

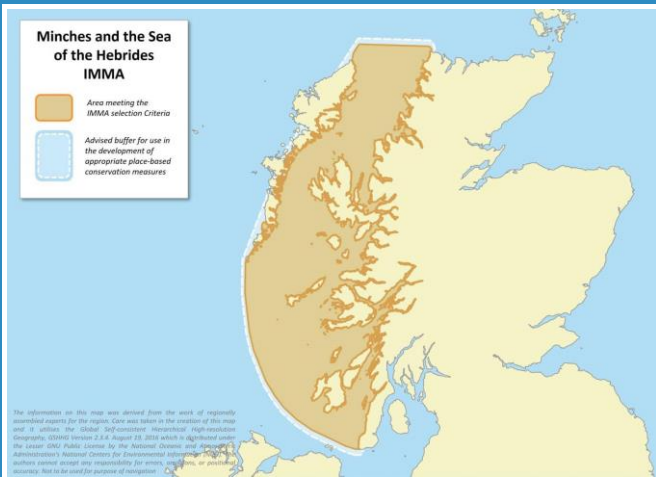
Minches and the Sea of the Hebrides IMMA

Summary

The waters between the Outer Hebrides and the mainland coast of west Scotland are amongst the richest in terms of marine mammal diversity of any in the British Isles. Twenty-three marine mammal species have been recorded here, nine of which meet at least one of the IMMA criteria. This is due to the area's proximity to the shelf edge, the complex currents that pass around the islands, and the various productive fishing grounds in the area. The continental shelf seas support the following marine mammal species: harbour seals (*Phoca vitulina*) and grey seals (*Halichoerus grypus*), harbour porpoises (*Phocoena phocoena*), common bottlenose dolphins (*Tursiops truncatus*), common dolphins (*Delphinus delphis*), white-beaked dolphins (*Lagenorhynchus albirostris*), Risso's dolphins (*Grampus griseus*), killer whales (*Orcinus orca*), and minke whales (*Balaenoptera acutorostrata*). The habitat is important for breeding for grey seals, harbour seals, harbour porpoises and Risso's dolphins. Hybrids of the latter with common bottlenose dolphins have been recorded in the area.

Description:

Off the west coast of Scotland and around the Hebrides, upwellings around headlands and islands provide suitable conditions for plankton concentrations to develop, supporting important fish populations. The waters are often relatively calm, being protected from the Atlantic by the long chain of islands that form the Outer Hebrides. Tidal currents passing over uneven bottom topography can have a considerable mixing effect, as for example in the Sea of the Hebrides.



Area Size

28 858 km²

Qualifying Species and Criteria

Common bottlenose dolphin – *Tursiops truncatus*

Criterion B (1); D (1)

Grey seal – *Halichoerus grypus*

Criterion B (2); C (1,2)

Harbour seal – *Phoca vitulina*

Criterion B (2); C (1,2)

Harbour porpoise – *Phocoena phocoena*

Criterion B (2); C (1,2)

Risso's dolphin – *Grampus griseus*

Criterion B (2); C (1); D (1)

Minke whale – *Balaenoptera acutorostrata*

Criterion B (2); C (2)

White-beaked dolphin –

Lagenorhynchus albirostris

Criterion C (2)

Marine Mammal Diversity

Criterion D (2)

Balaenoptera acutorostrata, *Delphinus delphis*,

Grampus griseus, *Halichoerus grypus*,

Lagenorhynchus albirostris, *Orcinus orca*, *Phoca*

vitulina, *Phocoena phocoena*, *Tursiops truncatus*



Figure 1: The Sea of the Hebrides. Photo credit: PGH Evans

The Minches and Sea of the Hebrides IMMA contain many types of marine and intertidal habitats, reflecting the range of substrata and the variation in exposure to wave action and tidal currents (Barne et al., 1997). There are several island archipelagos, sea lochs, fishing banks and reefs in the area, with seasonally persistent oceanographic fronts (e.g. Islay Front) and strong currents between land masses (Miller et al., 2014). On the western side of the Hebridean islands, conditions are influenced by those of the adjacent open North Atlantic Ocean, while those in the Minch and Sea of the Hebrides are influenced by the outflows from the west coast sea lochs. The residual northward flowing Scottish Coastal Current transports water through the Minch and west of the Outer Hebrides. Seasonal variation exists in circulation in both strength and positioning, due to changing wind patterns and water column conditions.

Several marine protected areas (SACs and SPAs) including a large SAC for harbour porpoises and several for harbour and grey seals have been established in the region. These have been incorporated into UK law and remain as marine protected areas under the Conservation of Species and Habitats Regulations (2017). The Scottish Government has also established marine protected areas for minke whales, Risso's dolphins, and basking sharks in the region based upon an analysis of survey data across Scottish waters (Paxton et al., 2014).

The offshore islands and skerries (clusters of rocks) make it an ideal place for seals to haul out and to breed, particularly for harbour seals.

Criterion B: Distribution and Abundance

Sub-criterion B1: Small and Resident Populations

Several species (e.g. harbour porpoise, killer whale, grey seal, harbour seal) have been recorded in the area in every month of the year, but the only species that qualifies as a small and truly resident population is the common bottlenose dolphin (*Tursiops truncatus*). A population of about 15 animals inhabits the vicinity of the Sound of Barra in the Outer Hebrides and has not been photo-identified outside this area (Grellier & Wilson, 2003; Cheney et al., 2013; van Geel, 2016). Around 30-40 bottlenose dolphins also range mainly inshore around the Inner Hebrides from the Kintyre Peninsula to the Isle of Skye (Cheney et al., 2013; van Geel, 2016; Hebridean Whale and Dolphin Trust, 2018; Evans & Waggitt, 2020). Off the east coast of the Isle of Lewis, 31 bottlenose dolphins have been photo-identified since 2005 (Whale & Dolphin Conservation Photo-ID catalogue, 2021; N. Hodgins *pers. comm.*), of which several have been re-sighted across multiple years (up to 15 years).

Sub-criterion B2: Aggregations

Seasonal aggregations of harbour porpoises (*Phocoena phocoena*) are observed regularly in the Minches and Sea of the Hebrides, particularly between June and September (Evans, 1997a, b; Evans et al., 2003). Several authors have mapped or modelled distributions in the region and identified areas of high density (Evans & Wang, 2003; Evans et al., 2003; Marubini et al., 2009; Embling et al., 2010; Booth, 2010; Paxton et al., 2016; Hebridean Whale and Dolphin Trust, 2018; Waggitt et al., 2020; Lacey et al., 2022). Several of these analyses have used the same data sets but adopted slightly different modelling approaches. The more recent studies are generally more comprehensive as they incorporate more data

and cover a longer time period. Loose groups numbering 100 harbour porpoises have been recorded on occasions in areas such as the Sea of the Hebrides and Inner Sound between Skye and the mainland coast of West Scotland. The species occurs far up the sea lochs on the west coast of Scotland. Porpoise abundance estimates in the region during July SCANS surveys have varied over the years with no clear trend (Hammond et al., 2002, 2013, 2021). The SCANS survey in 2016 obtained a density of 0.40 porpoises per km², yielding a July abundance estimate of 5,506 (95% CI: 2,403-9,961) animals in block I, and 0.34 porpoises per km², yielding an abundance estimate of 5,087 (95% CI: 1,701-10,386) animals in block G, the two blocks corresponding approximately to the area of this IMMA (Hammond et al., 2021). The area of the Minches and Sea of the Hebrides IMMA has been designated a Special Area of Conservation for the harbour porpoise, based upon areas of relatively high density within the West of Scotland Management Unit, from analysis by Heinänen and Skov (2015), Booth (2010), and Booth et al. (2013).



Figure 2: Harbour porpoise (*Phocoena phocoena*) at Gairloch, Minches. Photo credit: I Birks

When compared with other regions around Scotland, elevated densities of Risso's dolphins (*Grampus griseus*) persist in the north Minch off the coast of north-east Lewis (Paxton et al., 2014). This led the Scottish government to designate part of the IMMA as a marine protected area (NE Lewis scMPA) (NatureScot, 2019). The species also occurs regularly all down the east coast of the Outer Hebrides and occasionally ranges into eastern areas of the north Minch and Sea of the Hebrides (Boran et al., 1999; Evans et al., 2003; Paxton et al., 2014; Hebridean Whale and Dolphin Trust, 2018; Evans & Waggitt, 2020).



Figure 3: Risso's dolphin (*Grampus griseus*) spyhopping in the Sea of the Hebrides. Photo credit: PGH Evans



Figure 4: Risso's dolphins (*Grampus griseus*) in the Minches. Photo credit: PGH Evans



Figure 5: Minke whale (*Balaenoptera acutorostrata*) lunge feeding off the Isle of Skye. Photo credit: P Anderwald



Figure 6: Minke whale (*Balaenoptera acutorostrata*) in the Sea of the Hebrides. Photo credit: PGH Evans

In UK waters, aggregations of minke whales (*Balaenoptera acutorostrata*) rarely exceed ten individuals. However, in the Sea of the Hebrides in particular, feeding aggregations of up to 20 individuals have been recorded in late summer (Evans et al., 2003; Anderwald et al., 2011; Hebridean Whale and Dolphin Trust and Sea Watch Foundation sightings databases). The abundance of minke whales within the west coast of Scotland/Hebrides region (blocks G + I from the SCANS III survey in July 2016) was 695 animals, for which estimated densities are higher than all except two other survey blocks (see Table 16 in Hammond et al., 2021).

Over 20,000 harbour seals (*Phoca vitulina*) haul out in the IMMA which, equates to ~60% of Scottish harbour seals (which are a different metapopulation from England and continental Europe (Carroll et al., 2020), ~15% of European and ~ 10% of the Atlantic subspecies *P. v. vitulina*; SCOS, 2022). For the most part, the IMMA also encompasses the foraging distribution of harbour seals hauling out within it (Carter et al., 2022). Within the IMMA, ~7% and ~12% of UK grey seals (*Halichoerus grypus atlantica*) breed and haul out, respectively (SCOS, 2022).



Figure 7: Harbour seals (*Phoca vitulina*) haul out in Sound of Arisaig. Photo credit: PGH Evans



Figure 8: Grey seal (*Halichoerus grypus*) at the Sea of the Hebrides. Photo credit: P Anderwald

Criterion C: Key Life Cycle Activities

Sub-criterion C1: Reproductive Areas

Harbour porpoises with small calves recently born are regularly recorded in summer throughout the region (Evans, 1997a, b; Evans et al., 2003, Marubini et al., 2009; Booth, 2010; Embling et al., 2010; Hebridean Whale and Dolphin Trust, 2018), and several strandings of neonates have been recorded in the area (SMASS strandings database).

Risso's dolphins have long been known to utilise the area around the Eye Peninsula in East Lewis, Outer Hebrides (Boran et al., 1999; Evans et al., 2003; Paxton et al., 2014; Hebridean Whale and Dolphin Trust, 2018; Evans & Waggitt, 2020), where photo-ID studies have been undertaken over several years (Atkinson et al., 1997, 1999; Weir et al., 2019). These studies have frequently recorded neonates, particularly between April and September, and have photo-identified some of their mothers as individuals showing site fidelity to the region.

Both harbour and grey seals breed in the IMMA, although for grey seals, pup production is much lower (c. 4,500 pups) than for the Outer Hebrides (over 15,000; SCOS 2022). This area is important for harbour seal breeding, and, in contrast to most other regions of the UK, numbers of harbour seals are increasing (Russell et al., 2022).

Sub-criterion C2: Feeding Areas

The shelf seas within the Hebrides offer excellent feeding grounds for harbour porpoises with significant quantities of sandeels (*Ammodytidae*), sprat (*Sprattus sprattus*), whiting (*Merlangius merlangus*), and herring (*Clupea harengus*), all known to be important prey for this species; herring stocks show signs of recovery following overfishing in the latter half of the last century (Santos & Pierce, 2003;

Heessen et al., 2015; Evans & Waggitt, 2020). Habitat associations with environmental features such as tidal currents have been shown in this area by a number of studies (see, for example, Marubini et al., 2009; Embling et al., 2010; Booth et al., 2013).

In the same areas where feeding aggregations of porpoises occur, minke whales have been observed lunge feeding on shoals of fish (Evans, 1997a, b; Macleod et al., 2004; Anderwald et al., 2011, 2012). Stomach contents analysis of minke whales from west Scottish waters has shown that the species commonly feeds upon sandeel, herring and sprat (Pierce et al., 2004). Collections of prey samples at the surface in close proximity to lunge-feeding minke whales have revealed the presence of sprat and young herring (Anderwald et al., 2011, 2012). Similarly, sightings of feeding humpback whales have been made on occasions in the shelf seas of the Hebrides, frequently accompanied by aggregations of minke whales; prey sample collections on the surface close by have confirmed sprat and young herring (Anderwald et al., 2011, 2012; Sea Watch Foundation sightings database). These have often also been associated with large schools of common dolphins or white-beaked dolphins (P.G.H. Evans, *pers. observ.*).



Figure 10: Humpback whale (*Megaptera novaeangliae*) feeding in the Sea of the Hebrides. Photo credit: PGH Evans



Figure 11: Common dolphins (*Delphinus delphis*) breaching in the Minches. Photo credit: PGH Evans



Figure 9: Minke whale (*Balaenoptera acutorostrata*) lunge feeding in the Sea of the Hebrides. Photo credit: PGH Evans



Figure 12: White-beaked dolphins (*Lagenorhynchus albirostris*). Photo credit: C Weir

Habitat Association modelling highlights the importance of the IMMA waters for harbour seals (Carter et al., 2022), with the majority of harbour seals that haul out in the IMMA also foraging within it. Scat analysis has shown that several fish species (cod (*Gadus morhua*), plaice (*Pleuronectes platessa*), poor cod (*Trisopterus minutus*), sandeel (*Ammodytidae*), sea scorpion (*Taurulus bubalis*), dragonet (*Callionymus lyra*), ling (*Molva molva*), herring, and mackerel (*Scomber scombrus*)), that occur commonly in the region, are prevalent in their diet (Hammond & Wilson, 2016; Wilson & Hammond, 2019). Although grey seals range further on foraging trips than harbour seals, the habitat association modelling which were used to generate SAC-specific predictions of density, show that there are relatively high-density areas within the IMMA waters (see S10.1 in Carter et al., 2022).



Figure 13: Harbour seals (*Phoca vitulina*) haul out in Sound of Arisaig. Photo credit: PGH Evans

Criterion D: Special Attributes

Sub-criterion D1: Distinctiveness

Between 2010 and 2013, a land-based and boat-based study of the Risso's dolphin was carried out in nearshore waters around the Eye Peninsula located on north-east Lewis, Scotland (Hodgins et al., 2014). Three atypical individuals were photographed which exhibited morphological features intermediate between Risso's dolphin and the common bottlenose dolphin. These individuals were typically larger in body size than *Tursiops* and had a dorsal fin shape and size consistent with *Grampus*.

Two individuals had coloration most like *Tursiops* and the third exhibited extensive white linear scarring consistent with *Grampus*. The intermediate morphology was most apparent in the head shape, with all three individuals exhibiting a defined (in contrast to *Grampus*) but very short (compared with *Tursiops*) rostrum and two having an unusually steep (compared with *Tursiops*) forehead. On one occasion, one of the atypical individuals was observed within a mixed-species school of *Grampus* and *Tursiops*. There were four further sightings of atypical dolphins associated with *Tursiops*-only schools. Atypical dolphins were not recorded within *Grampus*-only schools. These observations are consistent with hybridisation between free-ranging Risso's and bottlenose dolphins, the first such occurrence to be documented for these species in UK waters (Hodgins et al., 2014). Since this initial occurrence, further observed occurrences supporting the possibility of the presence of intergeneric hybrids, putative bottlenose dolphin hybridization with Risso's dolphins, as well as mixed-species groups containing individuals from both species, have been reported in adjacent waters off eastern Lewis and off the west coast of the Scottish mainland (Bertulli, 2018; van Geel et al., 2022).

Sub-criterion D2: Diversity

Twenty-three marine mammal species (21 cetaceans and 2 seal species) have been recorded in the proposed area, making it one of the most species diverse of any in the British Isles (Evans & Waggitt, 2020).

Nine species are regular inhabitants of this IMMA. They include grey seals, harbour seals, harbour porpoises, common bottlenose dolphins, common dolphins, white-beaked dolphins, Risso's dolphins, minke whales, and killer whales, all of which have been observed in most months of the year (Boran et al., 1999; Evans et al., 2003; Hebridean Whale and Dolphin Trust, 2018; Weir et al., 2019; Evans & Waggitt, 2020; Waggitt et al., 2020). Many of these have been detailed above in relation to aggregations, feeding, and reproductive behaviours.

For at least four decades, a pod of killer whales (*Orcinus orca*), numbering 20 individuals in the 1980s and now apparently reduced to two mature males, has also regularly inhabited the Hebrides where they have been observed killing porpoises and seals (Evans, 1988; Bolt et al., 2009; Beck et al., 2014; Hebridean Whale and Dolphin Trust, 2018). This pod, referred to as the West Coast Community, has been suggested to be distinct from other killer whale populations (Beck et al., 2014). Occasionally, other small pods of killer whales have also been observed in the region.

Humpback whales (*Megaptera novaeangliae*), although rare in the area, are being sighted more frequently in recent years (Leaper et al., 2022). While the regular residents are largely shelf sea species, within the area are several basins with depths of between 100 and 200 m, resulting in occasional visits from deep-water species: Atlantic white-sided dolphins (*Lagenorhynchus acutus*), long-finned pilot

whales (*Globicephala melas*), northern bottlenose whales (*Hyperoodon ampullatus*), Sowerby's beaked whales (*Mesoplodon densirostris*), fin whales (*Balaenoptera physalus*), and sei whales (*Balaenoptera borealis*).



Figure 14: Killer whale (*Orcinus orca*) in the Sea of the Hebrides. Photo credit: PGH Evans

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