## Area Size

10,028 km²

## Qualifying Species and Criteria

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)

Minke whale – *Balaenoptera acutorostrata*

Criterion B (2); C (2)

Fin whale – *Balaenoptera physalus*

Criterion A; B (2)

Risso's dolphin – *Grampus griseus*

Criterion B (2)

Killer whale – *Orcinus orca*

Criterion B (2); C (2)

White-sided dolphin – *Leucopleurus acutus*

Criterion B (2); C (2)

Criterion D (2) - Marine Mammal Diversity

*Balaenoptera acutorostrata, Grampus griseus, Halichoerus grypus, Leucopleurus acutus, Orcinus orca, Phocoena phocoena, Phoca vitulina*

## Other Marine Mammal Species Documented

*Balaenoptera physalus, Delphinus delphis, Globicephala melas, Lagenorhynchus albirostris, Megaptera novaeangliae, Tursiops truncatus*

# Orkney Isles and Pentland Firth IMMA

## Summary

The Orkney Isles and Pentland Firth IMMA is located just off the northern coastline of the British Isles in North Scotland. The Orkney Islands comprise more than 70 islands separated by narrow, relatively shallow, channels with extremely high tidal currents. The Pentland Firth which separates Orkney from the Scottish mainland has some of the highest tidal currents in the world. This IMMA has some of the largest colonies of grey seals (*Halichoerus grypus*) in Europe and is one of the most important pupping sites for this species in the UK. It is one of two areas most frequently used by killer whales (*Orcinus orca*) in the British Isles (the other being Shetland). High densities of harbour porpoises (*Phocoena phocoena*), seasonal aggregations of minke whales (*Balaenoptera acutorostrata*), Atlantic white-sided dolphins (*Leucopleurus acutus*), and groups of Risso's dolphins (*Grampus griseus*) including mother/calf pairs, make this one of the most important shelf sea areas in the UK for marine mammals.

## Description:

The Orkney Isles and Pentland Firth IMMA is located at approximately 59°N just off the northern coastline of the British Isles in Northern Scotland. The waters surrounding the Orkney Islands and the northeast Scotland coastline are characterised by complex bathymetry and extremely high currents. The area is well known for its high biological productivity supporting major populations of seabirds as well as marine mammals.

There are 70 islands in the Orkney archipelago, of which 20 are inhabited. Coastal areas are characterized by relatively shallow water depths, whilst further offshore, the seabed topography becomes steeper, and descends to 100 m or deeper. Compared to much of the Hebrides the seabed in this IMMA is more gently sloping as the islands were not strongly glaciated. The Orkney Islands are characterized by indented coastlines and sand beaches and bars, with the islands divided by narrow straits (locally known as firths or sounds), that experience swift tidal currents and frequent whirlpools.

The Orkney islands are separated from the Caithness coast of Scotland by the 16 km wide Pentland Firth. The Pentland Firth has depths of up to 100 m and has some of the strongest tidal currents in the world, with tidal races of 30 km/hr reported near to the Pentland Skerries.

The water masses of the North Sea and the Atlantic Ocean meet in Orkney waters producing diverse hydrodynamic conditions. The east Shetland Atlantic Inflow and the Fair Isle Current are major influencing factors. The ocean in this area is exposed to wind, and frequent gales with big seas built up by the prevailing westerlies, resulting in the regular mixing of the surface layers and the dispersal of plankton and fish.  Eddies that occur downstream of headlands and islands and narrow channels that produce very strong local tides, can lead to mixing, which results in small-scale convergences, divergences and shear zones that occur in a tidal rhythm, favouring biological productivity and associated aggregations of fish, seabirds and cetaceans. Many marine megafauna associate with particular tidal phases, current strengths and flow structures, likely in response to tidally-forced prey distribution and behaviour (Benjamins et al., 2015).

Figure 1: Old Man of Hoy, Orkney. Photo credit: PGH Evans

Figure 2: North Caithess coast and Pentland Firth.
Photo credit: PGH Evans

Figure 3: Dunnet Head overlooking Pentland Firth.
Photo credit: PGH Evans

## Criterion B: Distribution and Abundance
## Sub-criterion B2: Aggregations

The Orkney Islands and Pentland Firth IMMA includes some of the most important haul-out sites, breeding habitat and high-use at-sea habitats for grey seals (*Halichoerus grypus*) globally. Over 10% of the global population of grey seals breed inside the IMMA with over 20,000 pups being born annually (Special Committee on Seals (SCOS) 2022). Grey seals forage in the open sea and return regularly to haul out on land where they rest, moult and breed. Habitat modelling of grey seal distribution in UK waters, shows that the waters within 100 km of Orkney are amongst the highest at-sea density areas for this species in the UK (Carter et al., 2022). The area includes the Faray and Holm of Faray Special Area of Conservation (SAC) for which grey seals are a primary feature.

Although severely depleted, there is still a high abundance of harbour seals (*Phoca vitulina*) in the IMMA, with recent estimates suggesting about 2,000 individuals are present (SCOS, 2022). The Sanday SAC in NE Orkney is primarily designated for harbour seals. Although harbour seal foraging occurs throughout the area, there is evidence that the tidal rapids in the Pentland Firth are a focus of foraging activity (Onoufriou et al., 2021). The harbour seal subpopulation of Orkney has been identified as a source subpopulation for the Scottish metapopulation (Carroll et al., 2020). However, the subpopulation is showing sustained declines (by c. 85% since the early 2000s; Thompson et al., 2018) for reasons that remain unclear (Arso Civil et al., 2019).

Figure 4: Grey seal (*Halichoerus grypus*) and harbour seal (*Phoca vitulina*) within the Orkney isles and Pentland Firth IMMA.
Photo credit: Sea Mammal Research Unit, University of St Andrews

Figure 5: Harbour seals (*Phoca vitulina*).
Photo credit: Sea Mammal Research Unit, University of St Andrews

The IMMA is important summer and autumn habitat for harbour porpoises (*Phocoena phocoena*), which are listed as Least Concern on the IUCN Red List of Threatened Species (Braulik et al., 2020). Resident coastally around the UK, harbour porpoises are recorded year-round within the area but occur more frequently and in greatest numbers during summer and autumn months (Evans et al., 2021). Large seasonal aggregations in August through to November have been recorded for the species in several enclosed waters within Orkney including Longhope Bay, and in Gutter and Weddell Sounds, as well as bays along the northeast Caithness coast such as Dunnet Bay and Gills Bay (Evans & Baines, 2010; Neave-Webb & Hetherington, 2023; Sea Watch & OMMRI sightings databases). Historical data show

these areas have been important habitat for many years (Neave-Webb & Hetherington, 2023). WDC Shorewatch surveys also indicate harbour porpoise aggregations in the Pentland Firth (for example off St John's Point, at the western end of Gills Bay (WDC Shorewatch, unpublished data)).

Figure 6: Harbour porpoises (*Phocoena phocoena*) in Longhope Bay, Orkney. Photo credit: Orkney Marine Mammal Research Initiative

In UK waters, aggregations of minke whales (*Balaenoptera acutorostrata*) rarely exceed ten individuals (Evans et al., 2003). However, in the Pentland Firth, feeding aggregations of up to 30 individuals have been recorded in late summer (Evans & Baines, 2010). Density maps of minke whales show moderate density of minke whales around Orkney and the Pentland Firth and high density on the west coast of Orkney especially in late summer (Evans et al., 2021). WDC Shorewatch sightings also cluster in the Pentland Firth and the west coast of Orkney (WDC, unpublished data) and citizen science records collated by OMMRI back this up (OMMRI, unpublished data).

Figure 7: Minke whale (*Balaenoptera acutorostrata*). Photo credit: PGH Evans

Figure 8: Minke whale (*Balaenoptera acutorostrata*) breaching in Pentland Firth. Photo credit: John O'Groats ferry

Risso's dolphins have discontinuous distributions around the British Isles, but the species is regularly observed with high relative abundance in the shelf sea areas around Orkney and the Pentland Firth (Evans & Waggitt, 2020; Waggitt et al., 2020). Here, groups of 1-10 individuals are regularly seen, with some group sizes reaching 20 plus individuals, particularly between May and September (Evans & Baines, 2010; Hodgins et al., 2023; Sea Watch Foundation, OMMRI & WDC, unpublished data). The Whale & Dolphin Conservation photo-ID catalogue currently holds 112 individuals (Hodgins et al., 2023).

Figure 9: Mother and calf Risso's dolphins (*Grampus griseus*) in Orkney Isles. Photo credit: Emma Steel - WDC

Figure 10: Mother and calf Risso's dolphins (*Grampus griseus*) in Pentland Firth. Photo credit: C Bird – Sea Watch Foundation

Figure 11: Risso's dolphins (*Grampus griseus*) surfacing in Orkney. Photo credit: Emma Steel - WDC

The waters off north Scotland, around Orkney and Shetland, host the largest number of killer whales (*Orcinus orca*) anywhere in the British Isles (Evans & Waggitt, 2020; Waggitt et al., 2020). Photo-ID data around Scottish waters have been compiled into a Scottish Killer Whale Photo ID Catalogue (Scullion et al., 2021), which contained around 220 individuals as of 2021. Several of these pods have been regularly recorded in the IMMA, with three pods occurring in most months of the year (Scullion et al., 2021; Sea Watch Foundation, unpublished data). Offshore, east and north of Orkney, killer whale aggregations numbering in tens to low hundreds have been recorded associating with pelagic trawlers fishing for herring (Luque et al., 2006; Sea Watch Foundation, unpublished data).

Figure 12: Killer whales (*Orcinus orca*) in Pentland Firth. Photo credit: C Bird – Sea Watch Foundation

Although pelagic dolphins such as the Atlantic white-sided dolphin, that typically occupy the continental slope and waters further offshore, may often comprise large groups, in the shelf seas around the British Isles most groups of white-sided dolphins number less than twenty individuals (Evans et al., 2003). By contrast, in waters of the Pentland Firth and around Orkney, group sizes of between 100-500 animals have been recorded several times during August and September (Evans et al., 2003; Evans & Baines, 2010; Sea Watch Foundation sightings database).

Figure 13: Atlantic white-sided dolphins (*Leucopleurus acutus*) spotted in Pentland Firth. Photo credit: PGH Evans

## Criterion C: Key Life Cycle Activities

### Sub-criterion C1: Reproductive Areas

Over 10% of the world's grey seals breed in Orkney. Orkney grey seal pup production was estimated at c.22,000 in 2019 making it the largest breeding region for grey seals in the Northeast Atlantic (SCOS, 2022). Breeding numbers seem to be levelling off following a steady increase in grey seal pup production between 1985 and 2005 (SCOS, 2022). Pupping occurs mainly between September and late November. The harbour seal population also breeds at several locations within Orkney, in haulout sites non-dependent on tidal state as pups can swim from birth (Thompson et al. et al. 1994; Arso Civil et al., 2016 & 2019). These haulout sites have been identified in different locations across the mainland and smaller islands and show females returning to the same haulout sites to breed in different years (Arso Civil et al., 2016, Arso et al., 2021).

### Sub-criterion C2: Feeding Areas

The waters around Orkney host significant spawning grounds for herring (Ellis et al., 2012), an important prey species of harbour porpoise, minke whale, killer whale, and Atlantic white-sided dolphin (Pierce et al., 2022). Peak numbers of those cetacean species in the region occur in August and September (see details provided under B2), coinciding with the main herring spawning season (Ellis et al., 2012).

Harbour porpoises and seals are prey to killer whales (Bolt et al., 2009; Scullion et al., 2021; Sea Watch Foundation, unpublished data). Larger pods of killer whales have also been observed in summer and autumn regularly offshore north and east of Orkney taking herring from pelagic trawlers, where numbers recorded closely associating with vessels are in the tens to low hundreds (Luque et al., 2006; Sea Watch Foundation, unpublished data).

Figure 14: Pod of killer whales (*Orcinus orca*) in Pentland Firth. Photo credit: C Bird – Sea Watch Foundation

Figure 15: Humpback whale (*Megaptera novaeangliae*). Photo credit: PGH Evans

Figure 16: Fin whale (*Balaenoptera physalus*) in Pentland Firth. Photo credit: Matthew Pearson

## Criterion D: Special Attributes
## Sub-criterion D2: Diversity

Twenty-three species of marine mammals (19 species of cetaceans and four species of seals) have been recorded in the waters around Orkney and the Pentland Firth (Evans, 1997; Evans & Waggitt, 2020), of which seven occur with high frequency in the IMMA. The variety of habitats, hydrodynamic and oceanographic conditions in this area (as described in section 1) supports not only large seabird colonies and stocks of a variety of fish and cephalopod species, but also one of the highest marine mammal species diversities in the British Isles.

In addition to the species mentioned above (grey seal, harbour seal, minke whale, harbour porpoise, killer whale, Risso's dolphin, and Atlantic white-sided dolphin), this area provides seasonal or occasional habitat for humpback whales (*Megaptera novaeangliae*), fin whales (*Balaenoptera physalus*), common bottlenose dolphins (*Tursiops truncatus*), common dolphins (*Delphinus delphis*), and white-beaked dolphins (*Lagenorhynchus albirostris*) (Evans & Baines, 2010; Evans & Waggitt, 2020). During the 1980s and 1990s, white-beaked dolphins were common in the area, but since then have declined whereas common dolphin sightings have increased (Evans et al., 2003; Evans & Baines, 2010; Evans & Waggitt, 2020).

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