Eelgrass and Anchoring in Studland Bay MCZ – overview from a boating perspective, April 2021

Following the designation of Studland Bay as a Marine Conservation Zone (MCZ), the Marine Management Organisation (MMO) are consulting on what management measures might be needed to protect the Designated Features. The main Feature is "Seagrass Beds", which are beds of eelgrass, the seagrass *Zostera marina*, which is the species found in Studland Bay. Another feature is the Long Snouted Seahorse, *Hippocampus guttulatus,* but its wellbeing is said to be dependent on the good health of the seagrass beds. Seagrass Beds are then really the key Conservation Feature. Here, we consider from a boating perspective some of the arguments being put forward.

MCZ Management objectives:

The objectives in the Studland Bay MCZ Designation Order are, for a habitat such as eelgrass (seagrass) beds, that

(i) its extent is stable or increasing, and
(ii) its structure and functions, its quality, and the composition of its characteristic biological communities are such as to ensure that it remains in a condition which is healthy and not deteriorating;

This objective describes a healthy and sustainable habitat, but does not require perfection in every respect. If for instance a boating activity were to mean a certain parameter, eg leaf length, was say 5% less than it otherwise might be, and that difference was stable and not increasing, then the habitat could fulfil the requirements of the Designation Order. Health and sustainability are the key points, not gold medals in a sort of underwater Chelsea Flower Show.

The basis of NE's Advice:

NE (Natural England) present no direct evidence as to the stability or otherwise of the extent (area) of the eelgrass habitat over the years during which boats have anchored in Studland Bay, nor do they present observational evidence on the items mentioned in part (ii). Their case is driven from their desks and is built on indirect extrapolations from carefully selected publications from the scientific literature.

There was a survey study, the Seastar Survey, carried out in the Bay in 2010 and 2011, which compared eelgrass health in a voluntary no anchor zone (VNAZ) and a control (anchoring occurring) zone (CTZ). The report recommended further study, but this did not happen. We are not aware of any study in the Bay since then, other than my own informal video survey in 2016 of 350 metres of seabed to prove that claims by the Seahorse Trust that the eelgrass was disappearing, that it was "like an underwater desert" were completely untrue. (https://boatownersresponse.org.uk/underwater-videos/)

The Seastar survey report incidentally reported the eelgrass coverage and shoot density in the Bay to be "typical for the wider Weymouth and Portland area". It did NOT report a poor state of eelgrass health in Studland Bay, in which anchoring has occurred for decades. The survey did report that the seabed in an anchoring-allowed zone was in the last survey (September 2011) more uneven than the seabed in a voluntary no-anchor zone, in which the seabed was even. However in the previous four surveys (Oct 2009 – April 2011) both areas were described as even. Since prior to the study both areas had been regularly anchored on for decades, the conclusion must follow that any unevenness created by anchoring is reversible, smoothed out by subsequent water movement, and possibly by bioturbation by lugworms in the sediment. Unevenness *per se* appears reversible and need not be an obstacle to the conservation objectives

I use the term "indirect extrapolations" above because I have found no reports in the worldwide scientific literature which describe anchor damage to eelgrass (the seagrass *Zostera marina*) other than the single

one by Collins et al in 2010, based on work done in 2008 - 2009 ((https://www.researchgate.net/publication/233512042_The_impacts_of_anchoring_and_mooring_in_seagrass_Studland_Bay_Dorset_UK) . We challenge several key aspects of that report, and in particular that they did not establish that the bare patches they studied were caused by anchors in the first place! (https://boatownersresponse.org.uk/Workshop_presentation7.pdf)

Eelgrass is found in many coastal areas of the USA and Canada, there are scientific papers describing damage to it from boat propellers, but not through anchoring.

There is a survey of the status and health of all the eelgrass in the Nordic countries, up to 2000 sq km of it, in the Baltic and the Norwegian Atlantic coast. The paper runs to 25 pages and cites 113 references. A word-search of the entire document showed that the words anchor or anchoring do not occur even once. Anchor damage is clearly not an issue there, although leisure boating in the Baltic, and in Sweden and Denmark particularly, is very popular. (https://onlinelibrary.wiley.com/doi/full/10.1002/aqc.2424)

A book on seagrasses worldwide, "Seagrasses: Biology, Ecology and Conservation" (Larkum, Orth & Duarte, publ. Springer 2006) mentions boat anchoring just once (p277) in its 691 pages, in a single short sentence which mentions that physical disturbance can cause shoot mortality, through storms, anchoring, dredging, and trawling. Clearly boat anchor damage is not a major consideration in seagrass conservation for those authors, who are respected authorities on seagrasses.

Direct evidence of unsustainable (non-recoverable) anchor damage to eelgrass is then extremely limited or non-existent, both in Studland Bay, and worldwide. Other species of seagrass, with very different characteristics, have been shown to be vulnerable in some cases by direct observation, but not eelgrass. The case against eelgrass is always by indirect inference.

It should however be noted that traditional swinging moorings with heavy ground chains without doubt do remove any eelgrass within their radius of seabed scouring, and there is an ongoing tendency among conservationists to conflate anchoring effects with chain mooring effects, frequently referring to "the effects of anchoring and mooring" together, and thus implying that the harmful effects of mooring ground chains are shared by anchoring events. However the impact of swinging mooring chains arises from the heavy chain sweeping across the same radius of seabed day in and day out as tide and wind move the mooring buoy around. Eelgrass is uprooted and any new growth is swept away. However the effect is limited to the area, usually circular, swept by the chain. Anchoring employs a lighter and less damaging chain, and is a case of here today and gone tomorrow, the (small) area impacted has a good chance to recover. There is no evidence that anchor chains themselves cause damage over the limited period they are in place.

Aerial images 1972 – 2020

I have compiled a series of available aerial images of the eelgrass beds in Studland Bay extending over nearly 50 years. In short, they show increasing eelgrass cover up to around 2012, then a maintained level of cover. NE ignore these and say we do not know if it is seagrass shown in the pictures. Our response is that the images show characteristic patterns of eelgrass growth (it is inclined to a characteristic patchiness, even where there is no boating or mechanical disturbance), also features, eg swinging moorings scars, which are known to be in the eelgrass, are recognisable year to year. Also my own video survey confirmed that the vegetation did consist of abundant eelgrass in the central areas it covered. It is possible that in certain years there is more seaweed (algae) than usual and this can fill in gaps, but the overall picture is clear. Although anchoring continued throughout this long period, the extent of eelgrass is increasing or stable, mooring scars are not expanding, and any damage caused by anchors is repaired by regrowth of the eelgrass. If that did not happen, the eelgrass cover would break down and steadily decrease over the years. This has not happened. See https://boatownersresponse.org.uk/aerial-images/ and

https://boatownersresponse.org.uk/aerials-2005-2020.pdf , also
https://boatownersresponse.org.uk/underwater-videos/ .

BORG's view:

At first sight, it is easy to think that if anchors dig into the sea bed in which the eelgrass is rooted, then damage must result. Well, yes, but if regrowth occurs the damage is repaired - just as grass on land can be damaged by human and farmed animal feet, and by being eaten by animals, but the meadow, lawn or pitch recovers – then the activities are sustainable. If the pressure is too intense, as on a narrow footpath, by a field gate, or near a goal area on a football pitch, then longer term damage may result. In the case of anchoring, there is an inherent limit on the intensity, because boats must be anchored sufficiently far apart that they do not bump into each other – this key point, completely overlooked by NE and MMO, is discussed further below. The seagrass beds, which are the designated conservation feature, not the individual plants, survive, the activity is sustainable.

Why does the eelgrass continue to thrive? There are two main reasons:

A. Resilience – eelgrass lives in relatively shallow seawater, which means in many locations it is subject to wave action. In Studland Bay in an easterly gale the eelgrass beds are exposed to large breaking waves, large quantities are dislodged and end up on the beach. Natural selection means that variants ("phenotypes") which can re-establish rapidly, by lateral rhizome growth, have evolved. See https://boatownersresponse.org.uk/Eelgrass-Resilience-and-Resistance.pdf .
B. Area impacted. This aspect has been utterly ignored by NE and MMO. Just how much of the seabed might be impacted by anchors? Is it all of it, or just a small fraction each year?

It is not hard to make some estimates of area impacted. Firstly, what area of seabed might be disrupted by an anchoring event? The average width of an anchor blade might be 30 cm (0.3 m), appropriate for a 30 ft yacht. If setting and retrieving the anchor occurs over a length of 0.5 m, that means 0.15 sq m are affected. It is also perfectly possible that in the process, some dislodged plant material would fall back into place and quickly re-root, thus reducing the affected area.

Reports in the literature give anchor scar areas in seagrass of 0.16, 0.09, and 0.16 sq m (details in our report https://boatownersresponse.org.uk/anchoring-density.pdf), in line with our estimate.

A single outlier is in the paper by Collins, referenced above, that reported "anchor scars" of 1 – 4 square metres in area. Collins failed to establish that the bare areas they were measuring actually were caused by anchors, and furthermore, for a leisure vessel anchor to create a scar of 4 sq m is downright implausible. A largeish anchor might be 40 cm, 0.4 m, wide, and would have to be dragged 10 metres through (not sliding over) the seabed to generate a 4 sq m scar, an extremely unlikely occurrence.

This however is the only anchor damage area report of which NE takes account, while other studies showing much smaller anchor "footprints" are ignored. This seems like a biased selection of data.

Given a plausible estimate of the area disturbed by an anchor, the next step is to estimate how many anchoring events can occur on the site. We have done this both by applying estimates of numbers of boats anchoring in the usual anchoring area in the Bay, some of which have been gathered by observation, and also by calculating a maximum anchoring density based on the safe swinging circles of boats anchored in a (notional) close packed array. Multiplying the average anchor footprint by the number of boats will give the area of seabed impacted. This turns out to be surprisingly small: based on reported observations of a popular anchoring area of the Bay, an upper estimate is about 0.7% of the seabed impacted in a season. The maximum density (close packed) gives a figure of 1.6% of the seabed impacted in a season, but 1% seems more likely and gives a general worst case or maximum impact.

Regrettably NE and the MMO fail to give proper consideration, indeed any consideration, of exactly how much of the seabed is impacted. The MMO draft assessment makes the sweeping and simplistic statement that *"regular anchoring activity mean that recovery of the seagrass feature is unlikely."* This is a subjective and deeply unscientific opinion which fails to give consideration to the recovery dynamics of disturbed eelgrass, which are in fact well documented, and utterly fails to consider the limited area of seabed actually impacted. And, as already noted, it is not supported by any actual evidence. In fact the evidence, which shows that the area of eelgrass has increased, and is currently stable, demonstrates that recovery **does** occur, otherwise there would have been a steady loss of eelgrass area year on year as the years go by. This just has not happened.

Conclusions

- For seagrass beds, the Conservation Objectives are stable or increasing area, and an underlying healthy condition. This does not mean total perfection in all respects.
- No direct evidence has been provided that the Conservation Objectives are not currently met.
- Other than a single paper, which we question, there is no direct evidence of anchoring effects causing unsustainable damage to eelgrass beds in the scientific literature. A recent paper on Nordic eelgrass ecosystems and the implications for coastal management and conservation, covering 2000 sq km of eelgrass, makes no mention of anchoring impacts at all, and a 691 page book (2006) on the biology, ecology and conservation of seagrasses worldwide has a single sentence on physical disturbances which can cause shoot mortality, through storms, anchoring, dredging, and trawling – the least impactful of which must be anchoring. So anchoring cannot be viewed as a significant factor by those (well respected) authors.
- Aerial images of the Studland Bay eelgrass beds between 1972 and 2020 indicate that the area of eelgrass in the Bay has been increasing and then maintained despite ongoing anchoring. This indicates at the very least that anchoring is not causing a significant threat to the eelgrass, that calling the "precautionary principle" into play is not justified for that reason, that there is no imminent threat to the eelgrass beds from anchoring, and that gains, if any, from management measures are likely to be small.
- The case NE makes for an adverse impact by anchoring is made not by observation but by assessment via a variety of sources. However a proper vulnerability assessment of a feature has three elements: the resistance of the feature to the pressure, the resilience (ability to recover) of the feature to the pressure, and the extent of exposure of the feature to the pressure: no exposure means no effect. NE and MMO have tended to overlook the resilience of eelgrass, and have completely failed to evaluate the extent of exposure, beyond saying, in essence, oh, there are lots of boats so it must be bad. This is deeply unscientific, it is anecdotal at best. We have published worked estimates that 1% or less of the seabed in anchored areas is actually impacted by anchors, but NE remain silent on the matter. Without an estimate of degree of exposure, NE's assessment of vulnerability of the feature to anchoring pressure is deeply flawed.

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