, and to coordinate Seasearch activities in northeast England, so I was delighted to have this opportunity to talk about Seasearch to an audience of nearly 180 delegates from across the NBN. This article is based on my presentation.

As many Porcupines know, Seasearch is a national project that trains SCUBA divers to record marine species and habitats, providing a cost-effective source of verified data to inform the conservation and management of the marine environment. It was set up nearly 30 years ago (yes, anniversary celebrations are being planned!) by the Marine Conservation Society and the Nature Conservancy Council, an early example of successful collaboration between a wildlife NGO and a government agency to enable volunteers to collect structured, policy-relevant data.

A key focus in recent years has been the provision of data to support the establishment and monitoring of the UK's emerging network of Marine Protected Areas (MPAs). The Seasearch dataset formed part of the evidence base used to inform initial recommendations for the location, boundaries and conservation objectives of potential sites. Seasearch then went on to fill data gaps by targeting survey effort towards areas being considered for designation and

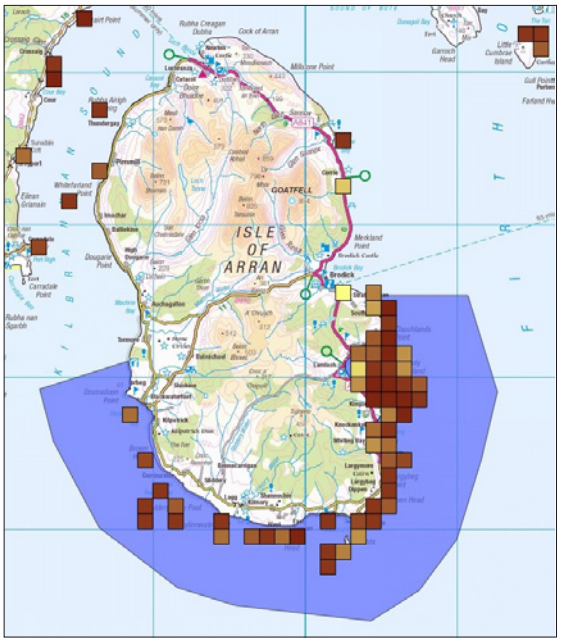


Figure 1: South Arran MPA boundary and Seasearch records aggregated to show species richness at 1km. Data sourced from the NBN Gateway Interactive Map accessed December 2015 © Crown copyright and database rights 2011 Ordnance Survey [100017955]

interpreting the data to produce detailed survey reports for individual sites.

Seasearch also empowers local people to secure protection for marine sites that are important to their community. From 2003, the Community of Arran Seabed Trust (COAST) carried out Seasearch dives throughout Lamlash Bay, Isle of Arran, to gather evidence to support their campaign for protection, resulting in the site being designated a No Take Zone in 2008 – the first of its kind in Scotland. They then conducted Seasearch surveys around the entire south coast of Arran to support their third-party proposal for a Nature Conservation MPA. Again, they were successful and the South Arran MPA was designated in July 2014 – figure 1 shows the MPA boundary and the Seasearch records that contributed to its designation.

Seasearch in the NBN

The primary mechanism for sharing data across the NBN is the NBN Gateway website (https://data.nbn.org.uk/). With a dataset of just under half a million records, Seasearch is the third largest provider of marine species data to the NBN Gateway, after the Joint Nature Conservation Committee and the

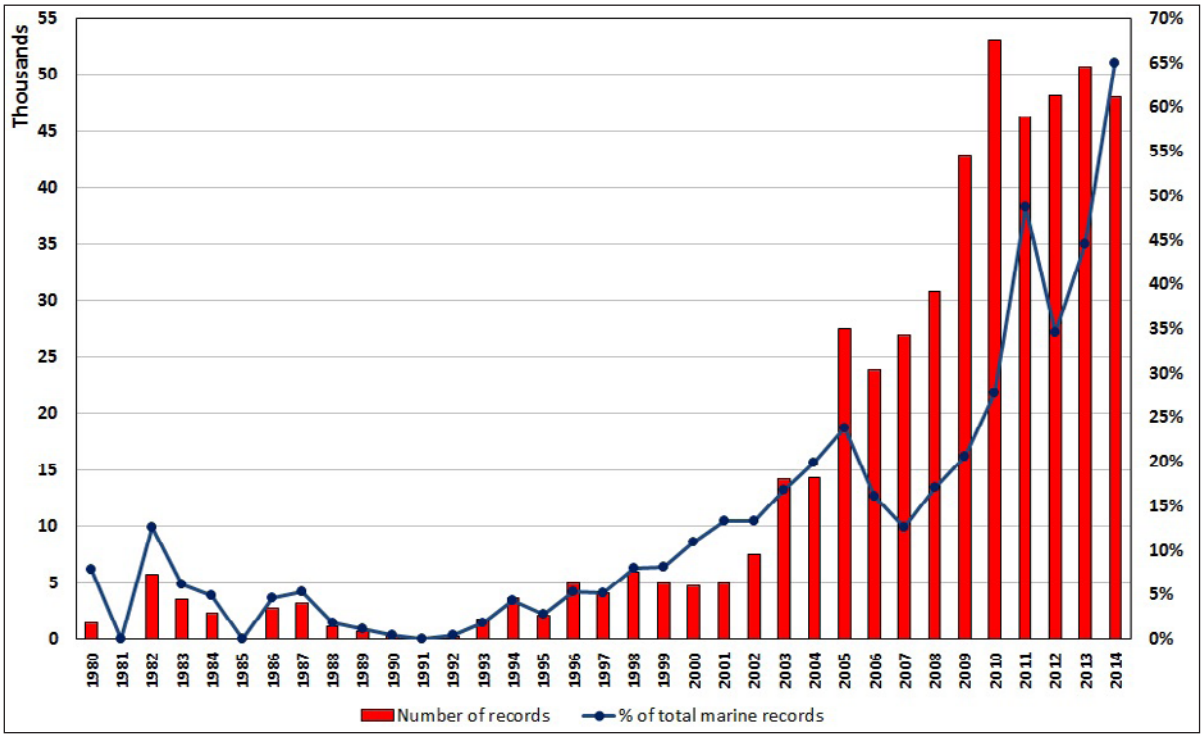


Figure 2: Taxon occurrence records shared by Seasearch via the NBN Gateway, showing the number of records and the proportion of total marine taxon records available via the NBN Gateway

Marine Biological Association. Thanks to their efficiency at mobilising data, Seasearch makes a particularly large contribution to NBN data holdings for recent years (Figure 2). Seasearch provides over 40% of the marine species records for 2010 onwards, a period in which there has been great demand for data to inform the MPA process.

Seasearch can be a particularly important source of data on species which otherwise have few records on the NBN Gateway, either because they are rare, new arrivals, on the edge of their range or just under-recorded. A few examples are shown in Table 1 – you can search the NBN Gateway to find more!

In addition to species data, Seasearch has collected over 20,000 habitat records classified according to the Marine Habitat Classification for Britain and Ireland (http://jncc.defra.gov.uk/marinehabitatclassification) and just under 40,000 records classified using a standard list of simple habitat types such as 'kelp park' and 'brittlestar bed' (Figures 4 & 5).

These habitat records are publicly available via the Marine Recorder 'snapshot' database which can be downloaded from the JNCC website (http://jncc.defra.gov.uk/page-1599). The NBN Gateway does not provide the functionality to share Seasearch habitat records, but new NBN data access websites are in development which should enable these habitat data to be shared, viewed and analysed in conjunction with other species, habitat and environmental layers. The ability to view Seasearch data against a backdrop of bathymetry and backscatter data from acoustic surveys would be particularly welcomed by Seasearchers as a dive planning aid! A pilot website, the Atlas of Living Scotland (www.als.

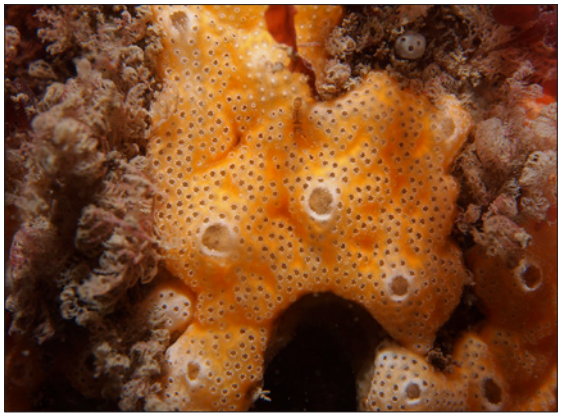


Fig. 3: The colonial ascidian Polysyncraton bilobatum *at St Ann's Head, North Pembrokeshire – every record of this species on the NBN Gateway has been provided by Seasearch divers. (Photo: David Kipling)*

Species	No. of records on the NBN Gateway	No. of Seasearch records on the NBN Gateway	Seasearch records as % of total records
Polysyncraton bilobatum (a colonial ascidian)	32	32	100%
Parablennius ruber (Red blenny)	79	78	99%
Periclimenes sagitiffer (Anemone prawn)	40	38	95%
Amphianthus dorhnii (Pink sea-fan anemone)	165	154	93%
Tripterygion delaisi (Black-face blenny)	174	157	90%
Caryophyllia inornata (Southern cup coral)	191	158	83%
Pycnoclavella stolonialis (Pin-head sea squirt)	108	81	75%
Zeus faber (John Dory)	195	146	75%
Trapania maculata (dorid nudibranch)	14	10	71%
Guancha lacunosa (Stalked sponge)	239	116	49%
Laminaria ochroleuca (Golden kelp)	477	223	47%
Balistes capriscus (Grey trigger fish)	107	45	42%

Table 1: Examples of species for which Seasearch provides a large proportion of the records on the NBN Gateway

scot) is already live, and likely to be followed in due course by Atlases for the rest of the UK. Seasearch Scotland data will be shared via the Atlas of Living Scotland in 2016.

Data Access

Although the NBN Gateway enables organisations to restrict access to their data, Seasearch records are fully publicly available in accordance with the wishes of the Seasearch Steering Group and the volunteers themselves. In a survey of Seasearch recorders conducted in 2013 (n=202), 51% said they felt it would be a waste of time filling in Seasearch forms if the records were not made fully publicly available, and 90% said that all organisations who make decisions about the marine environment should have full and free access to Seasearch data.

Seasearch data will be shared under a Creative Commons Attribution (CC-BY) license in future as part of the NBN's transition to data licensing, meaning that the data can be used for all purposes provided that Seasearch is credited.

Through the NBN, Seasearch datasets are also made available via the Ocean Biogeographic Information system (OBIS) and the Global Biodiversity Information Facility (GBIF), increasing their accessibility to the international research community. The GBIF Science Review shows that data accessed via GBIF have been used for research into topics including invasive species, climate change, biodiversity conservation and ecosystem services, and that the number of peer-reviewed papers using GBIF-mediated data increases every year, with 350 papers published in 2014 (http://www.gbif.org/2014-science-review).

Data Quality

Data users sometimes express concerns about the quality of 'citizen science' records, but Seasearch data are carefully quality controlled.

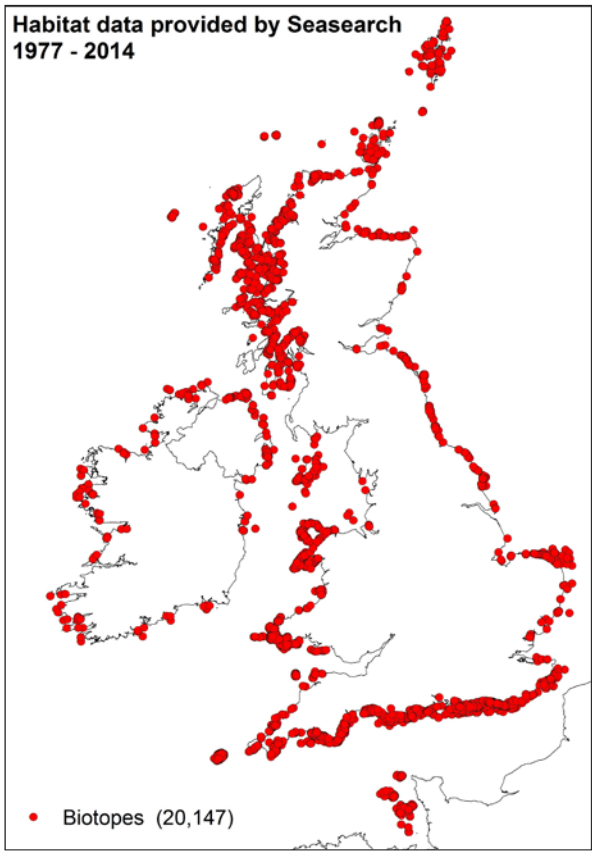


Fig. 4: Seasearch habitat data classified using the Marine Habitat Classification for Britain and Ireland

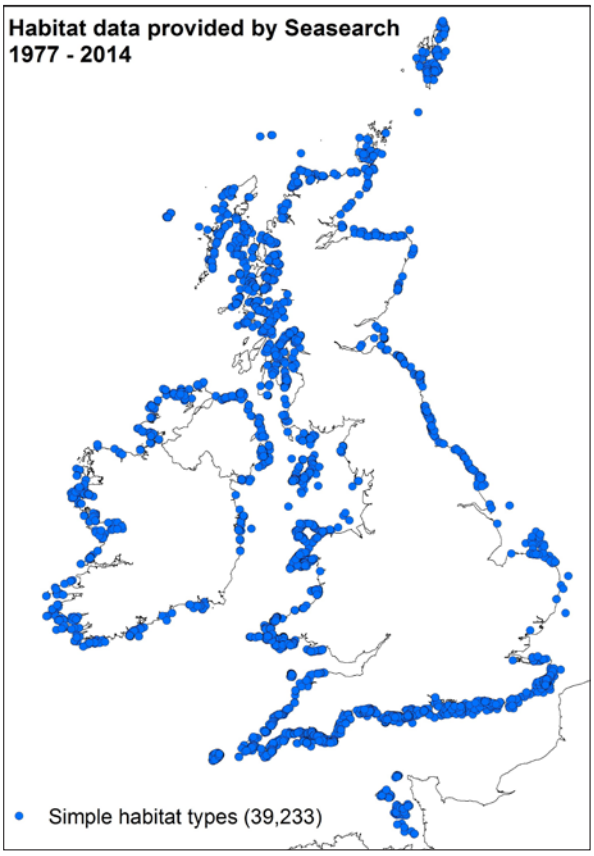


Fig. 5: Seasearch habitat records classified using a standard list of simple habitat types.

Seasearch offers a progressive training programme which teaches participants the skills they need to complete Seasearch forms, and includes an assessment of these skills in order to achieve certification and contribute to the project.

The training programme is backed up with a highly regarded series of photographic identification guides aimed at ensuring a reliable level of identification skills, including awareness of species that cannot be identified to species level *in situ*, and of similar-looking species that can be confused. Guides to Marine Life, Bryozoans and Hydroids, Anemones and Seaweeds are already available and a guide to Sponges and Sea squirts is in preparation.

Seasearch also receives considerable support from experts in marine taxonomy, who provide assistance with verification queries and run specialist training courses, as well as participating in the project and contributing data. Increasing use of digital photography and social media has brought huge benefits in developing identification skills and improving data quality, establishing a friendly online community in which skills and knowledge are shared. Most importantly, all records are validated and verified at the point of data entry, and if there is any doubt over a species' identity, it is recorded at a higher taxonomic level.

Seasearch Coordination Network

All of this is made possible by Seasearch's coordination network, consisting of a national coordinator and 19 local coordinators, covering the entire coastline of the UK, the Republic of Ireland, the Isle of Man and the Channel Islands. It was set up between 2003-2005 with initial funding from the Heritage Lottery Fund and maintained with support from the Marine Conservation Society, the Wildlife Trusts, the UK's statutory nature conservation bodies and the Irish Underwater Council.

Local coordinators run training courses, organise survey dives, validate, verify and digitise data, write reports, engage and support volunteers, and raise awareness of marine biodiversity and conservation issues

Figure 6: Seasearch divers heading off to take part in a National Trust bioblitz

amongst divers and the wider local community. They also source funding locally to support the project. For example, Seasearch participated in several of the National Trust's Coastal Bioblitzes in 2015 to celebrate the 50th anniversary of the Neptune Coastline Campaign, and in return the National Trust provided funding to subsidise boat costs (Figure 6).

The achievements of some local coordinators are extraordinary. The east coast of England has been less well studied and recorded than the UK's south and west coasts, but the Seasearch coordinators in East Anglia have made some amazing discoveries there. Thanks to their efforts, we know that the Norfolk coast possesses a 20 mile long chalk reef which is possibly the longest in Europe, a species of *Hymedesmia* sponge new to science, and a 10,000 year old fossil forest (Figure 7). These discoveries generated media interest and raised awareness amongst the local community of the diversity and conservation value of marine habitats and wildlife in their area. The Cromer Shoal Chalk Beds are proposed for designation as a Marine Conservation Zone in 2016, and a local councillor joined the Seasearch team for a dive in November 2015 to see this important site for herself (Figure 8).

Maintaining the coordination network costs around £120,000 per year, but this network is crucial to the success of the project. As figure 2 shows, the establishment of the coordination network led to an immediate substantial increase in the volume of data generated. Furthermore, 21% of the Seasearch

Figure 7: Seasearch East coordinator Dawn Watson exploring the Ice Age forest she discovered in 2014 (Photo: Rob Spray)

forms received since 2010 were filled in by the coordinators themselves, providing 26% of the species records made during those years.

Most Seasearch data – around 80% on average, but up to 100% in some areas – is generated on dives organised and led by the local coordinators. There are considerable benefits of coordinator-led Seasearch dives in terms of volunteer motivation and education, but one of the aims of Seasearch was to train recreational divers so that they could also collect data on independent and club dives.

Figure 8: Norfolk councillor and member of the Eastern IFCA, Hilary Cox, joining Seasearch East coordinators to dive on the chalk reef (Photo: Rob Spray)

This would increase the project's coverage and is the reason Seasearch adopts the motto "any dive can be a Seasearch dive". A current challenge for the coordination network is to motivate and support divers to fill in Seasearch forms after independent dives as well as after coordinator-led dives. Using the NBN Gateway and Atlases to highlight gaps in the data could play a role in this.

Building the Partnership

Following a consultation involving over 500 individuals for nearly two years, a new NBN Strategy and Action Plan were produced for 2015-2020. These comprise five strategic aims and over a hundred collaborative actions to achieve the NBN vision: "Biological data collected and shared openly by the Network are central to the UK's learning and understanding of its biodiversity and are critical to all decision-making about nature and the environment."

Seasearch participated in this consultation and is committed to supporting delivery of the strategic action plan. Many areas of the NBN Strategy are highly relevant to Seasearch, but I selected two examples to demonstrate how Seasearch might contribute.

Seasearch divers currently fill in paper forms which are typed into Marine Recorder at the end of each year by the coordinators or other data entry staff. However, online versions of the Seasearch forms have now been developed using the open source toolkit Indicia (*www.indicia.org.uk*) which will enable records, including photographs of species and habitats, to be entered directly into the system by the recorders themselves. This has the potential to improve the recording experience for volunteers, increase verification capacity and make data available more quickly to inform decision-making. This would support NBN's strategic objective 1A "*Increase, streamline and standardise the capture of high quality, structured biological data*".

Another NBN strategic objective of relevance to Seasearch is objective 1E "*Double the number of biological recorders through recruitment, training and retention.*" Since the Seasearch project started, nearly a thousand divers have contributed data, with around 400 per year contributing data in recent years. Naturally, some recorders are more active than others, and 50% of Seasearch species records have been provided by just 3% of the participants. So while the NBN objective is to double the total number of recorders, it could be equally beneficial to increase the activity of current recorders. Over four thousand people have attended Seasearch courses since the project began, but only 16% of those participating in the entry-level Observer courses went on to complete the qualifying dives and contribute to the project. The number rises to 32% for participants in the more advanced Surveyor course. Another important challenge for the coordination network is to increase the number of active participants in the project, which if successful would contribute to this NBN strategic objective.

More than a drop in the ocean?

When I heard of the NBN Gateway for the first time as a participant in a Seasearch course, I wrote in my notebook "anyone can access it". This has been an important motivation to me throughout my Seasearch recording: I can contribute records to a national database that anyone can access, and I can access other people's data to provide context for my own records as I continue to explore and learn about the UK's marine environment.

At the time of writing, the NBN Gateway provides access to over 112 million species records. Marine species records comprise less than 3% of this total.

The UK's sea area is over three and a half times the land area and it is under immense pressure from human activities. Data on the distribution and abundance of marine species and habitats are needed to inform the sustainable management of marine resources. This is why it is vital to support projects like Seasearch that enable volunteers to collect marine data. This is why all organisations who have marine data should make it available for others to use, and why we must find resources to digitise and mobilise historic marine data.

Let's make marine data in the NBN more than a drop in the ocean!

All presentations from the NBN conference are available here: http://www.nbn.org.uk/News/Latest-news/NBN-Conference-review.aspx

Marine Education at Amgueddfa Cymru – National Museum Wales

Kate Mortimer

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Background

Marine research and collections at National Museum Cardiff could be said to have started from its inception. William Evans Hoyle (1855–1926), our first director (1909–1924), was an eminent cephalopod expert who worked on material from Challenger and other expeditions (e.g., Wood 2014). Molluscs continued to form the mainstay of the Museum's marine work with the donation of the world famous Melvill-Tomlin shell collection in 1955. Diversification occurred in the mid 1980s with the creation of a marine invertebrate research post specialising in polychaetes. With expansion, the Marine Biodiversity section (now part of the Invertebrate Diversity section) was established in the 1990s.

Although the section has always been involved in marine outreach activities, the educational element of the Outer Bristol Channel Marine Habitat Study (OBCMHS) in partnership with the British Geological Survey (BGS) provided increased opportunities for outreach activities. The OBC project involved the production of an educational CD-ROM (3 versions, see Mortimer *et al.* 2007, Poulton *et al.* 2006 & Poulton *et al.* 2006), the touring *Explore the Sea Floor* exhibition (visiting six venues across England and Wales), and an extensive outreach programme for both families and schools. This programme of events has been built upon and has evolved since then and now forms part of the Museum's programme of events for the public. The following provides examples of the outreach activities conducted by the section:

Beachwatch

For the last 11 years the Museum has been running an annual Beachwatch event at Ogmore Beach in the Vale of Glamorgan as part of the National Campaign run by the Marine Conservation Society (now the Great British Beach Clean). Family workshops are run over the course of the morning concerning strandlines, rocky shore zonation, rock pool fauna and flora and fossils. In the afternoon, volunteers join in with the beach clean.

Rock pool activity during Beachwatch at Ogmore

Open Days

The Natural Sciences Department runs a series of open days throughout the year, where curators and researchers bring out specimens from behind the scenes to show visitors. The wealth of our collections amounts to approximately 5 million specimens. For the marine team this often involves the use of a rocky shore model to show zonation, and the variety of animals and seaweeds on British coasts.

An open day at National Museum Cardiff

Behind the scenes in the marine collections at National Museum Cardiff

Behind the Scenes Tours

The Department runs a programme of monthly outreach events which consists of behind the scenes tours, 'Meet the Curator' sessions, and gallery tours, details of which can be found on the Museum's What's On web-page (see link below). Visitors are able to tour the marine collections and laboratories as well as the Mollusc Collections (including the Melvill-Tomlin collection).

Lunchtime Talks and Talks in the Community

Natural Science monthly talks take place at National Museum Cardiff with curators across the Department talking about the collections and their research. However, curators also participate in talks within the community, to a wide variety of audiences such as local wildlife groups and community groups such as Age Concern and the University of 3rd Age.

School activity

School Workshops

We have been developing a range of workshops for schools in conjunction with the Learning and Participation Department at the Museum, including subjects such as classification, habitats and adaptations. These are delivered both within the museum but also within the classroom.

Family Workshops

Since the OBC project we have been developing marine workshops for families, which generally take place within the museum. Topics have ranged from rocky shores (bringing outside environments indoors), seaweeds and habitats. Workshops throughout 2015 have been based on the *I Spy … Nature* Exhibition looking at how modern and historic scientists and naturalists have observed and recorded nature through time. For examples of how this has been employed see Mortimer (2015).

Marine family workshops

Pop-up Museum

For the last two years the department has been taking the museum out into the community with an *I Spy … Nature* inspired pop-up museum. This has predominately happened in the Capitol shopping centre, but also Fairwater Library, in Cardiff. The pop-up museum is an ideal opportunity to engage with a broad audience and displays a plethora of specimens to people who may not otherwise engage with our specimens. Over 3600 people have engaged with these to date and we hope to continue with them, perhaps in other locations. For example, we have already used pop-up museums at events such as the Urdd and National Eisteddfod.

Pop-up museum at the Capitol shopping centre, Cardiff

Exhibitions

Many of our outreach events are linked to the exhibitions programme at National Museum Cardiff and this year is likely to be no exception. A brand new exhibition will be opening in June 2016 called *Wriggle*, running for at least six months, which will highlight the wonderful world of worms. Although the exhibition will cover a whole range of worm groups including tapeworms, nemerteans and nematodes to name but a few, it will focus heavily on polychaetes because of the research interests of our staff and the collections at the museum. Consequently the associated outreach programme for the next year will focus on polychaetes too.

Specialist Outreach

Staff are also involved in more specialist marine outreach courses aimed at students, professionals and naturalist groups. One example is the annual taxonomy course, which museum staff deliver for Masters students at Bangor University's School of Ocean Sciences in Menai Bridge.

Social Media

An important tool for marine outreach within the department is the use of social media to highlight the Museum's collections and research. Staff from across all sections provide material for various social media platforms such as Twitter, Flickr, Storify and Blog posts, see links below.

To see the range of marine outreach that happens at National Museum Cardiff follow the @CardiffCurator Twitter Account or see the Museum's What's On Guide.

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Useful links

What's on at National Museum Cardiff: http://www.museumwales.ac.uk/cardiff/whatson/

Twitter: https://twitter.com/CardiffCurator

Storify: https://storify.com/CardiffCurator

Beachwatch blog: http://www.museumwales.ac.uk/blog/2014-09-25/Beachwatch/

Natural History Galleries at National Museum Cardiff: http://www.museumwales.ac.uk/cardiff/natural-history/

Mollusc Collections: http://www.museumwales.ac.uk/curatorial/biosyb/mollusca/collections/

A mass stranding of *Velella velella* (Linnaeus, 1758), the by-the-wind-sailor, north-east Sicily, April 2015

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This is a record of a mass stranding of the by-the-wind-sailor in Villafranca Tirrena, north-east Sicily, on the 7th and 8th April 2015. Continuous belts strung out along the foreshore for almost two kilometres were seen, thick with individuals in places and spread more thinly in others (Figures 1–4). In the sea, the organisms appeared to cluster into short strings as they were blown onshore but in places large numbers were corralled against short rock groynes protecting the beaches. In these areas chaotic masses were pulped into a frothy soup (Figures 5-6). It is likely that the actual extent of the stranding was greater than the length of shore I was able to walk. In fact, I subsequently found reports online which indicated that the same event was occurring more widely in the Tyrrhenian Sea at that time. Kropp (1931) based at the Stazione Zoologica, Naples, reports that in the Mediterranean the months of March and April are exactly when huge numbers of the species can occur. He notes in particular that, 'on the beaches in Sicily' they are washed up, 'in such large numbers' that they, 'form a broad blue line hundreds of yards in length'.

Fig. 1 (top left): By-the-wind-sailor stranded on the shore at Villafranca Tirrena, 7th April 2015.

Fig. 2 (bottom left): Wave derived stranding pattern of by-the-wind-sailor on the shore at Villafranca Tirrena, 7th April 2015.

Fig. 3 (top right): Belts of blue decorate the shore, Villafranca Tirrena, 7th April 2015.

Fig. 4 (bottom right): Thick cluster of by-the-wind-sailor with concentric transparent chitinous structure clearly evident, on the shore at Villafranca Tirrena, 7th April 2015.

Fig. 5: Thousands of by-the-wind-sailor trapped against one of the short rock groynes guarding the beach at Villafranca Tirrena, 7th April 2015.

The pleustonic cnidarian *Velella* Lamarck, 1801, in the Family Porpitidae Goldfuss, 1818 is a monotypic genus the sole representative of which is *Velella velella* (Linnaeus, 1758), the by-the-wind-sailor (Kemp 1986; Schuchert 2015; WoRMS 2015). Pleuston derives from the Greek word for sailing, '*pleusis*', and thus itself provides a good indication of the travel arrangements for the organisms that litter the sea-air interface. These small travellers call the ocean home and for part of their life cycle they form characteristic chambered blue ovoid floats topped with a rigid

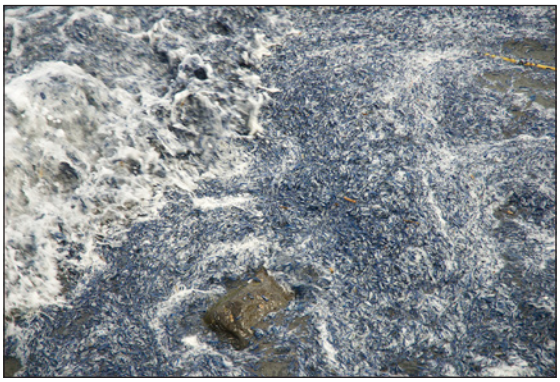

Fig. 6: The frothy soup of by-the-wind-sailor, Villafranca Tirrena, 7th April 2015.

transparent semi-circular-triangular chitinous sail that runs diagonally across their length (Figures 7-8). With this they can hitch a ride on any breath of wind that happens by.

What's in a name?

In Italy the common name for *Velella velella* is 'la barchetta di San Pietro', or 'the small boat of Saint Peter'. The north Italian rural tradition associated with this name is concerned with sails which might form overnight in water seeded with egg albumen. The presence of sails in this mythology indicates a good harvest to come (WoRMS 2015; Wikipedia 2015a). The English common name is perhaps more direct and functional, reflecting our maritime heritage, but has its own poetic resonance given the reference to sailors.

In applying the same scientific name to both the genus and the species, Linnaeus (1758) erects a clear sign-post to the defining feature of these little hydranths. The term 'hydranth' for this, the most visible stage of the life-cycle, is quite resonant, coming from the Greek word meaning 'water-flower'.

Fig. 7: The semi-circular-triangular chitinous sail of V. velella*, Villafranca Tirrena, 8th April 2015.*

Fig. 8: The diagonal track of the sail across the length of V. velella*, Villafranca Tirrena, 8th April 2015.*

'*Velella*' derives from the Latin '*vēlum*', meaning 'a sail' or 'a cloth, covering, curtain or veil' (not to be confused with the parchment, 'vellum', which, derives from 'vitulinum' meaning 'made from calf'). All the references I found while investigating the name *V. velella* make the link between the Latin '*vēlum*', and its 'sail' meaning. But it may be that the original sense of 'veil' was in fact 'sail' (Skeat 1882). It is worth noting that the Italian word for a 'sail' is 'vela' and in Latin '*vē la*' means 'sails' and is the plural of '*vē lum*'. The etymology of '*vēlum*' is uncertain but it may come from 'veh-o' which, in a passive context, means 'to be carried or borne; to go, ride, sail, fly' (and is akin to the Sanskrit root 'vah', to carry). The Roman philosopher Cicero, and the poet Virgil both use '*vēlum*' in the context of 'a sail'.

In Latin the suffix '-ella' can be used as a diminutive to express smallness, affection, pity, or even contempt. A contemporary example from our own lexicon is 'novella'. The Italian Neapolitan dialect still uses '-ella' as a diminutive. In the current context it is clearly used to indicate size and thus '*velella*' translates as 'small sail' and therefore *V. velella* would be 'small sail, small sail'.

Colouration

The incredible blue colour of the by-the-wind-sailor comes from the carotenoid pigment, astaxanthin. There are over 600 carotenoids found in plants and animals and they are the most common group of pigments found in nature forming complexes with proteins which are known as carotenoproteins (Wikipedia 2015b). These complexes are common amongst marine animals. But animals, with the exception of aphids and spider mites, are considered to be incapable of making their own carotenoids relying on plants for these pigments (Wikipedia 2015b; Wikipedia 2015c). In plants, carotenoids are involved in photosynthesis and hence can be found in the chloroplasts and other photosynthetic organisms, including some bacteria and some fungi. Aphids and spider mites are thought to have acquired the ability to make carotenoids from the genes of fungi (Wikipedia 2015c).

Astaxanthin belongs to a class of phytochemicals known as terpenes, which

Fig. 9: Violet snail, Janthina janthina *(Linnaeus, 1758), on* V. velella*, Villafranca Tirrena, 8th April 2015.*

are hydrocarbon compounds produced by a variety of plants. *Velella velella* has two blue astaxanthin-proteins in its mantle with about 100 carotenoids per complex. Astaxanthin is found in a range of organisms including microalgae (Wikipedia 2015d).

Algal symbionts

The tissues of *V. velella* contain zooxanthellae (single-celled symbiotic algae). These endosymbionts, or photobionts, have also been found in the medusa stages of *V. velella* (Schuchert 2010). It is probable that by-the-wind-sailors gain some nourishment from the photosynthetic activity of the dinoflagellate symbionts harbouring in their tissues. Does this source of nutrition play a critical role in survival on the open ocean or is it more 'surplus to requirements' when set against the food captured beneath the surface?

Gast and Caron (1996) suggest that radiolarian symbionts are most closely related to the dinoflagellate symbiont from the oceanic chondrophore, *V. velella*. It is generally understood that algal symbionts of radiolaria can carry out rapid rates of photosynthesis, and that a substantial portion of carbon fixed by photosynthesis is translocated to the host. In return, the host supplies its endosymbionts with inorganic nutrients derived from its waste products, and a stable environment for growth and reproduction.

Dinoflagellates currently reported as being found in *V. velella* studied from various geographic locations around the world include *Endodinium chattonii* Hovasse 1922; *Scrippsiella velellae* Banaszak, Iglesias-Prieto & Trench, 2000; and, *Zooxanthella nutricula* Brandt.

Fig. 10 (top): Large biomass of beached V. velella, *Villafranca Tirrena, 8th April 2015.*

Janthina janthina (Linnaeus, 1758)

As I walked the length of the shore at Villafranca Tirrena I kept a look out for the pelagic mollusc *Janthina janthina* (the violet snail or bubble raft shell). The species is a known predator of *V. velella*. Obviously, my search was not exhaustive but nevertheless across that two kilometres of coast I managed to turn up just one individual, still attached to its prey (Figure 9).

Organic matter input to near-shore environments

As a final thought it's worth noting that Kemp (1986) suggested such strandings as this may form a brief but major input of organic matter to beaches and near-shore environments (Figures 10 & 11). What the energetic importance of this might be is difficult to say and would depend, for example, on just how much of that potential biomass actually remained in the local system. However, as Kemp states, "If mass strandings materially affect production, they would constitute a stochastic perturbation which may contribute to inter-annual variation in sand beach systems."

Fig. 11 (bottom): Large but variable scattering of beached V. velella*, Villafranca Tirrena, 8th April 2015.*

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Winners of the inaugural UK Awards for Biological Recording and Information Sharing

Purba Choudhury

During the National Biodiversity Network's 15th conference, held in York in November 2015, the winners of the first UK Awards for Biological Recording and Information Sharing were announced.

These awards have been developed by the National Biodiversity Network, the National Forum for Biological Recording and the Biological Records Centre and were sponsored by Swarovski Optik UK, with the marine awards supported by Cameras Underwater and by the One Stop Nature Shop. Their intention is to recognise and celebrate the outstanding contributions made by adults and young people to biological recording, which is helping to improve our understanding of the UK's wildlife.

There were four categories of awards – two for marine and coastal recording (adult and youth categories) named after the Scottish naturalist David Robertson (1806-1896) who founded the University Marine Biological Station at Millport – and two for terrestrial and freshwater recording (adult and youth categories) named after Gilbert White (1720-1793) one of England's first naturalists.

David Fenwick is the winner of the David Robertson adult award. David has been a dedicated recorder for many years. He has a dogged and determined approach to finding, photographing and recording marine and terrestrial species but in recent years his particular strength has been his work with Stauromedusae, rare and protected stalked jellyfish, and the bizarre and often colourful marine nudibranchs or sea slugs.

David shares his passion via beautiful and comprehensive websites:

www.aphotomarine.com and www.stauromedusae.co.uk/

These are an inspiring and useful resource for new recorders and professionals alike.

He uses a Facebook group (search for NE Atlantic nudibranchs) to share his discoveries

David Fenwick receiving his award from Michael Hassell

and to impress and inspire others all around the world.

David has given up his time to help with Cornwall Wildlife Trust's Shoresearch programme which engages with local people, and raises the profile of Cornwall's local marine wildlife.

Callum Ullman-Smith is the winner of the David Robertson youth award for recording marine and coastal wildlife. 13-year old Callum has been out recording wild flowers, fungi and basically everything with his mother since he was tiny.

He developed a personal passion for amphibians and began recording coastal palmate newt populations in Highland in spring/summer 2011 when he was 8 years old.

In 2012 Callum began a research project to investigate whether stable breeding

Callum receiving award from Michael Hassell

populations of palmate newts occur in coastal brackish rock pools.

His first report was published in the Highland Naturalist (May 2012, No. 8, 7-8). Over the following three years he sampled up to 9 rock pools on a monthly basis (weather-depending!) - his results were presented at the *Amphibian and Reptile Conservation Symposium* at the Royal Botanic Garden, Edinburgh in 2014.

He has also been a regular seashore recorder on the Highland Seashore Project for the past three years.

For details about the winners of the Gilbert White adult and youth awards for recording terrestrial and freshwater wildlife, visit the National Biodiversity Network's website: *www.nbn.org.uk*

In the first year of the UK-wide awards 53 high quality nominations were received. Professor Michael Hassell, Chairman of the National Biodiversity Network, said: "We were delighted to receive so many excellent nominations. We are running the awards again in 2016, so if you would like to highlight the painstaking work that an individual or group of biological recorders is undertaking, please come forward and nominate them."

In fact, the standard of the nominations was so high that a special award was given (posthumously) to Nigel Jee. Nigel can best be described as Guernsey's own gentleman naturalist, a Gilbert White personified.

Nic Jee receiving an award from NBN Patron the Earl of Selborne on behalf of his father, the late Nigel Jee

Following his retirement in 1985, Nigel started gathering data from the large garden and fields that he owned on the west coast of Guernsey. Over the next 27 years he methodically collected data on the plants and animals that lived there. Most noteworthy was his weekly written records of the flowering dates of all the plants in his garden and in the fields surrounding, where many different Narcissi had become naturalised.

Nigel recorded the date when flowers first appeared, the days when the plants were in flower and when flowers were no longer seen. As a consequence his recording is almost without precedent as he recorded not just the first date of flowering but the duration of flowering of each plant species. In all, between 1985 and 2011 he recorded several hundred species of plants and made 163,433 written observations. This dataset has arguably become one of the most important long-term datasets in the British Isles.

Dr Tim Sparks of the Centre for Ecology at Monks Wood was involved in 2006 and analysed a small part of the dataset. Tim Sparks was searching for long-term datasets in an attempt to show how wildlife was affected by climate change. Nigel wrote out in long hand the data that he had collected on a selection of spring flowering plants and these were sent to Tim Sparks for analysis.

It was Nigel Jee's meticulous recordings that proved that climate change was affecting plants and animals in the Channel Islands.

While separate from the awards for biological recording and information sharing, another award was presented at the same ceremony in York – the John Sawyer NBN Open Data Award – to the Mammal Society.

Rachel Stroud, Interim Chief Executive of the National Biodiversity Network, said: "The National Biodiversity Network has 160+ data partners, and these organisations vary in their commitment to open data. Our national online database, the NBN Gateway, has more than 112 million biological records and some of these data are shared openly, but many are not available at full resolution or are hidden from public view.

Dr Fiona Matthews of the Mammal Society receiving John Sawyer NBN Open Data Award 2015

"The National Mammal Atlas Project dataset on the NBN Gateway currently has 43,207 open records on the NBN Gateway, 38,546 are available at 100m resolution, and the remainder are also fully available at 1km, 2km and 10km depending on the capture resolution.

"The NBN Secretariat is honoured to present the inaugural John Sawyer NBN Open Biodiversity Data Award to the Mammal Society because of their commitment and dedication to sharing these valuable data more widely."

If you would like to nominate an unsung biological recording hero, heroine or group for the 2016 awards, please subscribe to the National Biodiversity Network's monthly "eNews" for more information:

http://www.ow.ly/VEZYW

Link to the NBN home page:

http://www.nbn.org.uk/

David Fenwick's NE Atlantic Facebook pages:

https://www.facebook.com/groups/NE.Atlantic.nudibranchs/?fref=ts

David Fenwick's online guide to stalked jellyfish of the United Kingdom:

http://www.stauromedusae.co.uk/

The UK non-native species *Nematostella vectensis* (starlet sea anemone)

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Nematostella vectensis*, the starlet anemone*

I should probably begin by saying that this article may be redundant. In one sense it certainly is because the case I'll describe here has already been detailed in a paper published in 2008. No action based on this work has been made publicly available and in fact the paper itself suggested in part that this might be an appropriate response. But it's likely that, behind the scenes, this has been chewed over and, it could be, actions are in process and in due course these will be made public.

The paper in question is Reitzel *et al.* (2008) but in fact, as is often the case, the story really begins before that, with Sheader *et al.* (1997). Sheader *et al.* (1997) were the first to suggest that *Nematostella vectensis* might be an introduced species. These authors did not use the term 'non-native species' directly but they do clearly indicate that this may be the case and suggest that a genetic study of existing populations should be undertaken to clarify the situation. Eleven years pass before a study is published which uses DNA fingerprinting from hundreds of individuals collected from 24 different locations including, of course, the UK. In 2008, Reitzel *et al.* make the following definitive statement:

'Collectively, these data clearly imply that N. vectensis *is native to the Atlantic coast of North America and that populations along the Pacific coast and in England are cases of successful introduction'.*

That's about as unequivocal as good science gets. For our story here it's worth noting that Reitzel *et al.* (2008) clearly identify that the, '*conservation of introduced* N. vectensis *populations in England appears to be motivated by its misidentification as a native species*'.

So, we have a Schedule 5 protected species under the Wildlife and Countryside Act 1981 (herein abbreviated to WCA 81) which is in all likelihood a non-native species. Not necessarily a problem because in fact, there are mechanisms in place which allow non-native species to be listed. In their concluding remarks Reitzel *et al.* (2008) suggest that *N. vectensis, 'populations continue to receive modest protection, with the understanding that such protection is serving the more general goal of protecting a threatened habitat'*. I take their point entirely but those sensitive / threatened habitats are themselves already directly protected by current legislation. Supporting or strengthening that shield by identifying any associated individual species which require protection measures is reasonable, provided that such additions are legitimate within the legal framework. A species cannot be captured by existing legislation where in doing so you bring into disrepute the very mechanism by which that protection is achieved. Reitzel *et al.* suggest retaining '*modest protection*'. I am not privy to what the authors may have intended but as a strong and fundamental piece of legislation for the protection of species in the UK, the WCA 81 is unlikely to have ever been described as modest.

Could *N. vectensis* remain, or be re-listed on Schedule 5, given its status as a non-native species? The Joint Nature Conservation Committee (JNCC), review Schedules 5 and 8 of the Wildlife and Countryside Act 1981 every five years in a process called the Quinquennial Review (QQR). In April 2014, the Sixth Quinquennial Review was submitted to Defra, the Welsh Government and the Scottish Government. These governments have subsequently been considering the review

Quinquennial Review (QQR)	QQR date	Actual 'Report & Recommendations' publication date	Government response	Date amendments enforced
1st	1986	1986	-	-
2nd	1991	1991	-	-
3rd	1996	1996	-	-
4th	2001	2002	-	-
5th	2006	2008	August 2011	October 2011
6th	2011	Not yet publically available	Not yet publically available	N/A
7th	2016	N/A	N/A	N/A
[Note: R&R reports 1-5 are all available on the JNCC website at http://jncc.defra.gov.uk/page-4630]				

Table 1: A quinquennial review timeline from inception to the present and beyond.

and will, in due course, '*respond formally and publish amendments to the Wildlife and Countryside Act (1981)'* (JNCC 2015).

Predictably, the first QQR 'report and recommendations' (R&R) document was published in October 1986 (NCC 1986). Following the 'quinquennial' requirement it is possible to construct a timeline from subsequent publications (Table 1).

The eligibility criteria for a species to be listed on Schedules 5 (or 8) of the WCA 81 are clearly laid out in the QQR 6 information pack (JNCC 2012). The single eligibility criterion for non-native species is stated as follows:

'i. Generally, only native (including reintroduced native) taxa are to be considered (See Part 3.4.1 A). In exceptional circumstances, non-native taxa which have been introduced or thought to have been introduced to Great Britain by man could be considered if the species is endangered or extinct in its native range and if current information suggests that the species is unlikely to have an adverse impact on UK native species'

Even if the species passes this test it is then subjected to the following condition:

'*preference will be given to those non-native species whose native range reaches the north west coast of Europe (i.e. continental distribution extends to the Atlantic coast of France, Belgium, the Netherlands, Germany or Scandinavia) and for marine taxa, the distribution includes the north west Atlantic area'.*

The first test is clear. The species must be endangered or extinct in its native range. But how is 'endangered' defined in this context? This is clarified by the JNCC (2012). A species is considered endangered when either of the following is true:

- it is included in a JNCC-approved British Red List http://jncc.gov.uk/page-3352, using the revised IUCN criteria, as Extinct in the Wild, Critically Endangered, Endangered or Vulnerable;
- records indicate that the species is known from only a single locality or severely fragmented

In publishing the red list status in their taxon designations spreadsheet (available online at http://jncc.defra.gov.uk/page-3408) the JNCC have endorsed the assessment of 'vulnerable' for *N. vectensis*. One of the quality checks adhered to by the JNCC is that the version used is the 2001 IUCN version 3.1 (or later). But the assessment for *N. vectensis* is based on 'ver 1994; A1ce', or version 2.3. Although the assessment is based on pre-2001 criteria, rather than the 'revised' criteria referred to above, this clearly passes the hurdle for accepting that the species is 'endangered'.

The global assessment of 'Vulnerable - (V)', which has been in place for the species since 1983, is defined as follows based on the 1994 description (IUCN 2015):

'Taxa believed likely to move into the 'Endangered' category in the near future if the causal factors continue operating. Included are taxa of which most or all the populations are decreasing because of over-exploitation, extensive

destruction of habitat or other environmental disturbance; taxa with populations that have been seriously depleted and whose ultimate security has not yet been assured; and taxa with populations that are still abundant but are under threat from severe adverse factors throughout their range. N.B. In practice, 'Endangered' and 'Vulnerable' categories may include, temporarily, taxa whose populations are beginning to recover as a result of remedial action, but whose recovery is insufficient to justify their transfer to another category'.

The associated condition for acceptance of a non-native species on Schedule 5 or 8 is only half met. The native range does not extend to the '*north west coast of Europe*', but is within the broader, '*north west Atlantic area*'. As this condition is not strictly recorded as an 'eligibility criteria' there may be more latitude given to its application.

The notes on endangerment clearly state that this, on its own, cannot be considered sufficient justification, '*for recommending a taxon for scheduling*' (JNCC 2012). It goes on to say:

'*Many taxa will be endangered principally due to changes in land-use or land management leading to increased habitat fragmentation, deterioration or outright habitat loss. Such causes of endangerment do not constitute 'direct human pressures' as covered by Sections 9 and 13 of the Wildlife and Countryside Act (and listed in Part 3.2 above). To be recommended for scheduling, the endangerment of a taxon must, at least in part, be due to one or more of the direct human pressures listed in Part 3.5'.*

So, even where the eligibility criterion is met, the WCA 81 requires, '*a strong case that scheduling will afford significant benefits to it through a decrease in any of the direct human pressures listed below:*

i. intentional killing or injuring, picking or uprooting or reckless disturbance; or

ii. 'collection' including possession, dead or alive, in full or part thereof; or

iii. intentional or reckless damage, disturbance or obstruction to any structure or place of shelter and protection which is regarded as essential for the survival of the species6 (such as nests, burrows, holes, scrapes, or similar resting sites; sites used to raise young (and eggs), holts); or

iv. currently or potentially damaging trade, or other forms of exploitation or pressure.

[[6] This excludes the wider habitat in which the organism ranges]'

Let's skip back to that definition of 'Vulnerable' for a moment. Note, that it highlights '*extensive destruction of habitat or other environmental disturbance*' as an important causal factor. Is there evidence in its home range that *N. vectensis* is exposed to this issue? Hand and Uhlinger (1992) reported the following from the key IUCN publication:

'*Williams (1983) considered the species vulnerable to extinction in Great Britain, but it is plentifully abundant throughout most of its range and is readily collected*'.

It is of course unsurprising that the species is also considered a UK Biodiversity Action Plan (BAP) priority species and as such we have a report from the JNCC (2010). This report provides the following assessment with respect to 'Crit 1 Global threat' in Section 8 '*Additional information from specialists*' (compiled during Stage 1 of the priority species review - prior to 2007 (JNCC 2007)):

'*None - it is widespread across eastern and western seaboards of U.S.A., Canada along with the few sites in south England and East Anglia'.*

This updates the statement from Williams (1983), confirming the health of the species in its native range. The same report, states that for 'Crit 1' it is not, '*known if U.K. population is relict from last glaciation or introduced by human agent from U.S. However in Europe it is only known from ~20 lagoons in England and is therefore a species of European importance'* (JNCC 2010).

It seems fairly clear that the JNCC 2010 report rests on supporting information supplied prior to the publication of Reitzel *et al.* (2008). Hence, the status of the species remains entirely supported, because in and of itself Sheader *et al.* (1994) and subsequent work could not exclude the possibility that the UK population was 'relict'. But Reitzel *et al.* (2008)

is unequivocal and less open to challenge given the nature of the study.

But there is a bigger issue, under the heading 'Habitat and Ecology' Williams (1983) states the following:

'*The original habitat of this anemone was probably in shallow pools of high marshes and at sides of creeks at marsh edges in estuaries and bays [..]. North American records reflect this natural distribution pattern which facilitates the spread of the species from established to developing marsh, probably by tidal and storm action sweeping anemones from pool to pool and possibly to a lesser extent by wildfowl fortuitously transporting vegetation with adhering anemones. The English distribution is atypical and is the reason for the species being endangered'.*

The last sentence is absolutely critical. Williams, in 1983, is unaware that *N. vectensis* is not native to England, and based on the threat perceived to that population, lists the species as globally 'Vulnerable' under the IUCN criteria. Based on this evidence the UK subsequently lists the species on Schedule 5 of the WCA 81 in 1988. Reitzel *et al.* (2008) suggest that the conservation measures for *N. vectensis* in England are, '*motivated by its misidentification as a native species*'. But actually the entire case for the global assessment of 'Vulnerable' rests on that misidentification as do all subsequent protection measures.

Having read this article do you believe that *N. vectensis* can, as currently enshrined, remain on Schedule 5 of the WCA 81? Could it reasonably retain its status as a UK BAP priority species or a Species of Principal Importance in England under the NERC Act (2006)? Or, still be listed as a Feature of Conservation Interest (FOCI) for Marine Conservation Zones?

The IUCN (2015) assessment for *N. vectensis* was last updated in 1996. The current assessment is tagged as 'Needs updating'. So what is the delay? Why has no action been taken? Wheels turn slowly sometimes. That's clear. Human. Perhaps there's a piece of the puzzle missing. Work in progress, yet to be made public. Either way an update is long overdue and once that update has been carried out, any subsequent amendments that may be required can be cascaded through the relevant statutory mechanisms in the countries affected.

As I indicated at the start, it seems clear that all of this is likely to be already well in hand in one form or another.

As a non-native species there needs to be better understanding of what the impacts to our native habitats and species from *N. vectensis* are / have been. Reitzel *et al.* (2008) suggest that the species 'is unlikely to have negative ecological consequences'. But the lens and context through which the species has been viewed has surely changed and a reassessment from funded research would not be inappropriate.

Moran and Gurevitz (2006) state that because:

'N. vectensis *is exposed to a minimal variation of prey and foe, its neurotoxin gene family did not face the selective pressure that neurotoxin genes of other animals were subjected to. This hypothesis is supported by the fact that at least in some lagoons this anemone is feeding on a small variety of organisms [..]. A similar prey variety was observed in two lagoons located on different sides of the Atlantic at Nova Scotia and England, indicating that* N. vectensis *populations in different areas may be exposed to the same limited variety of prey, neglecting again the advantage of rapid neurotoxin evolution in a unique habitat as the brackish lagoon [...]. A large number of genes encoding for the same mature neurotoxin might provide the anemone with the ability to rapidly produce a large mass of Nv1 [*Nematostella vectensis *neurotoxin 1] and quickly 'reload' its toxin reservoir. Such ability is highly beneficial in the crowded brackish lagoon, where the anemone might encounter large foe and prey populations within a short period of time'.*

That sounds a bit like a competitive advantage to me.

Williams (1983) notes that the, '*original habitat of this anemone was probably in shallow pools of high marshes and at sides of creeks at marsh edges in estuaries and bays'.* Do we know for sure that the species isn't more widely present in similar areas here in the UK? Who's up for a muddy snorkel?

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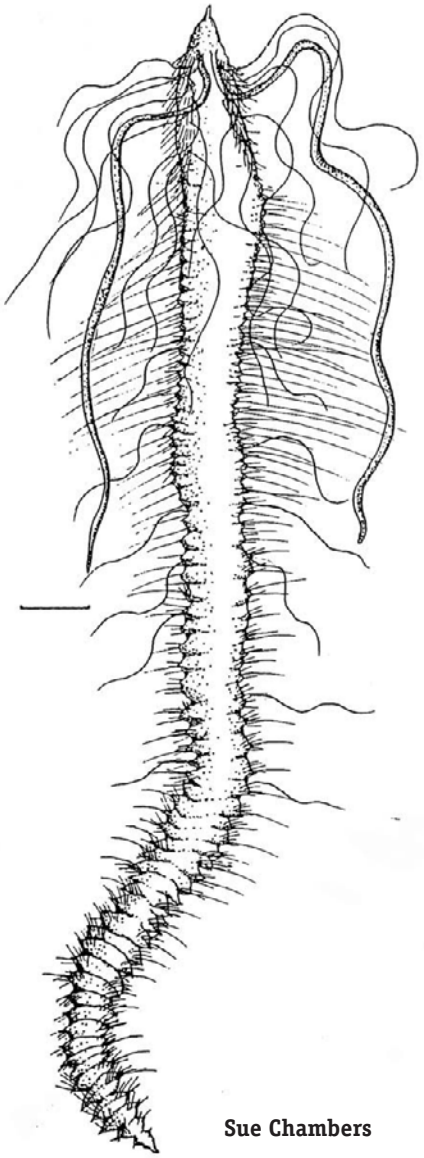


Sue Chambers

Chaetozone setosa *Malmgren, 1867*

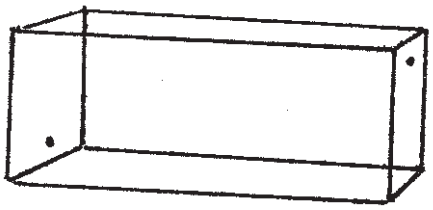
Polychaeta: Cirratulidae

Considered to be cosmopolitan in the North East Atlantic from the eulittoral to 1950 m. Found in diverse substrates from mud to muddy gravel.

The dog whelk and the limpet

Frank Evans

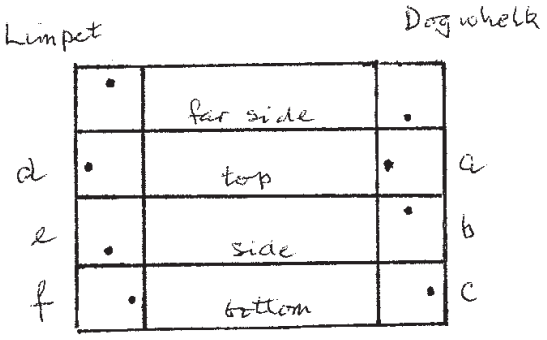
An aquarium tank complete with lid had the dimensions 100 cm. by 40 cm. by 40 cm. On one end wall is a dog whelk resting on the sagittal mid-line and 5 cm. from the top. On the opposite wall, also on the mid-line and 5 cm. from the bottom is a young limpet, the dog whelk's potential prey.



The dog whelk, a sharp fellow, sees that measured along the midlines of the aquarium glass the limpet is 140 cm. away along either the top or bottom of the tank (see diagram). But, shrewd nucellid that he is, he sees that there are four shorter ways to his breakfast and, when just about to set off, spots two more ways that are even shorter. Can you say what they all are?

Solution.

The key is to cut open the tank so that it lies flat. The 40 cm. by 40 cm. ends can be left attached to either the top, bottom or sides (see diagram). Join the dog whelk and the limpet. The straight routes are ad and cf, each 140 cm. The four shorter routes are ae, bf and similarly on the other side, i.e. √(125 2 + 55 2) = 136.6 cm. But by joining af we have one of two even shorter routes, i.e. √(110 2 + 80 2) = 136.0 cm.



Sabellaria alveolata in NW Britain: changes in distribution in response to extreme weather events and recent warming

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Global sea surface temperatures have been gradually rising since records began in 1861 (IPCC 2013). European seas are experiencing warming at twice the global average rate since 1960 (Burrows *et al.* 2011). The general warming trend has been punctuated by periods of cooling and warming with recent extreme climatic events placing the last few years among the most extreme weather years on record (Francis & Vavrus 2012).

Extreme environmental conditions have the potential to have significant and lasting effects on intertidal and shallow subtidal marine communities (Firth *et al.* 2015; Wethey *et al.* 2011). Organisms living in the intertidal zone are of marine origin but are exposed to aerial conditions daily during low tide. This vulnerability to aerial conditions elicits strong responses in intertidal organisms that can result in changes in distribution, structure, and functioning (Hawkins *et al.* 2013; Mieszkowska *et al.* 2014). For example, the extremely cold winter of 1962/1963 had a dramatic effect on marine organisms in Britain with widespread population decreases and localized extinctions (Crisp 1964).

The honeycomb worm *Sabellaria alveolata* Lamarck, 1812 (Figure 1) is a Lusitanian

Fig. 1: Sabellaria alveolata - *the honeycomb worm.*

warm-water species distributed from Morocco to southwest Scotland (Gruet 1986). This sedentary polychaete constructs tubes on low- to mid-shore hard substrata in semi-exposed and exposed locations and can form bioconstructions ranging from small patches, hummocks, and veneers to large reefs (Wilson 1971; Dubois *et al.* 2002, 2006). Reef-forming *S. alveolata* has the potential to provide important coastal protection (Naylor & Viles 2000) and biogenic habitat for a wide range of other species (Dubois *et al.* 2002).

Cunningham *et al.* (1984) produced the most extensive review of the distribution of *S. alveolata* in Britain. This report used historical data from the literature and new data from shore surveys and reports via correspondence with other researchers (including D. P. Wilson). As a result of this exercise, changes in the extent of *S. alveolata* distribution over a period of approximately 100 years were documented. Subsequently, Frost *et al*. (2004) carried out a broadscale survey of the distribution and abundance of *S. alveolata* near its northern range limit in Britain (from Anglesey, north Wales to Cumbria) and also used the extensive MarClim dataset (www.marclim.co.uk) to assess the UK distribution of *S. alveolata*.

The aim of the study was to combine "historical" (1919–1984, from Cunningham *et al*. (1984) and unpublished notebooks) and contemporary data (2002–2013, from Frost *et al*. (2004)) to map past and present distributions of *S. alveolata*. Specifically, we aimed to document long-term changes in the distribution and abundance of *S. alveolata* and discuss these changes in relation to extreme weather events and recent warming.

Materials & Methods

A total of 26 locations were surveyed between Penmon, Anglesey and St. Bees, Cumbria (Figure 2). Locations were predominantly selected based on those surveyed by Cunningham *et al.* (1984) and Frost *et al.* (2004). The survey was carried out during low water spring tides from 19-25 July 2012. A 30-minute search at low tide was performed at each location and the abundance of *S. alveolata* was recorded using the modified semi-quantitative SACFOR abundance scale to ensure comparability with previous surveys (Cunningham *et al*. 1984, Frost *et al*. 2004).

Results

In order to evaluate long-term temporal variability in *S. alveolata* distribution and abundance, the data were divided into four periods based on previous surveys: (1) pre-1963 (before the cold winter of 1962/1963); (2) 1980-1984 (Cunningham *et al*., 1984); (3) 2003/2004 (Frost *et al*., 2004); and (4) 2012 (present survey) (Figure 2). A summary of this information is given below.

Pre-1963

Prior to 1963, *S. alveolata* had only been reported from three sites within the study area (Cunningham *et al*. 1984, Figure 2, Table 3) partially as a result of the paucity of data available for this period. It was recorded as present in Colwyn Bay in the 1950s by Wilson (in Frost *et al.* 2004). *Sabellaria alveolata* was first recorded (abundant) at Hilbre Island at the mouth of the River Dee by Herdman (1919). In 1940 however, it was recorded as absent by MacMillan (in Cunningham *et al.* 1984). Jones also reported variable abundance at Heysham in Morecambe Bay in 1959-1961 (in Cunningham *et al*. 1984). The only other records available for *S. alveolata* in this region were from unpublished notebooks of Crisp and Southward. It was recorded as not seen at Penmon, Anglesey in 1952 by Southward and abundant at Seascale, Cumbria by Crisp in both 1953 and 1955. The only other records for the area were from St. Bees Cumbria, where it was found to be abundant in 1955 (Crisp) and common in 1959 (Southward) (Crisp & Southward 1958).

1980–1984

Despite the previous presence of *S. alveolata* in Colwyn Bay, Cunningham *et al.* (1984) reported that there were no records of *S. alveolata* from the north Wales coast between 1963 and 1980. It had also disappeared from Heysham and declined to rare at Hilbre Island in 1979 and was absent in 1984. Cunningham *et al.* (1984) reported *S. alveolata* to be completely absent from Anglesey to Barrow-in-Furness but present further north along the Cumbrian coast from Annaside Banks up to St. Bees (Figure 2).

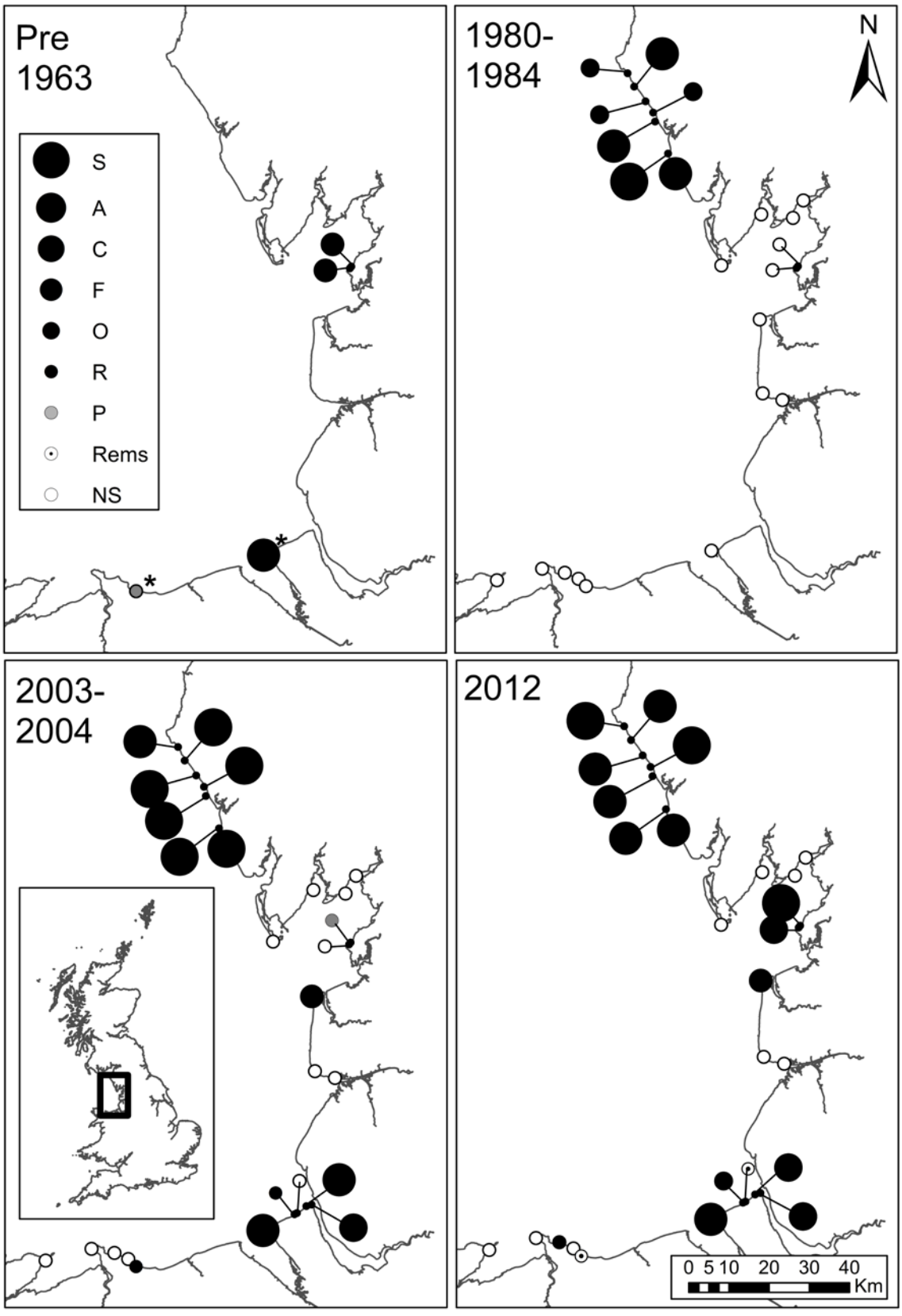

Fig. 2: Maps showing spatio-temporal changes in distribution of S. alveolata *in NW Britain.*

2003-2004

Frost *et al.* (2004) found large densities of *S. alveolata* at most sites along the Cumbrian and north Wales coastlines (Figure 2). Abundance was judged to have increased in comparison with previous surveys at eight locations (e.g. Hilbre Island, Wirral coastal defences, Fleetwood, Heysham and some locations in Cumbria (Figure 2). No locations exhibited decreases in abundance (Figure 2, Table 3) when compared to Cunningham *et al*. (1984).

2012

The majority of the sites resurveyed in 2012 showed similar abundances to those reported by Frost *et al*. (2004) (Figure 2). Six locations showed increases in abundance (Little Orme's Head, Leasowe lighthouse, Leasowe East, Heysham foot scar, Heysham Power Station and Walney Island) and no locations showed a decrease in abundance (Figure 2) when compared to Frost *et al.* (2004).

Discussion

Within the area investigated for the present study, the number of negative ('not seen') records decreased over time. Conversely the number of 'abundant' records increased over time. *Sabellaria alveolata* was found to be present at the majority of sites where it was previously recorded (Cunningham *et al*. 1984; Frost *et al*. 2004). It has been suggested that previous absences of *S. alveolata* along the north Wales, Wirral and Lancashire coastlines (Cunningham *et al.* 1984) were very likely to be in response to extremely cold air (-3.4°C, Swansea, Wales), and sea surface temperatures (0.6°C, Aberthaw, Wales) experienced during the cold winter of 1962/63 (Crisp 1964) and a subsequent spell of cold weather. Despite the paucity of records available prior to 1962, there were reliable reports of healthy populations of *S. alveolata* at Colwyn Bay, Hilbre Island, Heysham, Seascale and St. Bees (Cunningham *et al.* 1984; Crisp & Southward, unpublished). Crisp (1964) reported mass mortality (100% mortality at some locations) of *S. alveolata* at a number of locations both on the north and south Wales coasts. Subsequent recolonisation was probably inhibited by cooler conditions in much of the 1960s and 1970s.

Frost *et al*. (2004) reported increases in abundance of *S. alveolata* in many locations and re-appearances in areas where it has been absent for many years (i.e. Hilbre and Colwyn Bay). It was also reported to have spread to areas for which there were no known previous records (north Wirral, Rossal Point). Results were similar for the 2012 surveys.

When considered in isolation, Cunningham *et al*. (1984) provided a snapshot of the distribution and abundance of *S. alveolata* on a UK-wide scale. Frost *et al.* (2004) built on this valuable baseline dataset and provided a spatio-temporal comparison, focusing near the vulnerable northern range edge. The 2012 survey built on this again providing a short-term comparison with Frost *et al*. (2004). Without long-term and broad-scale contextual monitoring it is difficult to assess whether observed changes are a result of climate change or local impacts (Hawkins *et al*. 2013; Mieszkowska *et al.* 2014).

The 2012 survey was conducted following two consecutive extremely cold winters in Britain. Despite the broad-scale and long-term nature of the surveys discussed in this paper, the temporal frequency of the surveys (3 in ~30 years, at intervals of 21 and 8 years respectively) are not sufficient to test any hypotheses about the effects of recent cold winters (Prior & Kendon 2011) on *S. alveolata*. In order to appropriately assess the effects of short-term weather events, it is recommended that monitoring of fixed areas be carried out over both short (e.g. 3-5 years) and medium time scales (e.g. 5-10). The current known northern distribution of *S. alveolata* is Solway Firth, SW Scotland. It is anticipated that this range limit will extend northwards in response to climate warming. In order to appropriately assess the effects of climate change, it is recommended that sustained monitoring of the whole region (especially SW Scotland) be carried out over longer time scales (20-30 years).

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Trans-Atlantic rafting – American molluscs on British and Irish shores

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A large amount of anthropogenic waste washed ashore on British and Irish beaches after the storms of winter 2013-14 and still continues to do so. Many plastic bait pots used by American fishermen were found on beaches on the SW coast of England and Ireland with live marine invertebrates attached (Figure 1). Several bivalves and a gastropod, all of West Atlantic origin, were identified and although sea temperatures at these latitudes currently do not allow any of these warmer water species to reproduce, if sea temperatures continue to rise they could be a problem in the future.

What is rafting?

Rafting occurs when organisms travel on floating items over the sea surface and are transported to areas that they might not have otherwise reached. This process has occurred for millions of years thus populating islands and even continents with plants and animals that may not have reached there by other means. Rafting has allowed dispersal of terrestrial animals throughout geological time for example, 60 million years ago lemurs travelled on floating debris from Africa across the Mozambique Channel. Today the channel is 400 km wide at its narrowest point. However, 60 million years ago Africa and Madagascar were much closer together, 15° further south and in different ocean currents allowing dispersal of many land mammals to islands off the African coast. More recently, in 1995, iguanas were spotted by local fishermen surfing on an uprooted tree off the island of Anguilla in the Caribbean. The lizards had travelled 200 km from the island of Guadeloupe in around a week. A hurricane had uprooted the tree.

Fig. 1: Plastic waste (top) with hitchhikers (bottom)

There are 1205 species that either have rafting confirmed or inferred using distributional genetic evidence. These range from the protists and cyanobacteria to algae and marine invertebrates from most groups. Most common are the hydrozoans, bryozoans, crustaceans and gastropods. Some species have established their own means of rafting such as the Violet snail (*Janthina janthina*) and *Sargassum*. *Janthina* blows bubbles out of its aperture to create a bubble raft and leads a pelagic life and *Sargassum* has tiny air-filled bladders that are full of air and it creates a large floating mat. The Sargasso Sea is full of the floating algae, which provides a safe haven for many juvenile and adult marine species including 100 species of fish, 150 invertebrates and 4 species of turtle. The deep waters of the North Atlantic would otherwise be a treacherous and exposed place for these juveniles.

In March 2011 an earthquake and tsunami tore through Japan ripping docks apart, intertidal communities were wiped clean and terrestrial debris was washed into the sea. The debris was caught up in the Kuroshio current and swept to the East Pacific. A year later electrical appliances, five fishing boats and a 188 ton, 66 feet long chunk of dock were washed ashore in Oregon, the latter two were both infected with invasive crabs, seaweed and plankton.

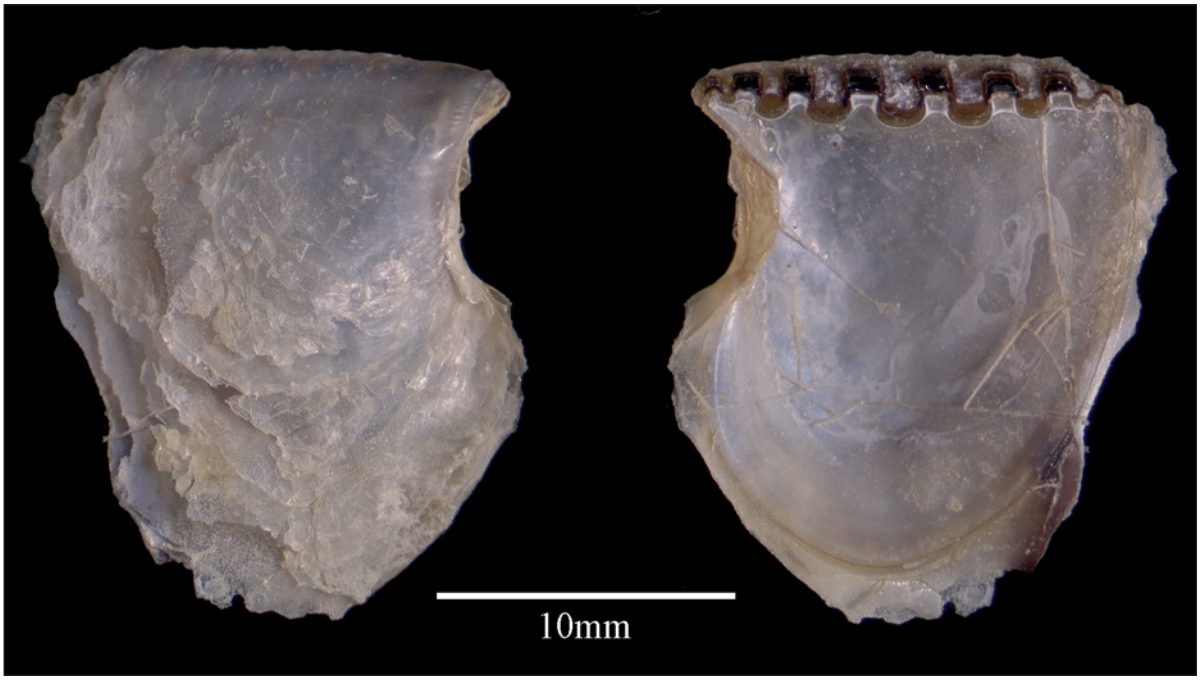

Fig. 2: The bivalve Isognomon bicolor

So what are the requirements to be an efficient rafter? Firstly and most importantly you need to be able to hang on and then if there are other organisms on the raft there will be competition for resources and space. Lastly, you need to be able to survive on that raft until the end of the journey. The requirements of an invasive rafter are all of the previous and more. They need to be able to grow and reproduce before then disembarking and then colonising their destination.

Non-native invasives

A non-native invasive is any species that colonised the UK or Ireland after the final land-bridges of the last ice-age disappeared. Much of this movement is by man. If that species had the ability to spread causing damage to the environment then it is considered an invasive. There are 90 non-native species in British marine and brackish waters and 112 species in Ireland. Over 55% of these species are established in Britain and Ireland (Minchin *et al* 2007; 2013).

The recent influx of anthropogenic waste carrying rafting species presents a worry if those species become established. At least one of the species discovered recently, *Isognomon bicolor*, is native to Florida and a known invasive in Brazil. *Isognomon* is opportunistic and not at all fussy about what is attaches itself to: as well as attaching to plastic bait pots it has been recorded attached to *Sargassum*.

Recent west Atlantic molluscan hitch-hikers

The following is a list of American species that were recently reported from British and Irish shores in Holmes *et al.* (2015) and in a presentation at the annual Porcupine MNHS meeting March 2015.

Pinctada imbricata imbricata (Pearl Oyster)

3 specimens found on plastic spool on Chesil beach, Dorset. Known from North Carolina, Caribbean and through to Brazil.

Isognomon bicolor (Bicolor Purse Oyster)

(Figure 2) 4 specimens found on plastic spool on Chesil beach. Known from Florida, Caribbean and through to Brazil. Is classed as Invasive in Brazil. A decrease in density of native bivalves was observed after invasion by *I. bicolor.* (Martinez 2012)

Aequipecten heliacus

2 specimens inside a bait pot washed ashore on Chesil Beach. Known from South Carolina to Florida through Caribbean and Bahamas.

Fig. 3: Washed up coconut with hitchhikers attached

Euvola ziczac (Bermuda Sand Scallop/Zigzag Scallop)

3 specimens inside a bait pot washed ashore on Chesil Beach. Known from North Carolina, Bermuda and throughout West Indies.

Pododesmus rudis (Atlantic false jingle)

2 specimens attached to a bait pot and 1 specimen inside bait pot washed ashore on Chesil Beach. Known from E coast of USA through to Argentina.

Chama congregata (Corrugate jewelbox)

1 attached to plastic fish box washed ashore on Chesil Cove. Known from South Carolina to the Caribbean.

Cerithium litteratum (Stocky Cerith)

1 specimen in a bait pot washed ashore in Waterville, W Ireland. Known from South Carolina, Bermuda and to Brazil.

Martesia fragilis

2 specimens inside a coconut washed ashore at Lusty Glaze Cove, Cornwall (Figure 3). Described from Virginia, USA.

Since reporting on the species above, further plastic waste has washed ashore, bearing further American species. These additional species are still being studied and will be officially reported on in *Journal of Conchology* and as a follow-up paper in the *Bulletin of the Porcupine Marine Natural History Society*. None of the above species have become established in our waters yet as breeding depends on higher sea temperatures than our summers average. However, reports of Bluefin tuna off Devon and Cornwall indicate that sea temperatures are rising and if this continues then optimum breeding temperatures could be reached in the future allowing spread of these potential invasives.

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Seaweed, skuas and sea sickness: a trip to North Rona and Sula Sgeir

Becky Hitchin

It was evening. Someone called down to the cabins that dinner was ready. There were sounds of movement from all around, and soon, clinks of cutlery and appreciative noises could be heard. I turned over in bed, groaned, and for what felt like the hundredth time, threw up.

We were on our way to North Rona, an uninhabited, isolated island 44 miles north of the Butt of Lewis, having left Stromness, Orkney on the MV *Halton* before dawn on an August morning. We did one dive on our way out of Orkney, just south of the Old Man of Hoy. It was a good first-dive-of-the-trip dive, on a rocky pinnacle that was covered with nudibranchs – *Janolus cristatus* (Delle Chiaje, 1841) everywhere, *Facelina auriculata* (Müller, 1776) (Figure 1), *Polycera quadrilineata* (O. F. Müller, 1776) and *Polycera faeroensis* Lemche, 1929 abundant on the kelp, *Cadlina laevis* (Linnaeus, 1767) providing splashes of startling white against the pinks of both coralline algae and *Pterosiphonia parasitica* (Hudson) Falkenberg, 1901. The specimens of *Janolus cristatus* were interesting – I'd seen photos of this species with an orange tint to the body, but never seen any for myself (Figure 2). These ones at Nipple Rock were nearly all orange.

Fig. 1: Facelina auriculata *from Nipple Rock*

Fig. 2: Janolus cristatus *from Nipple Rock*

After leaving Hoy, we sailed straight for North Rona, via a dive on Sule Stack. At least, apparently there was a dive on Sule Stack. By that time I had already retreated to my cabin, getting greener and greener as the hours passed. Half way across, I had come to an awful conclusion. My prescription-only, triple-strength sea-sickness tablets were not working. Was I about to have a whole week of not even getting onto the main deck, let alone getting in the water?

If that had been the case, this would have been a very short article. But luckily, when we finally anchored in a sheltered bay at North Rona, I remembered through a somewhat groggy mind that I had also packed a very different back-up type of sea-sickness tablet. I took one. An hour later I felt almost alive and soon after that, I almost literally bounced out of bed and got given some rehydration powders and food. I missed the first dive at North Rona, but was back up and running for every dive after that.

Our second day was a surprise, as skipper Bob Anderson decided that it could be our only chance to get to Sula Sgeir, so we headed off and dived a small rocky outcrop just south of Sula Sgeir called Gralisgeir. Some members of the dive

Fig. 3: Puffins on North Rona

group dropped down to the 38m seabed, finding smooth hounds and shoaling fish hanging off the wall in great clouds, including bait ball size clusters of silversides reflecting in the light. I stayed a bit shallower, floating past swathes of the jewel anemone *Corynactis viridis* Allman, 1846, and then getting fascinated by the kelp communities. Out there, the kelp occurred down to at least 20m, and in August, it was thick, luxuriant and crawling with life.

After that one dive, we made the run back to North Rona for shelter as weather and sea conditions were worsening. We did, however, have time that afternoon to go ashore on North Rona to explore. The only way to get ashore was to get close in to the island on the *Halton*'s small dinghy, either jump off gracefully or collapse in a heap on the North Rona rocks, and then navigate your way up the cliffs, avoiding patches of bog and contentedly idling puffins. Some routes up the cliff were little more than steps, some were distinctly more vertical. Whichever way you got onto the island, it was good to not feel the boat rocking for a few hours.

North Rona is fascinating. For a small island in the middle of nowhere (lying around 70 kilometres from both the Butt of Lewis and Cape Wrath), there's a lighthouse, a bothy kept up by Scottish Natural Heritage (more of which later) and an abandoned church and oratory. It is the most remote island in the British Isles to have ever been inhabited on a long-term basis, and makes St Kilda look like a tourist attraction. The church and oratory are associated with St Brendan. Old tales tell of how St Brendan was carried to the island from Lewis by a whale and was greeted on North Rona by a pack of monstrous dog-like animals, with long claws and great round eyes glowing like hot coals, which after a fierce battle he drove backwards over one of many island cliffs.

While we weren't greeted by anything akin to the Hound of the Baskervilles, we were greeted by something equally fierce – the local population of skuas that took off low from their nest sites, skimming to within a few inches of your head before gliding off again. The only notice you ever had of the aerial bombardment was a moment of whistling as their streamlined shape flung itself toward you. One of the dive party was German, and informed us that in his language, skuas are known as raptor gulls. I think that particularly appropriate. To soothe fraught nerves from aerial bombardment, we

spent hours watching the puffins that would let us sit within a few metres of them (Figure 3).

We were all interested to see what SNH considered essential supplies in their bothy. It turned out to be as expected – petrol, boxes of slightly out-of-date chunky Kit Kats, cider and a shelf of rather good quality whisky.

But back to the diving. All the dives we did in the bay were of similar type, descent to a white sandy seabed followed by a slow ascent in and out of gullies reaching far back into the island. One gully even went right through to the other side of the headland, but the swell in it was so strong that no one attempted the full traverse. Or rather, some attempted, and quickly got spat back out again. The rock in every site was a carpet of colour from *Corynactis viridis,* sponges, hydroids and numerous nudibranchs. The water column was clean and clear, full of fish such as pollack, wrasse, mackerel and saithe.

I could write a lot about how wonderful the sites were, but I'll restrain myself to some of the highlight moments that will stay with me for a long time. Descending at Cleit an t Sionnaich to come face to face with the largest lobster I've ever seen cruising along the rippled sand (Figure 4) then turning round to see my first ever nursehound, *Scyliorhinus stellaris* (Linnaeus, 1758). Watching light sparkle on the white sand. Hardly managing to get past the kelp zone at Poll Thomatom as it was so full of clingfish and nudibranchs – mainly all the colour morphs of *Polycera quadrilineata* and a number of *Eubranchus* species, including the balloon-like *E. farrani* (Alder & Hancock, 1844). The caves of Prigeachan Lamhaeleit – this dive took us through three separate gullies and caves, the first dark and narrow, but the second and third covered with life. We found the anemone *Phellia gausapata* Gosse, 1858 at the back of the second cave, and noticed that North Rona seemed to have a number of white colour morphs – I found a white *Caryophyllia (Caryophyllia) smithii* Stokes & Broderip, 1828 while another diver found a white *Porania (Porania) pulvillus* (O.F. Müller, 1776).

Eventually our time at North Rona was over, and Bob decided to dash back to Orkney when a weather window opened. We stopped on the way back to dive Nun Rock, a submerged

Fig. 4: Lobster at Cleit an t Sionnaich

pinnacle in the middle of nowhere. This turned out to be, I think, my favourite ever UK dive. After a warning from Bob that it would only be a good idea to dive if we thought we would be able to get back out in worsening swell, we descended to a pink world starting at about 10m below the water. Large gullies lead down from the top of the pinnacle, covered in every colour of *Corynactis viridis* and large patches of pink coralline algae (Figure 5). There was life on top of life on top of life. Hydroids on *Alcyonium digitatum* Linnaeus 1758, themselves covered with caprellid amphipods, reaching out into the water and making the whole surface move and shimmer. There was pink *Haliclona (Rhizoniera) viscosa* (Topsent, 1888) sponges, pink *Sagartia elegans* (Dalyell, 1848) anemones, nudibranchs, sponges, crustaceans, hydroids, bryozoans, sea squirts. Even surfacing to have to cling frantically to the lift plunging up and down several metres couldn't stop the smiles on our faces, and we headed back to Stromness with our heads full of wonder, of how vibrant and alive our shallow seascapes can still be.

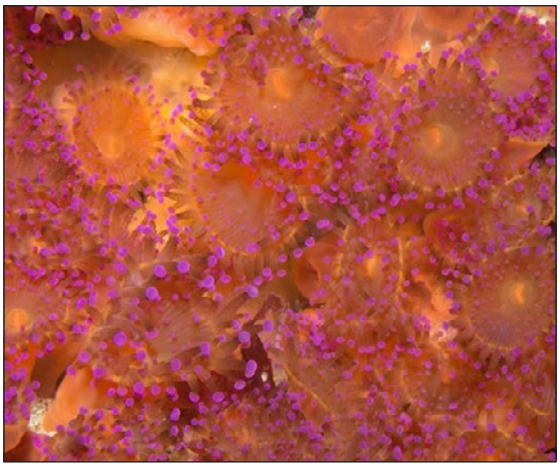
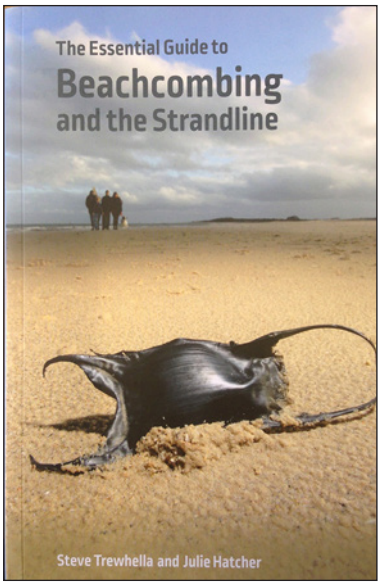


Fig. 5: Jewel anemones (Corynactis viridis) *at Nun Rock*

The Essential Guide to Beachcombing and the Strandline – Steve Trewhella & Julie Hatcher

Wild Nature Press
ISBN 978-0-9573946-7-4
RRP £16.99



Book review by Fiona Crouch

Beachcombing is an activity that consists of an individual "combing" (or searching) the beach and the intertidal zone, looking for things of value, interest or utility' (https://en.wikipedia.org/wiki/Beachcombing). I'm not sure that as a child I knew I was beachcombing but I have spent many an hour walking along a beach searching for shells, picking up litter or poking stranded jellyfish. Steve and Julie have taken beachcombing to a whole new level and have kindly shared their experiences, treasures and not so pleasant finds in this excellent book.

The Essential Guide to Beachcombing and the Strandline has something for everyone, being both an identification guide and an activity book. Sea whistles, seaweed pressing and how to turn your beach finds into an attractive garden feature; it's all here. Porcupine members may feel they have numerous ID guides already, so why purchase another? But Steve's photographs show species as they are found washed up, slightly tatty and not as they are presented in a traditional guide. Some beautiful photographs of species in all their glory before they succumbed to a predator or were left high and dry on the shore are pleasing to see as well.

The most fascinating sections of this book for me are the less familiar finds, ocean drifters, exotic (non-native) species found attached to marine litter and those bits of plastic which I curse but that may have travelled thousands of miles before landing on our shores.

Not everything you discover when beachcombing is natural. In addition to the wealth of information on what you can discover, natural or human-made (gender correctness) the authors have highlighted the associated threats to our marine environment.

This is in my opinion an 'Essential' guide! As I write this review a storm is raging outside and inspired by this book I'm wondering when I can get to the beach to discover what has been left in its wake. And yes I will take a few bags so I can do a 'Two-minute beach clean!

To support the book Steve and Julie have set up a public Facebook group 'The Essential Guide to Beachcombing and the Strandline'.

https://www.facebook.com/The-Essential-Guide-to-Beachcombing-and-the-Strandline-693606720748644/

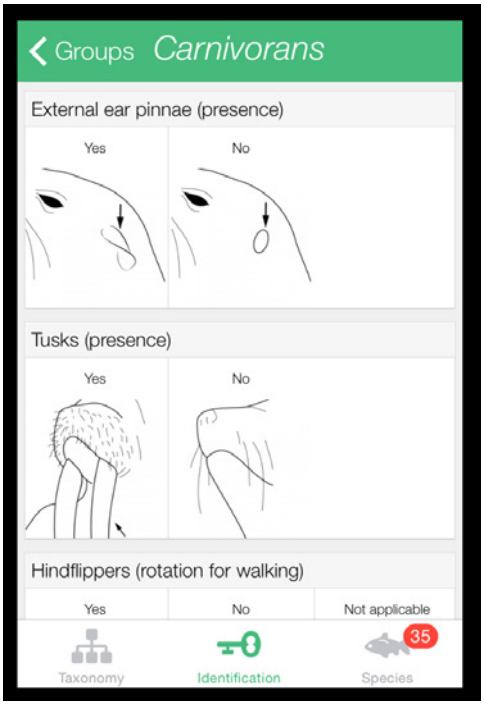
Ocean Life ID Web Application

Review by Mel Broadhurst

The Ocean Life ID web application (app) was developed in 2014 by Skaphandrus. Skaphandrus is a global marine based citizen science project, setup in 2010. It aims to provide initiatives, products and services to sea economy. The Skaphandrus project has an interesting website (which is worth a visit: http://skaphandrus.com), and regularly updates marine life information to the public via social media such as Facebook and Twitter.

The aim of the Ocean Life ID app is to provide a simple, yet effective way for the public (particularly scuba divers) to identify marine species. Skaphandrus states it has been designed by biologists, illustrators and scuba divers. The app primarily comprises of a series of neatly illustrated taxonomic keys of the taxonomic groups; Mammals, Reptilia, Ray-finned fish, Slugs, Molluscs and Aves.

I downloaded the app for free onto my IPad. The app opens into a nice, clear format displaying an illustration for each taxonomic group. I decided to test the app by trying to find a marine mammal species that I regularly survey, the grey seal (*Halichoerus grypus*). I selected Mammals > Carnivorans and was presently surprised. The page opens into a series of interesting taxonomic characteristic features, to help identify the species I was looking for. This included characteristic features such as distribution location, key body features (shape, length), marks/coat colouration etc. I was impressed with the variety of taxonomic characteristic features and how they were illustrated. I selected the distribution region feature (NE Atlantic), which instantly narrowed down the search to just three species; the Mediterranean Monk Seal (*Monachus monachus*), the Common/ Harbour Seal (*Phoca vitulina*) and the Grey Seal (*H. grypus*). I selected the Grey Seal feature which opened into a separate species information page. This page consisted of a large photograph of a Grey Seal (which was cleverly linked to Google images) and general information on the species. Unfortunately as I read the information I realised that it was rather limited (no male/female features, habitat preference feeding etc.) and that the text was incomplete. I thought the error may only be with this particular page, so I tapped back and had a snoop at the Common Seal (*P. vitulina*) page. Alas, the information was extremely short, incomplete and included the words 'leopard seal'. Gah (I sincerely apologise for the rudeness Porcupiners). I then played around with the app for a while and found that quite a number of the species information pages had limited information or incomplete text. I am disappointed with these errors and find it a real shame. I feel that a lot of



thought, time and effort have been taken to create this app.

Overall, I will give the Ocean Life ID app two and a half out of a potential five stars. I enjoyed using the app to identify species and the illustrations are beautifully accurate. However, I am a bit nervous regarding the species information given. For example, I cannot find references related to the species information or the author's name(s) (only the names of the illustrators). In addition, the app misses out several other marine groups such as marine algae, sponges, arthropods and so on. I fully support sound marine based citizen science projects, such as Skaphandrus. Therefore, if Skaphandrus can overcome these problems in the near future, I would recommend this app to Porcupiners who need a quick method to identify certain marine species. In its present state, when using this app I would personally double check the information given with another primary or secondary sources.

How on earth did I become a marine biologist?

It couldn't happen now

Bob Earll

Director at CMS Communications and Management for Sustainability

This is a story of my initial steps to become a marine biologist. It's not so much about me as the many other people whose actions and decisions shaped events. It involves a mix of luck, coincidence, chance, commitment and many other things. I didn't and haven't ever quite known what I wanted to be, but I have always been able to become actively interested in a very wide range of different things. I'd go so far as to say that I've become an expert generalist which is a rather useful trait for someone who organised conferences and now prepares newsletters. I've been interested in marine biology for a very long time. Initially inspired by field trips it was diving that really clinched my interest and still does. My interest has been sustained through many phases, the PhD research on bivalve activity, the work on sublittoral ecology and with sports divers, the insights on a variety of marine conservation issues and more recently in helping pull together a host of conferences where marine biology has underpinned the content of the events. The latest of these projects is a website on marine life (seastuff.com). So whether one is paid or not, an interest in marine biology once ingrained is rather hard to shift.

Early years, parents & school

Both my parents, in very different ways made a huge difference to this story. It was my mum's drive to move our family out of a London flat to a house near St. Albans that was key. I was interested in wildlife and bird watching, and watched, Attenborough, SeaHunt, Hans & Lotti Hass on the TV but she bought me the observer guides to wildlife and took me to a talk by Eric Hosking the bird photographer. My dad was a keen sea angler and he took me on some memorable trips; his weekly angling newspaper provided a drip feed that made me aware of marine life. I failed my eleven plus and went to a secondary modern school whose main role was to provide workers for Vauxhall and the aerospace industry; it didn't do biology, chemistry or French. My mum persuaded the school to let me do 'O' level Biology which I did with 1:1 lessons. Chemistry was more fundamental though. An astonishing teacher, volunteered to give a group of six

Fig. 1: Bob with a group of divers

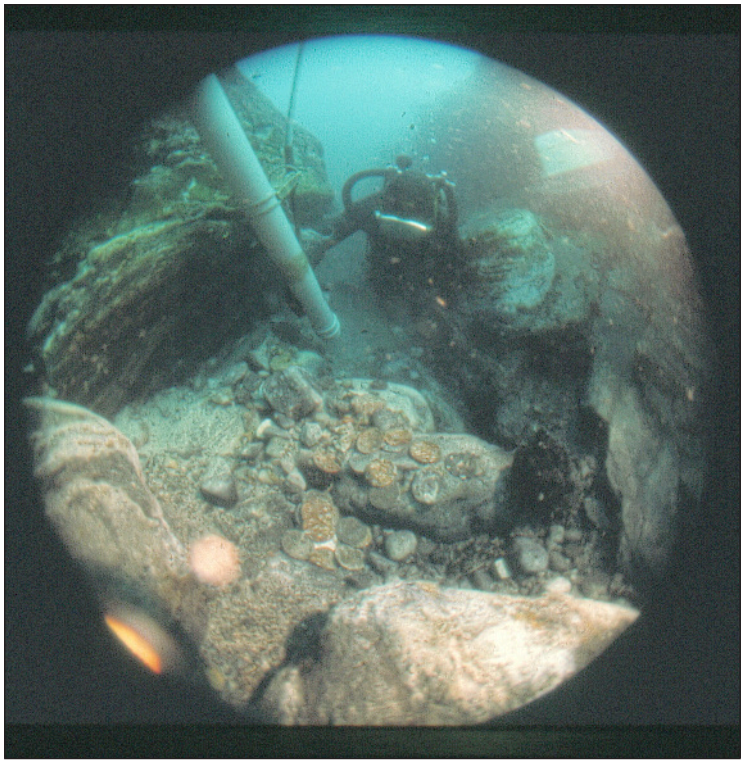


Fig. 2: With Flip Schulke on the wreck of the Liefde

of us chemistry lessons after school to do 'O' level chemistry – in one year – we all passed. I got good results and switched to a grammar school in St Albans for the sixth form where I was most interested in zoology but not very good at it. The chemistry master was a star he enabled me to get a B in 'A' level chemistry which secured my place to Hull University, and that grounding also enabled me to pass and survive 1st year subsidiary chemistry. I went to Hull because in the 60's it was one of only two UK universities to accept candidates without 'O' level French! My work experience in the 6th form took me with a local helminthology lab in St. Albans, push netting for plaice off Anglesey and on a MAFF boat trawling in the Irish Sea for four days. We also went to Northumberland on a week long field course – mud, and rocky transects and a visit to the Farnes all while based in St Albans!

The inspiration of diving

My dad worked with the chairman of the St Albans BSAC and because of this in September 1967 I went on a diving trip with them to Swanage. It was a game changing moment snorkelling around Swanage pier seeing a vast array of marine life *in situ*. In Easter 1968 I went back for a diving course at Divers Down on Swanage pier; diving the navy way! Divers Down contacted me shortly afterwards to see if I wanted to go on a diving expedition to the Out Skerries, Shetland to dive on the wreck of the Dutch East Indiaman *Liefde*. The two leaders were Commander Alan Bax and Jim Gill who set up Fort Bovisand later that autumn (1968). This expedition had huge influence on me. I did 80 work dives, mostly on my own, met the great American underwater photographer Flip Schulke, baked kelp in the oven for David Bellamy's Operation Kelp, spent a wonderful dive picking coins out of the sand and we discovered another Dutch East Indiaman wreck – the *Kennermerland*.

Saying yes

In the second summer holiday spent twelve weeks in Florida; this was set up by Flip Schulke. It provided first my experience of corals, and things tropical and I was able to get papers for my final year dissertation on artificial reefs. The following year I went on another expedition to Jamaica because of going to Florida and Helen Ross's recommendation (a psychologist at Hull). I was sitting on the veranda of our house in Kingston, Jamaica, when a telegram was delivered by a boy on a bicycle - It read, 'PhD. Ecophysiology of

bivalves. Trueman. Manchester University. Yes or No by return.' I said yes. Ted Trueman – a mollusc man - had been in Hull and had just got a chair at Manchester and so ensued what was six years work on bivalve activity patterns. Ted Trueman, had a sink or swim approach to supervision, but he was very supportive and he appointed me to a Post Doc fellowship in 1975 and then he let me have free use of a room at the University once I took on UCS* in 1978. Another chance event, Bob Foster-Smith coming to Manchester in 1974 rescued my PhD at a time of despair. An electronic flow meter he built enabled me to measure the pumping patterns of bivalves which beefed up my results. He also got the very short straw of reading my thesis and his retrospective supervision provided the encouragement for me to finish it.

Conferences played a huge part in my developing interests, the Underwater Association conferences in particular were inspiring and showed me that you could have a career using diving and science. It was these events that lead me to organise the Underwater Conservation Society (UCS) annual conferences, which in turn have lead on to Coastal Futures (now in its 23rd year) and the 200+ events of the last twenty years.

Shetland survey 1974 - Chance in a small world

At Manchester (1970) I naturally went to the diving club and the first person I met was Richard Price; he'd just come back from an expedition to Shetland diving on the wreck of the Kennermerland. We got planning and in 1973 returned to Out Skerries for a Manchester University expedition. In 1973 I'd completed a note (two sides of A4) on the marine life of the Out Skerries and circulated it to various people. Shetland in 1974 was going through the North Sea oil boom and oil pollution was still a major issue after the sinking of the Torrey Canyon. Out of the blue I got a letter asking if I'd like to do undertake a diving survey of Shetland for the Institute of Terrestrial Ecology (ITE); no proposal, no competition just an interview. I said yes. This was the first time I'd been paid to be a marine biologist. Two of us, Chris Lumb and I, spent 10 weeks doing shore based diving transects. The ITE approach to ecology was highly structured, systematic and statistical. Mark Hill (M.O.Hill) of their Bangor labs had just developed indicator species analysis – which also became known as twin span - and our output was the first benthic data set ever to be analysed in this way. We and an intertidal team used a physical analysis of the entire Shetland coast to structure our samples. The ordination diagram showed an almost perfect semi-lunar curve of site distribution from very sheltered at one end to very exposed at the other. We did our shore based diving transects across this entire exposure spectrum. Plotting the results from the sites on this spectrum you got in effect a Ballantine exposure distribution for the first 30m of the sublittoral environment. At the sheltered end dives were virtually all sediment, at the exposed end all rock, with the sites in between being a mixture of rock and sand depending on the exposure to wave action. That certainly influenced my views of subsequent diving surveys and it put every other site I dived in the UK into a clear context.

Working with sports divers

In 1975 a group of us from various different diving clubs in the Northwest formed the Northern Federation of Diving Clubs (Norfed) marine biology group, Rico, Jack Woodward, Ron Crosby played a leading part in setting this up and it was the forerunner for other such groups. In 1975 Hugh Jones and I were able to persuade the university to put on an evening class course on marine biology for sports divers – 10 weeks and a weekend field trip to Millport. By the time I left Manchester in 1980 the introductory marine biology courses were getting over 50 attendees and three different courses were underway. I always found it rewarding, teaching and working with the sport diving community; their interest and commitment are massive. When it came to setting up the Species Recording Scheme for Underwater Conservation Year (UCY) and then the job interview for UCS it was this desire and ability to work with a very wide range people that clinched getting the job.

David Erwin – a different kind of chemistry – right place right time

I've always liked observing and making lists, whether trainspotting or listing the species

on the bird table; I still do sitting on the cliffs counting the birds and seals or when snorkelling or diving.

Our generation had been brought up on David Bellamy's diving projects for sports divers; it wasn't called citizen science then. In the autumn of 1976 I went to Durham for a regional Underwater Association meeting and met David Erwin. His 'Shetland' was Strangford Lough where the hydrodynamic regime very clearly determines the distribution of sublittoral habitats and species. We clicked immediately, a different kind of chemistry. Then came a call for projects for Underwater Conservation Year (UCY 1977) and we quickly put a species recording project together, a checklist of species illustrating the major habitat types rock and sediment. It became the most popular project in UCY with over 400+ cards being completed; over 1200 were eventually filled in. I was working as a lecturer at Leeds Polytechnic at the time not on marine biology. It wasn't until March 13th 1978 that I got the job as project co-ordinator for what would become the Marine Conservation Society. For a few years the work was a lot of marine biology and citizen science but it soon became heavily involved in marine conservation and developing and administering the organisation.

Making sense of this 50 years on

Looking back I realise just how lucky I was, it was almost a charmed life. Lucky being at the right place at the right time, the start of the use of diving science to describe our shallow sublittoral zone and beginnings of marine conservation as a profession. In the end I made my living from bringing people together mainly through conferences not directly through marine biology, but the interest never leaves you. I derive as much interest from snorkelling now as I did on the very first time I snorkelled at Swanage almost 50 years ago.

UCY 1977 - Underwater Conservation Year was in 1977, and with money left over it morphed into the Underwater Conservation Programme in 1978 which is when I joined as project co-ordinator. By 1979 there was sufficient interest and financial support to form the Underwater Conservation Society. This changed to the Marine Conservation Society in 1983.

Would you like to contribute to the next *Porcupine Bulletin*?

- We are always open to offers of book reviews, website reviews and reviews of mobile apps!
- Interesting or topical sightings of marine life, or stories of your fieldwork experiences are always enjoyed;
- Informative line drawings of marine life are great for filling in small spaces at the end of articles;
- Articles on any subject relevant to marine natural history
- or anything else that you feel would be of interest to the readership!

In the first instance, please contact Vicki Howe with what you would like to offer. Guidelines to Authors are printed on the back page of the Bulletin, please take note of these when writing your article and particularly with reference to any images you wish to have printed.

Deadlines for contributions are:

Autumn 2016 issue - Friday 10th June 2016

Spring 2017 issue - Friday 9th December 2016

Instructions to authors

Although we can deal with most methods and styles of presentation, it would make our editorial lives easier and speed up publication if contributions to the *Bulletin* could follow these simple guidelines. Please submit material in electronic format where possible either by e-mail or CD.

Title, Author(s) & Address(es)

Title should be concise, informative and in bold type. Include author(s) names each with one full Christian name. In multiauthored contributions, the last name is separated by an ampersand, e.g., John Smith, David G. Jones & Susan White.

Include any institution/place of residence & contact details to appear with your name at the beginning of your article. Multiple author addresses can be linked to authors by superscript numerals.

Text

- Times New Roman font, 12pt, single line spacing, saved as a Word document (.doc/.docx)
- Use bold to highlight headings but do not use any Word 'styles' to format text. Avoid using headers and/or footers where possible.
- Reference tables & figures in the text as Figure 1, Table 1 etc. and in legends as Table 1: , Fig. 1: (individual parts A, B etc should be described also).
- Indicate where figures should be placed e.g. Insert Fig.1 here (send image files separately to text)

Illustrations (Figures and Plates)

- Photographs: greyscale or colour (RGB) JPGs or TIFs with a resolution of 300 pixels per inch and maximum width of 16 cm. Save at **high quality** (very important).
- Line drawings (particularly maps): EPS (preferred) or TIFF files. If it is a detailed map which will need the full page width, save it with a width of 16 cm. Maps with complicated colouring schemes are difficult to interpret in print – please consider using easily distinguished symbols instead.
- Graphs, histograms, etc. can be supplied as line drawings, or Excel files, each saved as a separate sheet

We can scan good quality photographs, transparencies and hard copies of drawings, where necessary.

For each illustration, photo etc. submitted, please provide: Filename, Caption, Photographer (if appropriate) and please be aware of any copyright issues.

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Scientific names

Latin names should be italicized. The entire scientific name should be given in full the first time it is mentioned, but thereafter the genus can be abbreviated — except at the beginning of a sentence. Authorities for taxa follow standard taxonomic guidelines, with a comma before the date; e.g., *Zeuxo holdichi* Bamber, 1990; *Melinna albicincta* Mackie & Pleijel, 1995; *Neanthes irrorata* (Malmgren, 1867).

References

- Do not leave a line space between references. Journal titles should be cited in full.
- Citations in text: ….Brown & Lamare (1994)…or… (Brown & Lamare 1994)…, Dipper (2001)… or…(Dipper 2001).
- The main reference styles are as follows:

Brown, M.T. & Lamare, M.D. 1994. The distribution of *Undaria pinnatifida* (Harvey) Suringar within Timaru Harbour, New Zealand. *Japanese Journal of Phycology* **42**: 63–70.

Dipper, F.A. 2001. *Extraordinary Fish*. BBC Worldwide Ltd, London. 96pp.

Ellis, J.R., Lancaster, J.E., Cadman, P.S. & Rogers, S.I. 2002. The marine fauna of the Celtic Sea. In J.D. Nunn (Ed) *Marine Biodiversity in Ireland and adjacent waters*. *Proceedings of the ECSA Conference, 26-27 April 2001*. Ulster Museum, Belfast. pp. 83-82.

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