

PRIORITY MARINE FEATURE (PMF) - FISHERIES MANAGEMENT REVIEW

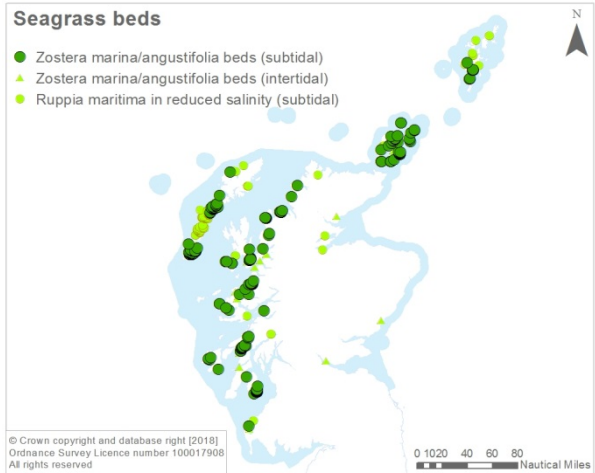
Feature

SEAGRASS BEDS

Image



Map



Description

Characteristics - Seagrasses (also known as eelgrass) are marine flowering plants found in shallow coastal areas down to 10 m, often growing in dense beds or meadows. The plants can be annual or perennial and stabilise the sediment, creating productive habitats that provide shelter and food for a wide variety of plants and animals (including other species of conservation importance and commercially valued fish species), as well as being important for carbon sequestration.

Zostera marina and a separate variant of the species, *Z. marina* var. *angustifolia* form subtidal seagrass beds (below MLWS) that are considered potentially at risk to towed bottom-contacting fishing activities. **It is only these two subtidal habitats that are considered in this review.** Intertidal beds of *Zostera* (*Zosterella*) *noletii* and subtidal *Ruppia maritima* are also part of the seagrass beds PMF but are not considered here because there are no overlaps with towed bottom-contacting fisheries.

Definition - OSPAR defines a *Zostera* 'bed' as having plant densities that provide at least 5% cover (OSPAR, 2009). Typically, *Zostera* plant densities provide greater than 30% cover and in favourable conditions, extensive beds may form with up to 95% cover (Lancaster *et al.*, 2014a&b). A minimum area of 5 m x 5 m with at least 5% cover of seagrass is required to qualify as a seagrass bed.

Environmental preferences - Seagrasses grow in sands and muds from the upper shore down to 10 m, in areas at least moderately sheltered from wave action such as sea lochs, inlets, bays, sounds, channels and lagoons. *Z. marina* is predominantly subtidal, whilst the narrow-leaved variant, *Z. marina* var. *angustifolia*, can occur in the shallow subtidal and intertidally on the mid to lower shore.

Distribution

Scottish distribution - Subtidal seagrass beds have been recorded mainly on the west coast and around Orkney and Shetland.

Estimated known Scottish extent - Beds vary considerably in size, patchiness and plant density. The smallest of six beds surveyed in Gruinard Bay and Loch Gairloch in 2010 was a mere ~0.03 ha in extent, essentially a discrete patch of seagrass of less than 20 m diameter (Moore *et al.*, 2011).

In a national context, even the largest bed in the 2010 study, at 6.22 ha is small when compared with the extensive seagrass coverage found in the Sound of Barra (est. 360 ha - Harries *et al.*, 2007) and Sound of Harris (est. 280 ha - Malthus *et al.*, 2006).

Wider distribution - Seagrass beds are recorded from Ireland, Wales and south-west England, and are widespread through the Atlantic and Pacific. *Z. marina* is the only seagrass species that extends into the Arctic Circle; it is found around Iceland and the north coast of Norway but has a restricted distribution in the Mediterranean where the intertidal *Z. noltei* is more prevalent (Borum *et al.*, 2006).

Status

Scottish waters support an estimated 20% of the seagrass beds in north-west Europe. Currently UK seagrass populations are considered degraded following significant declines (from a 'wasting' disease in the 1920s and '30s). Seagrass beds (*Zostera* spp.) are an OSPAR threatened and / or declining habitat. This feature can be part of the broadscale habitats protected under the EU Habitats Directive: Lagoons; Mudflats and sandflats; Sandbanks which are slightly covered by sea water all the time; and, Estuaries.

Sensitivity (including recovery)

[Key sources: [FEAST](#); [Fisheries Management Guidance](#)]

Seagrass beds are sensitive habitats, particularly to smothering, organic enrichment, nutrient enrichment, physical disturbance, changes in water flow and clarity, and non-indigenous invasive species (e.g. *Spartina* spp.) (OSPAR, 2009; Jackson *et al.*, 2013; d'Avack *et al.*, 2014; d'Avack *et al.*, 2015a&b). An epidemic wasting disease has caused severe declines to seagrass beds across Europe in the past (Jackson *et al.*, 2013) and anthropogenic stresses may increase susceptibility to disease. Activities associated with these pressures include coastal development, aquaculture, anchoring and bottom-contacting fishing. Severe storms, exposure to air and freshwater pulses are also threats (OSPAR, 2009). Projected increases in seawater temperatures, availability of CO₂ for photosynthesis, the frequency and strength of storm events, and changes in sea level associated with climate change all have implications for the future distribution of seagrass (Borum *et al.*, 2004; Gormley *et al.*, 2014).

Towed bottom-contacting fishing activity may cause disruption of the seagrass root system (rhizomes) within the sediment leading to increased patchiness, destabilization and erosion of the seagrass bed. Increases in fragmentation are thought to be more damaging than total area of seagrass bed loss (Jackson *et al.*, 2013). Fishing activity may also increase turbidity in the water column and subsequent sediment deposition (Davison & Hughes, 1998; Mazik *et al.*, 2015).

Recovery depends mainly on vegetative growth of rhizomes from perennial beds rather than natural seedling production (Jackson *et al.*, 2013; d'Avack *et al.*, 2014). The recovery of seagrass habitat from towed bottom-contacting fishing gear disturbance can take between 6 to 20 years depending on the amount of damage (Neckless *et al.*, 2005). Once lost, seagrass beds take considerable time to re-establish (OSPAR, 2009; Jackson *et al.*, 2013; d'Avack *et al.*, 2014; d'Avack *et al.*, 2015a&b; Tyler-Walters & d'Avack, 2015) and may potentially not recover if all rhizomes are lost or damaged and sediment dynamics change.

Connectivity

Between seagrass beds - Seagrass seed dispersal has the potential to cover large distances; however, high seedling mortality and seed predation may significantly reduce effective recruitment (Phillips & Menez, 1988). Most seagrass bed expansion seems to rely on vegetative growth from existing rhizomes (Holt *et al.*, 1997; Davison & Hughes, 1998). Additional management could help provide connectivity between beds, including with those within the MPA network.

With other PMFs - Subtidal seagrass beds have been found rooted within *maerl beds* (e.g. in Wyre, Rousay and Gairsay Sounds in Orkney (Thomson *et al.*, 2014)), and also in Loch Sween. *Native oysters* may also be found within seagrass beds (e.g. Loch Sween).

Seagrass beds sometimes overlay the *tide-swept coarse sands with burrowing bivalves* PMF, offering bivalves protection through shelter and stability (Lancaster *et al.*, 2014a&b). Seagrass at low abundance (insufficient to be recognised as a bed) may form part of the *kelp and seaweed communities on sublittoral sediment* PMF in some locations. *Low or variable salinity habitats* can often support seagrass beds, helping to stabilise the sediment, which can increase biodiversity and input of organic matter (d'Avack *et al.*, 2015).

Ecosystem services

- | | |
|---|---|
| <ul style="list-style-type: none"> • Biomass production • Larval / gamete supply (supporting connectivity) • Nutrient cycling • Formation of habitat for other species (supporting biodiversity) • Formation of physical barrier • Resilience to INNS & disease | <ul style="list-style-type: none"> • Coastal protection • Waste breakdown and detoxification of water and sediments • Sediment stabilisation • Carbon storage and climate regulation • Fish and shellfish stocks • Socially valued places • Watching/studying nature |
|---|---|

Existing Marine Protected Areas

Subtidal seagrass beds are a protected feature of 9 MPAs: Sound of Arisaig; Sanday; Sound of Barra; Loch nam Madadh; South Arran; The Vadills; Loch Roag; Obain Loch Euphoirt; and Loch of Stenness. The last 4 sites are considered inaccessible to towed bottom-contacting fishing activity, and all support the *Ruppia maritima* component only, except The Vadills which also has one historic record of *Zostera marina* (although the habitat was not relocated during monitoring work undertaken in 2003 - ERT (Scotland) Ltd., 2006).

Existing and proposed fisheries measures providing PMF protection

Details of existing fisheries measures associated with Sanday MPA and South Arran MPA are provided on Marine Scotland's web pages (<http://www.gov.scot/Topics/marine/marine-environment/mpanetwork/MPAMGT/protectedareasmgt>).

New fisheries management measures that will provide PMF protection in the Sound of Arisaig, Sound of Barra and Loch nam Madadh MPAs will be consulted upon later in 2018 (see - <http://www.gov.scot/Topics/marine/marine-environment/mpanetwork/inshorempas/Management>).

[Fisheries measures are not proposed for the 4 lagoonal MPAs (Obain Loch Euphoirt; Loch Roag; Loch of Stenness; The Vadills) considered inaccessible to fishing vessels]

Subtidal seagrass beds are afforded protection by virtue of existing or proposed fisheries measures associated with other designated features in a further 8 MPAs (Loch Creran; Treshnish Isles; Small Isles; Lochs Duich, Long and Alsh (through the combined Southern Inner Sound measures - CA150); Loch Sunart; Wester Ross; Wyre and Rousay Sounds; and, Loch Sween).

Seagrass beds are also afforded protection through the Loch Gairloch (CA58); Loch Roag (CA67); and, Loch Torridon and Northern Inner Sound fisheries areas (CA56).

Examples of PMFs that have no or partial coverage by fisheries measures

Subtidal seagrass beds:

- West highlands: Gruinard Bay, north-west Loch Gairloch, Loch Torridon, sea lochs around Skye, Enard Bay and Eddrachillis Bay, Sound of Arisaig. Two seagrass beds were lost from Poll Loisgann and Cùil Lochain within Enard Bay between 1987 and 2004 (James, 2004).

- Outer Hebrides: subtidal seagrass beds have been recorded in the Sound of Harris and to the north of Loch nam Madadh.
- Orkney: extensively distributed across the islands and mainland.
- Shetland: Whiteness Voe, Weisdale Voe and South Voe (the latter between East and West Burra). These beds are currently considered to be afforded partial protection (from scallop dredging only) within a series of statutory closed areas identified by the Shetland Shellfish Management Organisation (SSMO - <https://www.ssmo.co.uk/maps>).
- Argyll/Clyde: Loch Indaal on Islay, Loch Craignish, Ulva, South Kenneth and north-west Arran. Historic records around Fairlie and Largs Channel are no longer thought to be present (Allen *et al.*, 2013).

Assessment against National Marine Plan General Policy 9:

Development and use of the marine environment must not result in significant impact on the national status of Priority Marine Features.

Subtidal seagrass beds are functionally important, biodiverse, sensitive, slow to recover and if lost completely may not recover. They are an OSPAR T&D habitat, scarce in north-west Europe with evidence of decline in Scotland. Therefore any activities that lead to the loss of entire beds or damage beds to the extent that function or provision of ecosystem services cannot be maintained should be considered a significant impact on national status.

Existing licensing and consenting processes will continue to consider the potential for significant impacts on the national status of development proposals on seagrass beds. The following assessment relates to fishing using towed bottom-contacting gear only but is consistent with the approach taken for assessing proposed developments. Please refer to the *consultation overview* for further details.

Subtidal seagrass beds are concentrated on the west coast of Scotland, the Outer Hebrides and Orkney and are a protected feature in 9 MPAs. A number of additional subtidal seagrass beds are encompassed by other existing fisheries management measures (i.e. are afforded protection by the wider Scottish MPA network).

In a fisheries context, additional measures to protect subtidal seagrass beds from pressures associated with towed bottom-contacting gears are recommended in the following eight areas: **SW Shetland; Orkney; Enard Bay and Edrachillis Bay; Gairloch; Sound of Harris; South Skye; Islay; and, Ulva (Mull)**. The recommendations for subtidal seagrass beds need to be considered alongside the recommendations for the other 10 PMFs considered as part of this review. The areas identified provide a starting point for discussions regarding future fisheries management. These discussions will be led by Marine Scotland.

The beds in Whiteness Voe are recorded as the most extensive seagrass beds in **Shetland** (Hiscock, 1989). Beds are also present between East and West Burra and at the head of Weisdale Voe (Howson, 1999). The **Orkney** beds are more widespread, around both the mainland and across the islands, and may still be under-recorded.

The northerly records in **Enard Bay and Edrachillis Bay** (where some beds have been lost between 1987 and 2004 - James, 2004) also warrant protection and there are a number of records adjacent to the existing fishing order in Loch **Gairloch** that it would also be sensible to consider.

Around **South Skye**, the beds are patchy in Loch Ainort (Dipper, 1981) and interspersed with maerl beds in Lochs Eishort and Slapin (Moore *et al.*, 2015). Seagrass beds in the **Sound of Harris** are very extensive (280ha) and well developed, typically consisting of a series of dense bands (Malthus *et al.*, 2006).

There are swathes of healthy seagrass beds (amongst patches of maerl gravel, with live maerl beds slightly deeper) at Traigh Bhain, to the south of **Ulva (Mull)** together with beds to the south of Inch Kenneth (Dipper, 2016).

The beds around **Islay** include more open coast examples in contrast to the Loch Sween seagrass beds that are part of the MPA network. The beds in Loch Indaal are particularly rich in biodiversity (Hiscock, 1983).

Knowledge gaps and other records

Other records - There are records of beds to the north of Sound of Arisaig in Loch nan Uamh (Howson, 1990). Further work to investigate the extent and condition of these beds could inform future consideration of the need for appropriate fisheries management measures. Similarly, survey work is required to confirm the continued presence and status of beds in Loch Craignish in Argyll (Gubbay and Loretto, 1991).

There are numerous additional observations of subtidal seagrass as a species. At low densities, such records may have been assigned to non-seagrass bed habitats. In some cases this may reflect a deterioration in condition of a former bed e.g. Skipness in the Clyde. These records are not reflected in the mapping.

Data confidence

Available records span 1976 to 2016. Surveys vary in their original aims from Seasearch (carried out by volunteer divers), broadscale seabed habitat mapping (e.g. 2005 SNH Sound of Harris survey) to dedicated PMF validation (e.g. Ullapool approaches survey in 2010). Three records have been approximated from the [Seagrass Spotter](#) web portal that relate to research undertaken in Loch Eishort in 2017 (Furness, 2017a&b). Additional seagrass records (species and beds) are available in Seagrass Spotter and the NBN Atlas. Work to collate and mobilise relevant PMF records to best inform future marine planning requirements is ongoing.

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Areas where fisheries management should be considered to avoid a significant impact on the national status of the PMF

Seagrass beds

Zostera marina/angustifolia beds on infralittoral clean or muddy sand

