Scottish MPA Project

Fisheries Management Guidance

MAERL BEDS

MAERL OR COARSE SHELL GRAVEL WITH BURROWING SEA CUCUMBERS

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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 2.0 of the fisheries management guidance

MAËRL BEDS and MAËRL OR COARSE SHELL GRAVEL WITH BURROWING SEA CUCUMBERS

Maërl beds are found along the west coast of Britain and Ireland, although the majority are located in Scotland. Scottish maerl beds are distributed along the west and north coasts of the mainland, in the Hebrides and the Northern Isles. These beds represent about 30% of all maërl beds in north-west Europe. Maërl is extremely slow growing and some of the more extensive beds may be over 1000 years old. Maërl beds in Scotland are usually formed by the species *Phymatolithon calcareum* or *Lithothamnion glaciale* (the former being the most common). Maerl creates a complex, open structure that supports diverse associated communities of red seaweeds and animals such as sea firs, scallops, brittlestars, sea cucumbers and tube dwelling sea anemones, as well as the juvenile stages of a range of commercially important species[1]. In some locations the sea cucumber *Neopentadactyla mixta* can be found in high densities and is classified as 'Maerl or coarse shell gravel with burrowing sea cucumbers'[9]. As the sensitivity and management considerations for this habitat is largely the same as other maerl beds these have been combined in this note.

Impacts

Demersal towed gears (including scallop dredge, hydraulic dredge, beam trawl, otter trawl etc).

Demersal towed gears have the potential for significant negative impacts on maërl beds. This is because of high sensitivity to physical disturbance and low rates of recovery[4,10]. The recovery of maerl beds from disturbance has been estimated to be in the order of 10 - 40 years[2,3], due largely to the slow growth and accumulation of maërl nodules[3,4,10]. Studies have illustrated significant impacts with up to 70% of maërl crushed and buried (up to 8cm) by one pass of a scallop dredge[10], and buried at a rate of 5.2kgm^{-2} by a hydraulic dredge[6]. The impacts from smothering have been also experimentally demonstrated[5,6]. Research from the Firth of Clyde have assessed both the nature and persistence of impacts over time[4,10]. Similar impacts on the structure and integrity of maërl have been recorded in relation to hydraulic dredging [6].

For the substrate 'coarse shell gravel', no specific studies could be found in relation to demersal towed gear. A generic assessment of the sensitivity of the gravel sea cucumber (*Neopentadactyla mixta*) is available[8]. During periods when the gravel sea cucumber's tentacles are extended for feeding it could be vulnerable to surface abrasion[8], However, it spends a considerable amount of time buried below the surface which would reduce its vulnerability. Sub-suface abrasion, such as by hydraulic gear, would cause mortality/disturbance although no information is available to determine recovery potential.

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

No direct evidence of the effects of static gear on maërl beds was found. However, given the fragility of maërl and length of recovery time[2,3], a high intensity of deployment and recovery of static gear could cause sufficient abrasion to have a detrimental effect[11]. Further research will be required to determine the level of fishing that would produce an unacceptable impact.

JNCC/SNH advice

Demersal towed gear – On maerl beds, the sensitivity of this feature is such that JNCC and SNH advise removal of relevant pressures, and therefore management measures to restrict bottom contacting gears (including hydraulic gears operated from vessels or by diver) are appropriate. On 'Coarse shell gravel with burrowing sea cucumbers' measures to reduce pressures should be considered, informed by local conditions, fishing intensity and site condition monitoring.

Demersal static gear – Although there are no specific studies of static gear interactions with these features, management measures that limit the intensity of fishing with static gears should be considered. Site condition monitoring or evidence arising from relevant studies will inform the requirement to reassess this recommendation.

Confidence in advice

Demersal towed gears - High certainty for maerl beds which are supported by good quality, directly relevant scientific studies. The evidence for habitat 'coarse shell gravel with burrowing sea cucumbers' is derived from generic sensitivity analysis for burrowing gravel sea cucumber.

Demersal static gears – Medium certainty. Evidence to support this assumption is limited. There is no published evidence specifically for static gear impacts on this feature and sensitivity of these habitats to physical disturbance has been used to determine advice[11].

Evidence

[1]Baxter *et al.,* 2011; [2]OSPAR, 2006; [3]Hall-Spencer, 2000; [4]Hall-Spencer and Moore, 2000a; [5]Wilson *et al.*, 2004; [6]Hauton *et al.,* 2003; [7]Bárbara *et al.,* 2003 ; [8]Jackson, 2008. [9]MPA detailed ecological guidance ; [10]Hall-Spencer & Moore, 2000b ; [11]MacDonald et al, 1996.							
There is direct evidence of the effects of dredging on maërl beds from Scotland and UK waters. Evidence on the effects of otter trawls comes from the Mediterranean[7]. No direct evidence of static gears on maërl beds was found. Conclusions were based upon the sensitivity of the habitat from scientific and grey litterature.							
Directly relevant peer reviewed literature	✔	Directly relevant grey literature	✔	Inference from studies on comparable habitats, gears or geographical areas.	✔	Expert judgement	✔