

**Scottish MPA Project
Fisheries Management Guidance**

BLUE MUSSEL BEDS

JULY 2013¹

The fisheries management guidance has been produced to provide advice on the impact various fishing activities may have on MPA search features in Scotland's seas. The advice is organised by features and gear types. Fishing gears are grouped to combine those with broadly similar impacts, but where there is likely to be variation within a group of features (e.g. for high and low energy sand habitats), this has been taken into account. Where possible the guidance has been based on evidence from peer-reviewed scientific journals.

The advice on fisheries management falls into three broad categories:

- Gear/feature combinations that are unlikely to cause unacceptable impacts (except possibly at very high levels of effort) and so no additional management is likely to be required;
- Gear/feature combinations that are likely to cause unacceptable impacts and for which no possible mitigation measures could be identified at this stage other than closure to that gear;
- Gear/feature combinations that are likely to cause some degree of impacts but for which management may be possible to mitigate the effects (e.g. modification or restriction of certain gears, partial or temporary area closures, effort limitation).

In the last type of cases in particular, further site-specific evidence gathering and discussion with stakeholders will be required to determine the appropriate management measures.

The fisheries management guidance has been used, along with the FEatures Activities Sensitivities Tool (FEAST), to inform the development of management options papers for each possible MPA.

¹ Based on Version 1.1 of the fisheries management guidance

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Blue mussels (*Mytilus edulis*) can form beds or reefs in intertidal or subtidal regions, composed of a single or multi-layered framework, held together by byssus threads. The bed stabilises sediment and creates a habitat for a diverse community of animals, living on, within, or in the underlying sediment¹

This advice covers blue mussel (*Mytilus edulis*) beds in both intertidal and subtidal environments. Mussel beds can be of two distinct types; ephemeral beds consisting of only young mussels which last only for relatively short periods, and persistent beds which establish and may persist for many years². This advice assumes that any mussel beds identified as MPA features will only be of the latter type.

Impacts

Mussel Dredging

Mytilid mussels enhance biodiversity of sedimentary coastal systems by increasing habitat heterogeneity³. Direct removal of blue mussels through dredging and trawling activities results in loss of biogenic reef habitat and species richness of benthic invertebrate communities^{4,5}. Dredging may increase the vulnerability of mussel beds to storm damage resulting in reduction in extent or even complete loss of beds². Over-exploitation may reduce subsequent recruitment although this relationship is poorly understood^{6,7}. Recovery potential will therefore be variable.

Other demersal towed gear (including scallop dredges and otter and beam trawls)

No direct evidence of the effects of these gears on blue mussel beds was found, most likely because there is relatively low likelihood of use of other towed gears. Mussel beds are assessed as moderately sensitive to the effects of towed gears (surface and shallow abrasion)⁸. It is likely that a proportion of mussel patches and their associate species will be removed. Recoverability is likely to be high⁸.

Demersal static gears (including pots, traps, lines and nets)

No direct evidence of the effects of static gears on blue mussel beds was found. On the assumption that levels of abrasion are likely to be lower than experienced with mobile gears, mussel beds are assessed as of low sensitivity to the effects of static gears (surface and shallow abrasion)⁸. Recoverability is likely to be high⁸

Bait collection, hand collection and raking

Mussels may be exploited by hand in formal fisheries or informally – for example the collection of bait by recreational anglers. When exploited by hand at moderate levels using manual methods the biogenic reefs are likely to retain most of their intrinsic biodiversity. However, as above, natural mussel beds are vulnerable high levels of exploitation or disturbance^{6,8,9,10}, when the effect of trampling combined with mussel collection may reduce mussel cover and create mussel free gaps¹⁰.

JNCC/SNH advice

Mussel Dredge - Management should aim to limit levels of exploitation to a point which allow beds to persist over the long-term and maintain associated biodiversity. Where historic exploitation has reduced the extent of beds, management of effort may be necessary in order to allow recovery.

Other demersal towed gear - If mussel habitats have been adversely impacted by mobile fishing gears, management of effort may be required to allow recovery to favourable

condition. However, there are no previous studies to draw upon and research may be required to inform best practice where this occurs.

Demersal static gears - It is not expected that static gears will require any additional management in this habitat unless in circumstances where fishing intensity is very high. In which case further site-specific research may be required to inform the management response.

Bait, hand and rake collection - The extent of impact is linked to intensity with similar considerations to the gears mentioned above. However, where exploitation is informal there may be a requirement for the use of relevant byelaws, developing codes of best practice and awareness raising.

Confidence in advice

Mussel Dredging - High certainty. The conclusions are supported by good quality, directly relevant scientific information (habitats from similar environments in Northern Europe and experience of existing fisheries in UK).

Demersal towed gears - Low certainty. Conclusions have been based on sensitivity assessments which may rely on significant assumptions or generalisations. It has not been possible to validate these assumptions.

Demersal static gears - Low certainty. Conclusions have been based on sensitivity assessments which may rely on significant assumptions or generalisations. It has not been possible to validate these assumptions.

Bait, hand and rake collection - Medium certainty. There is directly relevant scientific information to support the conclusion but it comes from UK grey literature sources. Evidence has also been sourced from areas outside the UK.

Evidence

¹ Baxter <i>et al.</i> , 2001; ² Anon, 2010; ³ Buschbaum <i>et al.</i> , 2009; ⁴ Dolmer <i>et al.</i> , 2001; ⁵ Herlyn & Millat, 2000; ⁶ Holt <i>et al.</i> , 1998; ⁷ Tyler-Walters, 2008; ⁸ Tillin <i>et al.</i> , 2010; ⁹ Roberts <i>et al.</i> , 2010; ¹⁰ Smith <i>et al.</i> , 2005;							
There is good evidence for the impacts of mussel dredging on intertidal and subtidal blue mussel beds however much of this evidence is from other areas (Denmark, Germany) or refers to ephemeral mussel beds so may not be directly applicable to the type of beds likely to be designated as Scottish MPAs.							
No study has been found that directly addresses the impact of other towed gears or demersal static gears on blue mussel beds. Our advice is therefore based on our interpretation of sensitivity assessments ⁹ .							
Evidence has also been captured from UK grey literature and scientific literature found on blue mussel beds from the USA.							
Directly relevant peer reviewed literature	✓	Directly relevant grey literature	✓	Inference from studies on comparable habitats, gears or geographical areas.	✓	Expert judgement or anecdotal evidence	✓