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Underwater Cultural Heritage, An Assessment of Risks from Commercial Fishing

P. H. MacMullen

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Author(s): P. H. MacMullen
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Summary:

This report was written at the request of the Joint Nautical Archaeology Policy Committee JNAPC). It wanted a review of issues arising from the discovery of several wrecks by Odyssey Marine Exploration (OME), statements made about the level and type of risks posed to this heritage material by commercial fishing, and recommendations as to the future management of these and other heritage sites. Seafish has undertaken this review, finds the claims by OME to be lacking a credible evidence base, but accepts nonetheless that the sites in question are vulnerable to fishing impacts and need effective management arrangements. Finally Seafish suggest a way in which appropriate protection could be effected.

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1. Introduction

1. Seafish has been invited by the Joint Nautical Archaeology Policy Committee (JNAPC) to comment on issues arising from the interactions between fishing operations and marine heritage sites. This follows survey work undertaken by Odyssey Marine Exploration (OME) in the western English Channel and the Western Approaches. The OME report on that work identified fishing activities as a continuing and significant threat to the integrity of a number of sites of high heritage value. This led OME to make a number of recommendations for the future management of sites and the protection of artefacts from them.

2. The broader framework for this contribution is the recent consultation by MoD and DCMS on options for managing a site surveyed by OME and now confirmed as the wreck of the 18th century vessel 'Victory'.

3. Seafish's response has been prepared by Philip MacMullen, Head of Environmental Responsibility, in consultation with colleagues Mike Montgomerie and Neil Murray. Seafish is a statutory body charged with supporting the entire UK seafood supply chain – from fishermen to consumers.

4. Philip MacMullen has a background in fishing gear design and technology and 35 years' experience working in the industry. He has undertaken many research projects on the benthic impacts of fishing gear and specialised for seven years on the causes, evolution and impacts of lost and abandoned fishing gears. He currently chairs one ICES working group, is a member of two others, and has co-authored a number of ICES reports on fishing gear impacts and their mitigation.

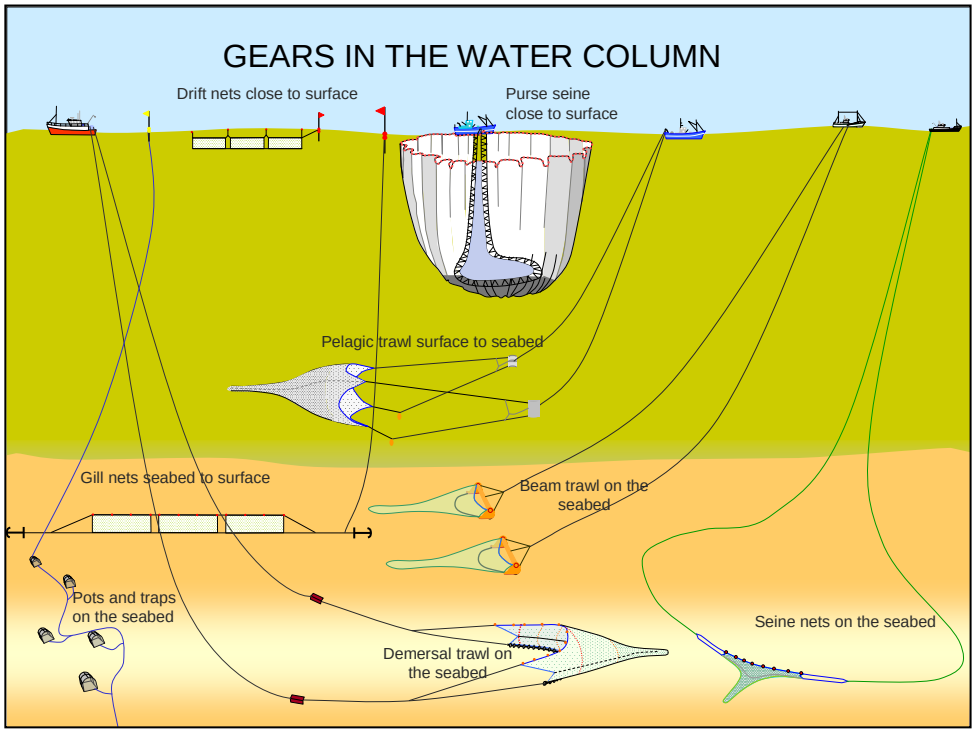
5. Mike Montgomerie is an experienced fishing skipper who spent over 20 years at sea and is now a fishing gear technologist working for Seafish since 1995.

6. Neil Murray is also an ex-fisherman and skipper. He has run the specialised charting service 'Kingfisher Charts' for Seafish for the past 10 years. He has particular expertise in charting and identifying seabed features that may have safety implications for fishing vessels.

7. Should the current debate continue, and there be a need for specifically fishing-related information, then Seafish would be pleased to contribute in whatever way may be thought appropriate – resources and other commitments permitting.

2. A Fisheries Perspective

8. The figure below gives an idea of the range of fishing gears that can be deployed depending upon the species targeted and the environmental niche that they inhabit. There is a clear distinction between gears that are designed for, and operated in, contact with the seabed, as opposed to those used in some part of the water column.



9. Operating conditions can vary widely. Surface waves can produce extreme forces and cause damage to towed gears, especially if they are already under stress from, for example, the weight of catch or being caught on the sea bed. Surface waves can also result in a counter-rotating system of waves that may reach the seabed as a 'ground swell'. In exposed areas around the SW peninsula these swells can cause damage to shellfish traps fishing as deep as 100m.

10. A sea surface wave with a height of ten metres – not an excessive height in winter storms off our coast - can induce a particle velocity of 40 cm/second at a depth of 100 metres under the surface[1]. This approximates the velocity (actually 49 cm/sec) 2 metres under a wave with a height of one metre – a feeling that most of us will have experienced. Most of our bottom trawling is carried out at depths <100m.

11. Ground swells and tidal streams can also result in significant seabed disturbance, movement of sediments and the formation of sand waves. These dynamic conditions can also result in the exposure of features and structures that were hitherto covered over, scouring around hard features, and their subsequent re-burial. As a graphic example of this, monitoring of scouring in the newly-commissioned wind farm at Scroby

[1] See: The oceans, their physics, chemistry and biology by H U Sverdrup, MW Johnson and R H Fleming: 1942, Prentice Hall Inc

Sands off the Lincolnshire coast has confirmed scouring at the predicted rate of ~0.8 x diameter of each individual turbine structure. In this case, despite rock armouring of each tower, scouring has occurred to a depth of ~7m.

12. These examples show that seabed conditions can be extremely dynamic. Features can become exposed or buried quite rapidly. The western Channel exemplifies this as it is exposed to the full reach of Atlantic swells, and seabed features such as substantial sand waves can move significant distances. Likewise fishing opportunities and the distribution of fishing effort can change over time in response to changing environmental and market conditions. The management of sites needs to be reviewed regularly in order to ensure that it remains appropriate to the level and types of threats at any given time.

13. The technology available to fishermen has advanced substantially. Navigational and position-fixing equipment means that seabed features can be charted with an accuracy of a very few meters. Synthetic materials and the mechanisation of fishing mean that fishing gear has much more longevity than was previously the case, is stronger, and can exert greater forces.

14. Seafish's 'Kingfisher Charts' has a database of seabed obstructions that has evolved over more that 50 years. It originally charted fishermen's information on seabed 'fasteners' as a safety service but now also charts the positions and characteristics of wellheads, other industrial artefacts and protected areas. Many fishermen now also have their own 'bespoke' databases starting with Kingfisher and progressively adding more of their own information. An examination of track plotter data from vessels working in the vicinity of reefs now shows how accurately towed gears can be positioned in order to avoid known obstructions. Recent evidence presented to Natural England by The Channel and West Sustainable Trawling Group showed bands around reefs ranging from 10-50m deep where no towed gear was present.

3. Evidence and Interpretation

15. The Seafish staff identified above have looked at the evidence, assertions, and conclusions in the OME report and assessed it from fishing and a fishing gear technology perspective. They have also considered the information and arguments put forward by the Joint Nautical Archaeology Policy Committee (JNAPC) and Wessex Archaeology in respect of the site of the wreck of 'Victory' and marine sites in general.

4. OME report

16. We are concerned with several aspects of the OME report as well as the evidence that underpins many of the assertions made in it. The introduction, in particular, gives headline messages that would be more appropriate in a summary and that could be viewed as disingenuous or even misleading, depending upon the reader's expertise.

17. Our major concern is that the presence of textile and other material at heritage sites that could be associated with fishing activities really should not be presented uncritically as evidence of 'fishing impacts'. The reality, unfortunately, is that marine litter is widespread and can easily be found in many places. It may well have been generated at some time

and place far from the site in question but automatically to associate it with a wreck location as evidence of 'impact' simply isn't tenable. Placing figs 1 and 2 in the introduction, rather than a summary, implies that the case against fishing has been made – it hasn't – hence assertions such as 'shipwrecks of all ages are at high risk', and the suggestion that 'many important shipwrecks have already been lost' (pp 1 & 2) are not supported by the data produced via the surveys.

18. The provisions of Annex 5 of Marpol have made it illegal to dump material at sea since 1989. In reality, however, port authorities charge for the disposal of fishing and related material. This has historically given fishermen a strong disincentive to act responsibly. As a result fishermen have traditionally used wrecks and similar sites as safe dumping grounds for material that could otherwise prove hazardous or inconvenient if dropped on clear ground. As an example, where fig 38 shows a single dredge on a wreck site, it is clear that there is no evidence of a towing bridle. If this had parted then at least a few links of chain should have been evident. To our mind, describing this as being 'snagged' on a wreck is almost certainly wrong. It's much more likely that a damaged dredge has been dumped on a site that is avoided by trawlers and dredgers. Other specific examples of what we believe to be misinterpretation, and hence mislabelling, of figures are given in para 21 below.

19. Section 2 attempts to summarise the evolution of towed gears. We regret that this comes across as a trawl – or dredge – through information easily available via the internet but demonstrates neither insight, logic, nor the reality of gear types, how they are used and the impacts that they may have. Much seems to have been simply cut and uncritically pasted into the report.

20. We had concerns with many aspects of the OME report which can come across as naïve, for example:

    20.1 terminology is important – 'deep sea' is used frequently in this report but nearly all the fishing grounds covered by the survey are on shallow continental shelf areas that seldom exceed 80m depth;

    20.2 Likewise the vast majority of vessels cited in the report only work what fishing folk refer to as 'inshore' grounds. Some may work mid-Channel, perhaps 40nm from UK baselines, and a very small number are nomadic. Nearly all the beam trawlers work the same traditional and well-defined grounds;

    20.3 Section 2A on the history of trawling notes that destructive technology (the 'wondyrechoun') was introduced (and commented upon) nearly 650 years ago. Negative comments from static gear fishermen have been made since then – documented particularly in reports from Frank Buckland and others through the second half of the 19th century[2] - and yet, despite this history, fisheries have remained remarkably productive until the present day. This is not to say that there are no problems with the environmental impacts of fishing operations or with the management of fishing activities, merely that those predictions of both local and global collapse seem to have been consistently premature. Marine ecosystems

[2] See for example Buckland and Walpole1879: Report on the Sea Fisheries of England and Wales, Eyre and Spottiswoode for HMSO

are incredibly resilient and have managed to withstand many centuries of maybe ill-considered impacts: from fishing and from many other sources;

20.4 the apparent insights into the factors that enabled 'formerly unexploited fishing grounds (to be) penetrated (!) and 'the final expansion of deep water fleets' are mostly non-sequiteurs that we would be happy to expand upon if invited;

20.5 On p4 the comments on the causes of catch fluctuations in pelagic fisheries are mostly just wrong. As an example the productivity of many of the fisheries to the west of the American continents (N & S) are profoundly affected by the 'el Niño' phenomenon completely independent of fishing effort which merely exploits an ephemeral population the size of which can fluctuate, year-on-year, by an order of a magnitude or more;

20.6 Reference, also on p4, to the ICES Study Group on the Effects of Bottom Trawling and related reports (starting in 1970 and followed up in 1988) is very dated. I (P MacMullen) have been involved in many more recent ICES investigations which make the final paragraph in section 2A pretty meaningless;

20.7 Section 2B is garbled at best. There is a continuing confusion and conflation of information about the different types of otter trawls, pair and beam trawls, and dredges. Part way through B IV relating to dredges there is a morph into static gear like pots and gill nets. This, again, does nothing to detract from the impression that material has been pasted in with little understanding of its meaning or implications;

20.8 An important omission from the section on wreck and reef fishing is an understanding of the specialised ways that these nets are rigged. Recognising the risk of becoming entangled on some feature of the structure, the nets are designed to tear away leaving the footrope behind. In this way the headline, floats, anchors, and bridles are retrieved, along with most of the netting and catch, and the footrope is sacrificed. As a result it is common to see these remains on wrecks and other seabed features but, again, they are not necessarily evidence of fishing 'impacts'.

20.9 continuing through B iv. there is a hotchpotch of information gleaned from CEFAS reports on inshore fleets that is used to reinforce the impression of threats to seabed features: none seems to make any particular argument;

20.10 the descriptions (and implied significance) of figures in 2 A, B, C & D are questionable and are here dealt with in para 21 below.

20.11 Section 2C on 'Quantifying Trawler Disturbance on Marine Ecosystems' draws on a report from Watling and Norse that compared trawling with clearcutting forests. This phrase from that report has been repeated over the years and consistently refuted by many more considered observers. Its relevance to this report is

questioned. Specifically, the penetration depths of fishing gears in this and many other reports referenced here are refuted in peer-reviewed literature[3].

20.12 An example of the hyperbole employed is the reference in the first paragraph of 2C. This notes that, 'whereas forest clear cutting is estimated to fell a vast 100,000km2 of woodlands per year worldwide, the area trawled annually is about 150 times greater. Each year trawling disturbs an area of seabed as large as Brazil, the Congo, and India combined….' Given the analogy to the profound impacts of clear cutting it may be relevant to point out here that an extrapolation of the seabed areas 'clear-cut' annually would result in ALL sea areas (globally and including the abyssal depths) being trashed every 23 years. Given the recovery rates suggested in the same section and derived from the same source (years to centuries) it seems extraordinary that the marine environment continues to produce huge quantities of benthic/demersal species that we continue to harvest.

20.13 Lokkeborg (with whom P MacMullen has co-authored ICES reports) undertook a 12 month meta-review of reports describing towed gear impacts whilst on secondment from the Norwegian Marine Institute to FAO (see footnote). He also critically examined the methods used by researchers and found many of them lacking. He found that trawl doors caused furrows and berms of 1-10 cm. The extremes were found in the Barents Sea where very large trawlers operate with very heavy doors and ground gear. Such gears are not used in the study area. Lokkeborg pointed out that different sizes and weights of towed gears will cause different levels of disturbance. The situation with beam trawls is a little different because larger, heavier gears tend to be towed faster so that the uplift from the warps counteracts the greater weight. A distinction also has to be drawn between 'open' or 'V' nets which are used in the North Sea and the 'closed' or 'R' nets that are used in the central and western Channel. The former, which have been studied, use tickler chains; the latter, which are little studied, use 'chain mats' in place of tickler chains. Tickler chains have been shown to penetrate up to 8cm in the southern North Sea on mobile sandy substrates. The chain mats which run from the beam to the ground rope screen out rocks and cobbles. Given this configuration it is unlikely that the chain mat can dig into the seabed any more than is required for disturbing flatfish, most likely significantly less than tickler chains;

20.14 We were surprised that the OME paper made no mention of the Seafish-co-ordinated and EU-supported research programme called 'Ecodredge'[4]. This is still the most comprehensive programme worldwide looking at issues relating to bivalve dredging. Instrumentation was developed that measured very many operating parameters in fisheries throughout Europe, including the depth of seabed penetration resulting from toothed and blade dredges. Results for Newhaven dredges with 100mm/4" teeth were typically a maximum of 30mm/1¼". French dredges were not dissimilar. Table 2 (p12) from Hall, 1999, overestimates penetration depths.

[3] See particularly, Lokkeborg, S. Impacts of trawling and scallop dredging on benthic habitats and communities. FAO Fisheries Technical Paper No. 472, Rome, FAO, 2005.
[4] EU contract no. FAIR CT98-4465

20.15 The OME report seems equivocal about potting and netting. Some impacts do result from the deployment of static gears like pots and nets but, generally, they roughly balance the recovery time of the species concerned. Note that pots are commonly spaced ~14fm on their back line so they'll rarely impact the same spot more than once. The Countryside Council for Wales (CCW the statutory conservation advisers in Wales) filmed pots being hauled over sea pens. As the tension comes on the pots skim the sea bed for a few feet. The sea pens could actually sense the pressure wave and bent over, seemingly in anticipation of impact! Gill nets can display a slight 'plucking' action as meshes close under tension. Strings of pots are usually shot with the back rope as taut as possible in order to avoid entanglement. It is however possible that, when working around rocky ground for lobsters, the rope and/or individual pots can get jammed under a boulder or some other protuberance. Standard procedure is to try to work out how the obstacle is lying and then to circle back and try hauling for the reverse direction. So if cannon are becoming progressively more exposed it is possible that this mechanism could result in their being moved. Pot haulers on most boats will have a maximum 'pull' of ~1.5 tonnes but they are usually set to stall at well below this. If the back rope is around a sharp object there's the risk of it parting, so normal procedure is to go to the other end and start hauling from that direction. This will be more difficult because one always starts at the end that allows you to stem the tide whilst hauling. Steerage can be awkward otherwise. How static gears might impact on timberwork is currently a matter of speculation.

20.16 Section 2D deals with wreck fishing but it is difficult to disentangle the commentaries applying to angling and commercial fishing respectively. The main authors cited, Arnold and Gammon are both sports fishing specialists and advocates. Bad feeling often exists between recreational and commercial fishing interests so it would have been useful to have had some balancing perspectives from either the scientific or commercial communities. This section is bound to be confusing for those without specialist knowledge.

20.17 We were surprised to see that the French angling handbook was cited in section 2D, but not the UK's Kingfisher Charts which has a database running to several thousand wrecks and other seabed obstructions.

20.18 Section 2D concludes with a reference to work by Revill and Dunlin 2003 which I (P MacMullen) supervised as part of the Euro-funded 'Fantared' programme[5]. Not surprisingly the main conclusion related to fishing mortality but the divers concerned also observed that abrasion against the structure of these (exclusively recent and/or steel) wrecks cut through ropes as well as meshes. The energy in any particular location is important – the same natural forces that degrade the structure of a wreck will also cause fishing gear like netting and ropes to deteriorate. We fail to see how the 'potential threats A-D on p15 follow on from the evidence presented.

20.19 Several of the calculations made in sections 3 and 4 are difficult to follow. There appear to be discrepancies in the calculations of areas using metric and imperial

[5] EU study contract FAIR CT98-4338

units. This can, in turn, make it difficult to understand the methods by which 'fishing hot spots' are identified.

20.20 It's hard to reconcile some of the statements in the numbered sections. For example #1 cites 'four distinct sets of beam trawler furrows between 500 and 1000m ENE of the site' as showing that '***trawler impacts*** have been verified visually on the surface of HMS Victory' (emphasis added).

20.21 Section 5 attempts to quantify deep sea fishing by the use of VMS data. The section opens with the statement that '838,048 vessels were sighted by VMS… within the survey zone … between 2000 and 2008'. We are also told that there were 73,385 over flight sightings between 1985 and 2008. The survey area covers some 4,725 square nm. We know that, excluding pirogues and similar artisanal craft, there are rather less than 838,048 fishing vessels in the world[6] so assume that this figure relates to VMS 'pings' which are made every 2 hours – or 12 times per day. Dividing 840,000 by 12 produces 70,000 vessel days and assuming an equal spread across 8 years gives us 8730 vessel days/year. A homogenous distribution across the study area produces an average of one vessel day/0.54 sq nm/year; heterogeneous distribution will clearly result in some areas sustaining more effort and others correspondingly less.

20.22 A similar breakdown of the overflight reports gives us something like 3170 sightings/year which then breaks down to around one vessel day/1.5 sq nm/year. Allowing for the different eras covered and changing access arrangements these figures are very roughly comparable.

21. Moving on to the legends attached to specific photographs in the OME report, and with the caveat that it would have been very useful to have been given some idea of scale in these pictures:

21.1 Fig 4 looks like large pelagic trawl netting, probably from a French bass net. This material is of fine diameter and easily torn from these large nets;

21.2 Fig 5 looks like netting from the wing of a fine ground trawl;

21.3 Fig 6 seems to show netting that has been dumped rather than 'snagged' (but there's no evidence either way);

21.4 Fig 7 is difficult to interpret, the small mesh isn't from a gill net, maybe dumped trawl netting; the lines could well be very large meshes from a pelagic trawl as these can each be up to several metres in length;

21.5 Fig 8 looks like gill netting left after the ropes have torn away as described in 20. 8) above;

21.6 Fig 9 looks like dumped back line from a potter;

[6] See, for example, Garcia & Rosenberg, 2010: Food security and marine capture fisheries, Royal Society Publishing, who estimate <50,000 vessels of >100t globally

21.7 Figs 10 & 11 appear to show fragments of netting litter;

21.8 Fig 17 doesn't appear to show commercial netting given the apparently small mesh size;

21.9 Fig 18 artefacts cannot be identified;

21.10 Fig 19, hard to see 'rope' but most fishermen do not wear ties;

21.11 Fig 20, none of us can recognise as a beam trawl shoe, seems to have a long nail through to be hammered into wood – impossible to conclude "snagged on a boulder" as that seems to be too rounded;

21.12 Figs 20-21, the term 'fishing cable' (used frequently) is meaningless, this looks like fragments of braided nylon rope;

21.13 Fig 23, shows textile material that has clearly been in situ for a very long time – cannot interpret;

21.14 Fig 24, looks like a dumped pot. If it had come fast and the rope had parted there would be evidence because pot bridles are spliced into the door end and then run to a single rope. The latter would have parted as it would be weaker than the double bridles. Also no sign of closing strap comprising cut inner tube knotted onto top of door with hook to hold closed;

21.15 Figs 25-26, clearly show that the cannon has been moved, it's reasonable to attribute the cause as fishing gear;

21.16 Figs 27-31, 44 and 46 seem to show nothing conclusive or particularly significant;

21.17 Figs 32-34 show abrasion on cannon: in #32 this could be fishing-related but the others? The 'scratches' shown in #34 in particular seem too fine and random to be caused by a wire; rope would not scratch this way;

21.18 Fig 35 is incomprehensible given that there's no positional information and the VMS 'pings' are so dense, being aggregated over eight years, that the different effort categories are unrecognisable;

21.19 Fig 36 is curious and very difficult to interpret without knowing the mobility of the substrate. Are these artefacts becoming progressively more exposed? Were only the extreme edges exposed when the damage occurred? A Newhaven (toothed) dredge would have disturbed these plates from their bed more than is shown, and some that look like they are at the same level are quite undamaged. We speculate that the damage could equally have been caused by forces internal to the wreck and the whole area has subsequently been exposed. Towed gear may well be working in the immediate area but somehow this doesn't look like that kind of damage – whereas the snapshot of a small area shown in Fig 37 could well be fishing related, or could be fragments from Fig 36 moved by ground swell (same site in both);

21.20 Figs 39-40 seem to show towed gear marks but interpretation would be aided by some indication of scale;

21.21 Fig 47, the disposition of the 'steel trawler cable' doesn't suggest that it was under tension at the time of loss. If it does show a length of steel warp then it has quite lost its flexural rigidity given the curvature where it isn't constrained. It looks more like textile material.

5. Evidence from Wessex Archaeology and JNAPC and the March 2010 response from Dr Sean Kingsley

22. We can only comment on the fisheries-related aspects of this material. We concur with the boxed comment from Wessex Archaeology on p22 of their desk-based assessment and their conclusions on pp33 & 34. It seems most likely that the site has been protected by some overlying material for a substantial period and has subsequently suffered some impacts from fishing. We cannot find any evidence that identifies what fishing methods might have impacted the site nor what level of risk there may be of future impacts.

23. We found the note from David Parham to be measured and credible. It seems to be a well-reasoned critical assessment of the OME report and uses much the same logic that we have in these notes: clearly there is fishing activity in the areas covered by the survey and fishing does have the potential to impact on seabed features including wrecks, but the case isn't proven and there's little basis for taking policy forward. Mr Parham's research record affords him the luxury of not having necessarily to refer constantly to others' work.

24. In contrast the 'Reply to David Parham' repeats much of the misunderstanding of fishing activities that are apparent in the original OME report and that result in misinterpretation of observations. We find it hard to reconcile the statement in para 1 that there is a 'very serious problem of damage caused to shipwrecks…by the offshore fishing industry' with the ambition expressed in para 3 'to ensure scientific accuracy in an extremely serious debate' and the frankly hysterical tenor of the quote from Professor James Delgado.

25. We believe that it is very important that a full and appropriate range of expertise is brought to bear in order to interpret the novel information presented by OME in their report and to assess the levels of threat that fishing operations might present to underwater heritage sites. It is in this context that experienced ex-fishermen can contribute insights into fishermen's behaviour and the significance of fishing-related phenomena. We would argue that this type of knowledge should be accorded particular credibility.

6. Discussion

26. None of the observations or arguments made above is in any way intended to undermine the core debate – the need for adequate and appropriate protection of the UK, and wider, marine heritage sites. And it is certainly not the case that the fishing industry argues against conservation. All sectors are reconciled to the provisions of the Marine Act and the need to protect seabed features and biodiversity – even at the cost of lost fishing

opportunities. What the industry does insist upon, however, is that such measures should be evidence-based, proportionate and practicable, allowing multiple use of sea areas wherever this is possible.

27. It is also beyond dispute that many types of fishing gear have the potential to impact negatively on sites that contain conservation features. Our view however is that the OME report fails to make the case in a systematic and credible way. The authors might have been better advised to seek editorial guidance from professionals with appropriate expertise rather than risk the current debate as to the quality of some of the evidence presented.

28. Of particular concern is the impression given of the over-riding level of threat posed to nautical heritage, and the wider marine environment, by most types of fishing activity. Of regret is the use of highly charged commentary from papers widely regarded as lacking balance and objectivity.

29. It is clear from information in the OME report and from other sources, many of them anecdotal, that fishing activity has resulted in the first clues as to the location of important marine heritage sites. Flint workings in the southern North Sea are a good example along with the wreck discoveries described on p13 of the OME report.

30. It is also clear, and demonstrably so, that towed and static fishing gears can be, and are, deployed to increasingly high degrees of spatial accuracy. There is currently a vigorous debate as to the ways that boundaries should be set around seabed features in order to afford appropriate protection from towed gears. Conventional wisdom about the need for large areas to be closed to towed gear by the use of straight lines and substantial buffer zones is rapidly being displaced by a rather more progressive approach. This combines the known accuracy of gear deployment with recently developed VMS systems combining conventional and mobile phone-based technology. These allow the 'geo-fencing' of sea areas and 'ping rates' of up to four seconds frequency. Fishing gears can be tagged with RFID markers so that there is certainty as to the types of fishing gear being deployed by any given vessel. Vessels approaching controlled areas using controlled gear types can be warned of the situation and their exact circumstances logged by software at the control centre.

31. For static gears it has been accepted by HMG's statutory conservation advisors (Natural England) that there is no need to protect sensitive and highly bio diverse reef habitat from static gears. Their status reports on the most recent tranche of marine SACs (designated under Natura 2000 provisions) have shown reef and similar habitats of the Dorset, Devon, and Cornwall coasts as well as Lune Deep in Liverpool Bay to be in 'excellent' condition with full ecosystem function and no evidence of fishing impacts. These are sited in areas of high fishing activity with many inshore boats deploying static gears – pots and gill/tangle nets – and significant trawling and scallop dredging also. The technology described in the preceding paragraph can ensure that vessels recognised as working static gears are not also deploying towed gears.

32. The parallel with the emerging regimes for habitat and biodiversity conservation are, to us, quite striking. In terms of both policy and technology, managers and 'the managed' are developing monitoring and control regimes that can deliver conservation objectives along with extremely high confidence of compliance with those regimes. There seems to

be no reason why the provisions of the Marine Act should not apply to designated archaeological sites in the same way as to sites designated for biodiversity or habitat conservation. Indeed the current consultation on the UK Marine Policy Statement proposes just such a mechanism.

33. Levels of fishing effort, certainly in terms of numbers of vessels, are falling. The >12m fleet has shrunk substantially in recent years, by more than 60% in some areas, and there is a very strong likelihood that the inshore fleet is also facing significant reductions. As a result our view is that the threat level to conservation features of all kinds has also been falling with this 'benefit' being augmented by the technological advances described in para 26 above.

34. It should also be noted that the legislative provisions of the Marine Act are well in advance of those likely to come from Europe via the Integrated Maritime Strategy and the Marine Strategy Framework Directive. This means that protection for sites outwith the UK 6nm limit will be problematic in the absence of sensible negotiations with other member states' fishermen: the CFP is currently the only mechanism by which the activities of vessels can be controlled in these 'European' sea areas.

35. The mid-Channel potting agreement is proof that this can be achieved, however the incentives for those negotiations and compliance with them are perhaps more straightforward.

7. Conclusions

Summary conclusions

These notes have provided a review of the OME paper, specifically in terms of the quality of evidence it presents, the assertions made and the conclusions reached as to the most appropriate means of managing nautical heritage sites.

We conclude that the paper has drawn upon a somewhat dated and unrepresentative sample of the available literature. As a result the OME report fails to provide any credible view of the scale, nature, or intensity of the threat posed to heritage sites by commercial fishing activities. As a consequence it fails to make a compelling case to support the conclusions that it reaches.

This is regrettable because there is a pressing need for a rational and evidence-based case to be made for site-specific management measures in the context of the provisions of the Marine Act and Marine Spatial Planning (MSP).

We consider that those involved in the debate over site management options should engage with the MMO. This new body is currently establishing policy guidelines to enact the Marine Policy Statement through Marine Plans. Concurrently they should establish the scale and nature of threats to specific sites based upon contemporary evidence and also investigate mitigation and management options.

Expertise is rapidly developing in the field of designating and managing sites to protect the natural environment and this new body of information should be investigated carefully to establish what lessons and models can be drawn from experience to date.

Seafish has been involved in much of the exploratory work on MSP and would be pleased to contribute further to the debate in this specialised area.

Sea Fish Industry Authority

e: seafish@seafish.co.uk w: www.seafish.org

supporting the seafood industry for a sustainable, profitable future