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After the storms

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Fig. 1: The Mewstone from above Wembury Point in South Devon on 8th February 2014

Introduction

From mid December 2013 to the end of February 2014, the coast of south-west and southern England and Wales were battered by a succession of severe gales, introducing a new category of sea state to my vocabulary: "Phenomenal". Furthermore, there was exceptionally heavy and prolonged rainfall (the highest since 1760 apparently). The significant damage to coastal properties and infrastructure, and the wrecks of seabirds (almost all auks) were widely reported and a great deal of litter was washed-up. So, what of shore and seabed marine life? The following is an account of findings that I have gleaned from my own and your observations. Not every sighting of washed-up or broken wildlife is necessarily the result of storms but many are. For observations that are not mine, the source is indicated.

Overall, it seemed that there had been some extremely large movements of sediments including very coarse material such as the cobbles especially on Chesil Beach[1]. Pebbles and cobbles being thrown at intertidal reefs had smashed barnacles and no doubt there were mussels either ripped-off by wave action or smashed off by mobile large sediments. Many limpets attached to rocks in Whitsand Bay showed signs of shell abrasion and thinness. In North Devon, some areas of large mussels had been devastated[2] and, in the Torridge Estuary, about 90% of mussels had been lost from some intertidal areas[3]. The level of sediments on sandy beaches had dropped by over a metre in many places and, by the end of May, had not returned, or only a little had returned. At Wembury Beach, the sediment had not returned by the end of June and was reported as dumped on shallow reefs just offshore. At Crackington Haven in North Cornwall, sand had been stripped away revealing long-dead *Sabellaria alveolata* (Linnaeus, 1767)– doubtless settled after a previous major storm event[4]. Early colonization of bare rock, mainly by *Ulva* (tubular) sp(p) and *Porphyra* sp(p) and, at Hell's Gates on Lundy, *Alaria esculenta* (Linnaeus) Greville, 1830, was occurring during and after

Fig. 2: Tregantle Beach, Whitsand Bay, 30 March: (left) Isolated area of scoured rock, most rocks were little affected; (right) colonisation on rocks exposed by sand level reduction but otherwise not subject to damaging scour. Mussels and barnacles seem largely intact.

Fig. 3: Boulder displaced from a rockpool at Wembury Point, 3 March 2014.

April. At Kimmeridge, probably because of loss of limpets from some areas of very soft friable rock, there was a bloom of green algae[5]. Young limpets (8-10mm across) were common in the areas of uncovered rock at the end of June at Wembury. On many rocky shores, friable rocks had been broken in places and boulders displaced out of rockpools so that the fauna and flora was subject to desiccation and died. At Long Rock in Mounts Bay near Penzance, reefs had been broken-up and an eel-grass, *Zostera marina* (Linnaeus, 1753), bed largely (more than 50%) destroyed. Although there were signs of damage to eel grass off Marazion, the beds there were almost all intact[6]. There was also an unusually high abundance of stalked jellyfish at Marazion after the storms and the possibility they had been displaced from elsewhere and deposited in the shelter there[7]. Movement of sediments (presumably suspension and re-settlement elsewhere) also occurred in deeper subtidal areas with fishermen observing that they were trawling-up rocks where previously there had been level sediment[8]. In Plymouth Sound, divers observed bare rocks in places where previously there had been sediment. Any species living in the sediments must have been

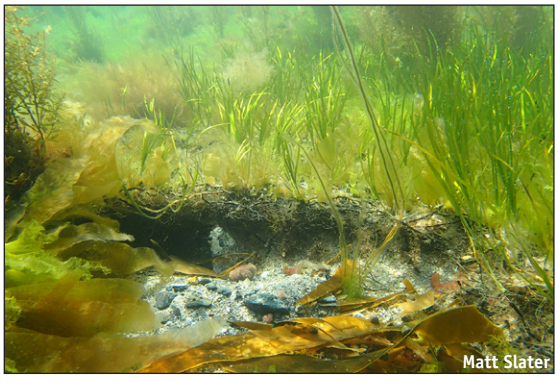

Fig. 4: A damaged eel grass bed at Marazion.

displaced and many may not have been able to re-burrow. The stranding of otter shells (*Lutraria lutraria* (Linnaeus, 1758)) at Whitsand Bay[9] on 20 February was spectacular. A stranding of *Lutraria* was also reported on 12 February at Marazion and it was noted that such had also been observed on 19 February 2001 by Nick Tregenza[7]. Mantis shrimp, *Rissoides desmaresti* (Risso, 1816), were washed-up following storms at Dungeness in Kent and at Felpham in west Sussex[10]. Razor shells, *Ensis ensis* (Linnaeus, 1758), were also washed out of sediments providing a feast for the gulls. 'Policeman

*Fig. 5: A spectacular 'wash-out'of otter shells (*Lutraria lutraria*) stranded in Whitsand Bay.*

anemones', *Mesacmaea mitchelli* (Gosse, 1853), that normally live buried in sediments, were being picked-up in MBA trawls in Bigbury Bay and at station L4 halfway between the Plymouth breakwater and the Eddystone including in mid-June[11]. There was even the shell of a fan mussel, *Atrina fragilis* (Pennant, 1777), washed-up at Sand Bay, Exmouth[12]. It seems that scallop populations may have been adversely affected on the open coast and a fisherman working out of Polperro, working grounds between Rame Head and Mevagissey reports not being able to find any scallops[13]. Some pink sea fans, *Eunicella verrucosa* (Pallas, 1766), had been detached and there were many washed-up at some locations on the strandline (at Chesil Beach, Wembury Point and in Whitsand Bay[14]), although almost all popular diving sites on rock reefs with sea fans looked much as always. On ex-HMS *Scylla* in Whitsand Bay, comparisons of photographs taken in October 2013 and in April 2014 revealed eight fans in one location where

Fig. 6: Specimens of the burrowing anemone Mesacmaea mitchelli *caught from the surface of sediments in a MBA trawl in Bigbury Bay, South Devon. They were still being caught in mid-June.*

there had been nine and the same seven fans in another. However, on the nearby wreck of the *Rosehill*, seafans, with their sea fan anemones and all else had been stripped from many of the plates and some plates overturned leaving bare metal. Similar observations were made on the *Persier* in Bigbury Bay. Some rocks were scoured in the intertidal and most likely in the subtidal no doubt by sand blasting. However, they were not typical and it seems most likely that they were facing in the 'wrong' direction and received isolated damage. Many rockpool algal communities looked much as always in springtime during the seaweed identification course at the MBA and the comment was made that those rockpools that had been scoured may well develop very rich communities[15].

Some subtidal reef habitats may have been significantly damaged. In particular, the studies monitoring recovery of Lyme Bay reefs suggested that massive amounts of sand have been dumped on the reefs and that a lot of recovering benthic

Fig. 7: Scoured-out sediment and a 'new' rockpool at Lundy with rockfall in the foreground, 17 May 2014.

Fig. 8: Seafans were found on the strandline at several locations, although populations on the seabed surveyed after the storms seemed normal except that the lower parts of some individuals were scoured. Renney Rocks near Plymouth on 19 March.

fauna had been scoured away[16]. At one location outside of Plymouth Sound, shale reefs had been broken-up in places or at least pre-existing slabs of rock moved-around and pink sea fans, *Eunicella verrucosa*, displaced[17]. Many seafans near to sediment had bare skeleton near the base where the coenenchyme had most likely been scoured off, although regrowth of tissue may be occurring[5]. Although many large colonies persist, there is a suspicion that the very fragile colonies of ross coral, *Pentapora fascialis*, may have been destroyed in places. At Firestone Bay in Plymouth Sound, the abundance of filigree worm, *Filograna implexa*, colonies (which are often loosely attached to other organisms) appeared much less in spring and early summer than usual although seemingly 'as always' by the end of June. Also, although difficult to link to storms, abundance of *Tubularia indivisa* Linnaeus, 1758 in Firestone Bay was much reduced this spring.

What has been remarkable is the apparently small amount of 'damage' to subtidal reef habitats. Dives at the Eddystone reefs, at Hand Deeps and Hatt Rock as well as further inshore at the Plymouth Dropoff (2nm south of the Plymouth Sound Breakwater) and along the coast near Wembury, have shown the marine life to look much as always including shallow *Laminaria hyperborea* (Gunnerus) Foslie, 1884 forests intact. Sediments between the reefs also looked much as always. There were a very few detached *Eunicella verrucosa* but no

other detached species observed (although the *Diazona violacea* Savigny, 1816 caught in trawls in Bigbury Bay[11] had most likely been swept off reefs). Nevertheless, there was the currently high abundance of *Diazona* at the Plymouth Sound Dropoff still present in late May. Rock surfaces at the Dropoff at depths in excess of 30m were very silty in March as were some attached species such as hydroids and this may have been the result of the very large amounts of silt being transported down rivers and out to sea as well as local sediment disturbance. The storms had uncovered 'artefacts' (mainly glassware and chinaware) at the Dropoff, no doubt from long-ago rubbish disposal, suggesting considerable disturbance of sediments. High levels of silt were also observed in Lyme Bay and may have blocked algal growth including settlement of seasonal algae[5].

'Other' effects

There were difficult-to-explain changes during and after the period of storms and heavy rain. A great deal of silt was no doubt washed-out from the land and muddy sediments were disturbed from sediment flats and even deep subtidal areas. This sediment would have been expected to settle-out within a few days or weeks. The high turbidity meant that diving was not possible before the second week of March when, for the rest of the month, underwater horizontal visibility was less than 3m off Plymouth and was reported as very low elsewhere in the south-west. Much of that turbidity had a 'milky' appearance after the storms had abated. An early interpretation of the milky water was that the waves had penetrated deeply into sediments, mobilizing very fine particles which did not sink. An inspection of such milky water near Penzance by David Fenwick revealed very fine quartz particles and mica. Another explanation (Gerald Boalch, pers. comm.) might be that the incursion of freshwater into the open sea caused flocculation of dissolved substances (e.g. phosphates, heavy metals). Turbidity measurements at station L4 approximately 5nm offshore of Plymouth Sound remained high until at least early May but underwater visibility was back to normal after that. Nevertheless, high turbidity may have affected spring algal growth which seemed delayed in subtidal areas at inshore locations. The 'milky water' that persisted after the storms only started to disperse by about mid-April.

There were other effects of the storms on marine life including 'interesting' drift material washed-up on strandlines with goose barnacles, Columbus crabs etc. – others can write that up.

So what?

It is important to understand which species are susceptible to natural events such as storms and which species are not to help interpret changes in abundance of species detected in surveillance programmes and to separate natural from man-made influences. What we have discovered from the storms (in broad terms) is that sediment-living species are highly susceptible when the wave action is so strong that it penetrates to depths where sediments can be mobilized and the species in them displaced. However, species attached to or living on hard substratum habitats will most likely survive with local 'hotspots' of damage especially where pebbles, cobbles and boulders are moved.

The trouble is, where do those observations of which species were and were not (significantly) affected get recorded and remain accessible for many years to come? It is about time that question was answered and a structure produced!

What now?

I have reported only the selection of observations that have been given to me and my own observations. Perhaps there should be a follow-on note assembled by the newsletter editor for the next edition. Send yours in.

Reports by:

[1] Lin Baldock; Steve Trewhella
[2] Paula Ferris, Coastwise North Devon
[3] Sarah Clark, Devon & Severn IFCA
[4] Chrissy Robinson
[5] Lin Baldock
[6] David Fenwick; Matt Slater
[7] David Fenwick
[8] [Noted as observation by Matt Norman but confirmation not obtained. Beshlie Pool[13] confirms beam trawlers report picking-up boulders where they had been catching flat fish]
[9] Darren Newton/Rame Beach Care
[10] Records from DASSH via Becky Seeley
[11] Aisling Smith, Marine Biological Association
[12] David Horne
[13] Beshlie Pool, Marine Management Organisation
[14] Lin Baldock, Esther Hughes, Sam Naylor
[15] Juliet Brodie, Francis Bunker, Christine Maggs
[16] Emma Sheehan, University of Plymouth
[17] Peter Rowlands

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