MPA Condition Improvement Case Studies

Bait collection in the MPA network in Wales: Evidence gathering and management options.

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Project Location	Welsh MPA network
Project Partners	N/A
Funding Mechanism	MPA Network Management Steering Group
Synopsis	This desk-based project was designed to further NRW's knowledge of bait digging, associated evidence and management options available. The outputs included two evidence reports. One discusses strategies for the collection of further evidence and the second focusses on prioritising sites in Wales and the management options available.

Project Introduction and Objectives

Bait digging (the digging of holes in the intertidal area to extract worms for angling bait) has been noted as causing damage to a number of features at various locations across the MPA network. The most vulnerable features to bait digging occur in the intertidal, such as the SAC feature intertidal mudflats and sandflats and a number of intertidal features of interest within Site of Special Scientific Interest. In Pembrokeshire Marine SAC for example, bait digging is listed as a contributing factor to the unfavourable condition of intertidal mudflats and sandflats.

Evidence gathering and management options to reduce the impacts of bait collection activities on the MPA network in Wales was listed under the MPA Network Management Action Plan 2021/22. NRW have led and coordinated a project, with two distinct but related elements, to review the methods for the collection of evidence and assessed possible management options for bait digging activities. A summary of the findings from these projects are detailed below.

Figure 1: The Gann in Pembrokeshire, showing modification of its habitat from bait digging, forming craters and pools. © NRW

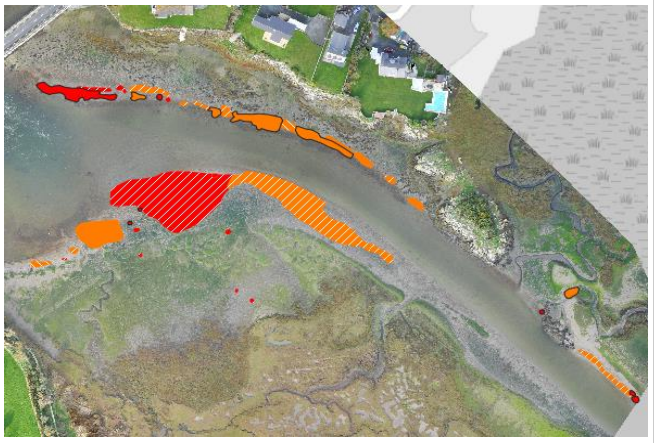

Figure 2: Four Mile Bridge, Anglesey. Red hatching – high intensity, and orange hatching – Medium intensity bait digging. © NRW

This project was funded through the MPA Network Management Steering Group and ran between October 2021 and March 2022. It was led by NRW and contracted to ABPmer consultancy. The project aims were to better understand the activity of bait digging in order to improve management of this activity to reduce its impacts on the marine environment. There were two separate, but related, aspects to this project:

- An appraisal of the potential methods for gathering evidence of bait digging.
- An evaluation of the most sensitive MPAs and features in Wales to bait digging pressures and the potential management options available at these sites.

Which Marine Protected Area Network Management Priority Action(s) does this project assist with?

This project helps to address the priority action 'Bait collection in the MPA network in Wales: Evidence gathering and management options', which was listed under the MPA Network Management Action Plan 2021/22. This project also addresses a longstanding threat to the MPA network of non-licensable activities and improves the evidence required to develop NRWs advice on MPA management.

Methods

This work was desk based and did not involve site visits. The methods for the two elements of this project are set out below;

Bait Digging Evidence Collection – Methodology Review

ABPmer was commissioned by NRW to review the methodology used in existing NRW Evidence Report 449 (Perrins *et al.,* 2020) and identify potential alternative techniques for measuring bait digging extent and intensity on Welsh shores. The review involved a thorough assessment of methods of gathering evidence on this activity, including Unmanned Aerial Vehicles (UAV, often called drones), field observations, cameras and aerial imagery. The review presents benefits and limitations of the UAV methodology in the context of efficiency and robustness of the data for estimating bait digging extent and intensity.

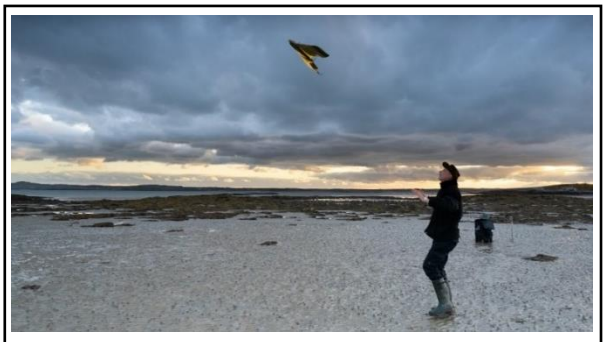

Figure 3: Drone flying as a method of data collection around bait digging. © Rohan Holt

A literature review of local and international studies was undertaken to identify alternative methods which have been used to investigate the effect of bait digging or other recreational activities on the shore and their overall effectiveness. Expert judgement was used to suggest future methodologies that could be used to obtain cost effective and accurate surveys of bait digging extent and intensity along with recommendations for future surveys.

Bait Digging Management Options

ABPmer were then subsequently commissioned as part of this project to again review the (Perrins *et al*. 2020) report, and this time to specifically assess which sites were a priority for management and the options available. They explored;

- The susceptibility of the 11 sites vulnerable to bait digging (note, the sites chosen were discrete areas where bait digging is occurring and not synonymous with MPA sites). A number of site-specific criteria were considered to assess each site's susceptibility and subsequently assess which of the sites were sufficiently vulnerable to require management.
- The potential bait digging **management options** available for each of the sites with an appraisal of their suitability.

Outcomes

Two separate evidence reports were completed as part of this overall project and are available on NRW's website Natural Resources Wales / Marine and coastal evidence reports.

Bait digging Evidence Collection – Methodology Review, Report No 603

The main findings of the report are summarised below;

- **UAV (drone)** enabled bait digging to be captured across entire shores in a relatively short period of time but require good weather to coincide with a suitable low tide in daylight hours. In addition, it required significant amounts of ground truthing to ensure accuracy. The need for field-based surveys to ground truth the UAV result makes this method far more costly and time consuming.
- **Field-based survey methods** can be used to assess the density and recovery of bait dug holes within different sediment/ habitat types. Field-based methods can provide information which cannot be assessed with the UAV methodology, such as fine scale temporal (day or tidal cycle) trends in bait digging effort and extent, and site characteristics such as the ecology and sediment types on the shore. This methodology is often time /cost intensive.
- **Fixed cameras** can be used to gain a cost-effective measure of bait digger effort and overall time on the shore. This data could help highlight variability of bait digging intensity over the long-term and assess the impacts of disturbance from bait digging on birds. Fixed cameras could also be used to encourage enforcement and to assess compliance. However, image quality is heavily dependent on weather and light conditions, coverage (what can be captured in the field of view of the camera) can be limited and resources are also needed to review the footage.
- **All methodologies** reviewed had benefits and limitations and it is likely that a combined approach will be required. UAVs in combination with field-based survey methods provide the best combination of cost and time effective monitoring whilst maintaining a high level of accuracy for quantifying digging extent, intensity and effort.

Bait Digging Management Options, Report No 602

The vulnerability assessment identified three sites, two in north west Wales and one in Milford Haven, as most likely to benefit from management measures to reduce the impacts of bait digging activity. A review of potential management measures highlighted:

- **Full or partial closure (byelaw)** has the highest potential to reduce impact of bait digging in high vulnerability locations. Careful consideration is needed with regard to the features that require protection and the legal powers for which an order or byelaw can be implemented.
- **Closure of sites** or other restrictive management measures could lead to the displacement of bait diggers to other locations and has the potential to have significant impacts on other sites.
- **Voluntary measures** can be used at all sites and can be an effective mechanism for managing a range of unlicensed activities where guidelines are well defined and have local support. In areas where intense bait digging activity or lack of compliance to voluntary measures are known to occur, byelaws or orders may provide a more effective management mechanism.
- **Individual site assessments** should be undertaken to consider the implications of such measures before implementation.
- Information on general compliance with management measures would greatly inform likelihood of success of introducing measures.
- Use of more **innovative approaches**, such as co-management of bait digging or bait farming, could provide alternative means to manage bait digging activities and have potential to manage bait digging without the need for strict enforcement.

Figure 4: Marker buoy installed at the Gann to identify the current voluntary no-dig zone. ©

Limitations of the reports

Bait Digging Management Options

Certain factors could have reduced the accuracy of the vulnerability scores assigned to the sites, thus affecting the sites prioritised for management:

- The criteria used to assess site vulnerability were given equal weighting and some criteria could have a greater influence on site vulnerability than others.
- Data used in this study to assess vulnerability of sites were based solely on Perrins *et al.* (2020). This study was based on a single time point and may not be representative.
- Due to the experimental design in Perrins *et al.* (2020), there was no measure of bait digging hole recovery before 3-4 months. Recovery at some sites could be quicker.
- Site specific information was based on data collected in winter 2019/2020 which was considered exceptionally stormy in Wales and likely resulted in greater than normal wave action which resulted in the unusual smoothing of sheltered habitats.
- Each site boundary of the 11 chosen sites to visit were arbitrarily drawn. As bait digging extent was quantified as a proportion of the site over which it occurred, changes to the drawing of the site boundary may alter the estimates used in this study.

What evidence gaps remain?

Bait Digging Evidence Collection – Methodology Review

- Bait digging data collection should be carried out multiple times on the same shore in better weather conditions and over multiple seasons
- If UAV were used to collect data, more accurate information regarding the speed the holes recover in different conditions would be useful and provide further ground truthing.

Bait Digging Management Options

- Investigation is needed to understand the impacts of bait digging on the condition of SSSIs and SACs. Evidence that bait digging is leading to the deterioration of feature condition would help justify implementation of management measures.
- Bait digging has potential to cause disturbance to birds. More data is needed on species and population specific impacts to accurately assess bait digging impacts on a site-by-site basis.
- Very few studies have evaluated the success of management measures once implemented. Information on the potential recovery of the shore and designated features, displacement of diggers, and compliance with management measures would greatly inform likelihood of success.

How can the outcomes support site condition or network management and what are the next steps?

This discrete project is now complete, and the two reports published on NRW's website. These reports increase understanding of how to appropriately assess the level of bait digging activity which directly informs the management and assessment of site / feature condition and addresses options for network management. Both reports have developed NRWs understanding and ability to appropriately manage this activity where required.

The outputs from these projects directly fed into the identification and development of a project under the Nature Networks Programme: "Implementing management measures for bait collection across the MPA network in Wales". NRW have been successful in securing funding through this programme to carry on work around bait collection activities and their potential impacts on the MPA network. This includes a continued investigation into the location and intensity of bait collection activities across the network and will draw on outputs from these projects to inform and guide any potential management work going forward.