

Advice	
Scottish MPAs and fisheries	
FLAPPER SKATE (<i>Dipturus intermedius</i>)	
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Flapper Skate (*Dipturus intermedius*) n.b. part of the common skate complex including the flapper skate and the blue skate (*D. batis*)



Conservation status: ICUN red list, Critically Endangered

Fisheries interactions:

All life stages (eggs, juveniles, adults) may be exposed to fishing-related pressures, including:
Bottom towed gear – incidental catch (juveniles, adults) and disturbance/mortality (eggs);
Static gear – entanglement, incidental catch (juveniles, adults);
Recreational fishing – injury and/or mortality (juveniles, adults).

MPA Network: Flapper skate are protected features of the Loch Sunart to the Sound of Jura MPA and the Red Rocks and Longay possible MPA.

Wider seas: Population decline and contraction of range (particularly from the North and Irish seas) have been recorded for the overall common skate complex (OSPAR 2010). More recent data suggests population recovery may be occurring (Rindorf *et al.*, 2021), although the distribution remains focused in the north and west, i.e. the west coast of Scotland, Orkney, Shetland and the Outer Hebrides.

Protection: Listed on OSPAR Annex V, the UK BAP and Scottish Biodiversity List and Priority Marine Features list. Skate in Scottish waters are covered by fisheries legislation (both domestic and retained EU law) that prohibits their landing by both commercial and recreational fishers, see [Scottish Statutory Instrument 2012 No 63](#) and [Council regulation 2020/123](#), as amended by [The Common Fisheries Policy \(Amendment etc.\) \(EU Exit\) Regulations 2020](#).

Background – common skate complex

In 2010 a genetic study distinguished ‘common skate’ (*Dipturus batis*) as two species (Iglesias *et al.*, 2010) now known as the flapper skate (*D. intermedius*) and the common blue skate (*D. batis*) (Last *et al.*, 2016). For the sake of clarity, this document relates primarily to the flapper skate, although noting that much of the fishery-related advice is likely to be relevant to the blue skate also.

The ‘common skate’ or ‘the common skate complex’ is the wording used for flapper skate and blue skate collectively in some conservation legislation and listings.

The division of the species complex has led to difficulties in interpreting older data and information regarding the species. Prior to 2010 it is difficult to know whether flapper skate or common blue skate is being described. More recent genetic studies indicate that the vast majority of individuals in Scottish territorial waters are likely to be flapper skate *D. intermedius* (Griffiths *et al.*, 2010; Bache-Jeffreys *et al.*, 2021; Frost *et al.*, 2020).

Consequently, much of what we have learned about the species complex from research in nearshore areas is specific to flapper skate.

The common skate was once widespread across the northern North Sea, but since the 1970s has shown a marked decline and significant range contraction largely as a consequence of targeted removal by fisheries (Walker & Hislop 1998, Bache-Jeffreys *et al.*, 2021). In common with many other elasmobranch species, the common skate is highly sensitive to exploitation due to their slow growth rates, long maturation time, long incubation period and low fecundity (Stevens *et al.*, 2000). Recent data indicates that the skate population may have begun a recovery trajectory in the last 10 years (Rindorf *et al.*, 2021), however its distribution remains focused in the north and west compared to the historical range.

Flapper skate ecology

Flapper skate are thought to be generalist bottom-feeders, although they also appear to be capable of active feeding in mid-water. Within the Loch Sunart to the Sound of Jura MPA, adults spend much of their time in deep (100 m+) trenches, however they do make use of all depths and spend time in shallower waters particularly in the winter months (Nov – April, Thorburn *et al.*, 2021). Although the flapper skate is a mobile species capable of swimming large distances, studies point towards site fidelity being an important aspect of their ecology and life history. For example, in the Loch Sunart to the Sound of Jura MPA the extensive studies using mark-recapture and acoustic-tagging techniques have provided an important insight to the mixture of movement and residency. The majority of flapper skate in the MPA are resident (Neat *et al.*, 2015, Thorburn, *et al.*, 2021). However, some of these resident skate are known to undertake periodic trips out of the MPA (to the Clyde and Northern Ireland) and then return (J Thorburn *pers comm*). A smaller number of flapper skate are transient in the MPA and are simply passing through.

Flapper skate lay their eggs amongst cobbles and boulders on shallow (20-60 m) reefs (Dodd *et al.*, *in press*) and the eggs take around 18 months to hatch (Benjamins *et al.*, 2021). Until relatively recently, the understanding of flapper skate egg-laying was largely limited to records of empty egg cases found on the shore. Skate egg cases have been reported in small numbers on the west coast of Scotland, Shetland and the Outer Hebrides and in significantly greater numbers on Orkney (The Shark Trust [Great Egg Hunt](#)). More recent *in situ* observations of egg cases at a number of Scottish locations by divers and via remote camera surveys have provided an improved insight to this aspect of skate ecology. The data available so far points to a general habitat preference for rocky cobble / boulder substrate in depths of 25-40m. Abundances observed so far are variable. In most cases the eggs occur in low numbers, in isolated clumps whereas the Red Rocks and Longay urgent MPA was designated in March 2021 on the basis of significantly higher densities of eggs over an area of 12 km².

The eggs take up to 18 months to hatch (Benjamins *et al.*, 2021) but little is known about the reproductive habits of flapper skate, such as when the eggs are laid or how many eggs a female lays per year. The biology of similar skate species points to a likelihood of two eggs being laid at a time, a few days apart (Luer and Gilbert, 1985). Female skate can store sperm and consequently more than two eggs may result from a single mating event. All life stages of flapper skate (eggs, juvenile and adults) can be vulnerable to disturbance and/or capture in towed fishing gear. Domestic law and [Council regulation 2020/123](#) (as amended) requires both commercial and recreational fishers to return flapper skate unharmed however, the ability of flapper skate and their eggs to recover from capture is unknown. Survival from discarding is thought to be relatively high for adult skate; however there is evidence of damage (ropes on tails, missing tails, scrape marks) in [Skatespotter](#) (an online photo-database of flapper skate captured during sea angling). In addition, if eggs are returned to

the seabed away from favoured/optimal egg-laying habitat the eggs may not develop to hatching.

Recent data obtained by a programme of acoustic tagging in and around the Loch Sunart to Sound of Jura MPA indicated that flapper skate make use of the full range of water depths, and spent time in shallower waters especially during the winter months (November – April Thorburn *et al.*, 2021, Lavender *et al.*, 2021). As a result, there is no spatial separation of the skate from relevant fisheries based on depth.

A considerable understanding of the interactions with recreational fishers has been built up through angler-led tagging and recapture studies, including within the Loch Sunart to the Sound of Jura MPA. Multiple recaptures (often on the same day) of flapper skate studied suggests that angling does not have a significant effect on flapper skate (Neat *et al.*, 2015). More recent studies of skate tagged with archival tags (which record temperature and depth) show that flapper skate do react to being captured by angling (by moving into deeper water and reducing their vertical activity for a period after release) (Thornburn *et al.*, 2021). However, behavioural recovery is quick therefore they do appear to be relatively resilient to capture by anglers (Lavender *et al.*, *in prep*). Anecdotal evidence from anglers shows that gravid female flapper skate occasionally release eggs on to the decks of angling vessels.

Impacts

Skate in Scottish waters are covered by fisheries legislation (both domestic and [Council regulation 2020/123](#) (as amended) that prohibits their landing by both commercial and recreational fishers. While targeted commercial fishing for skate no longer occurs, there is the potential for a range of interactions as indicated below.

Towed demersal gear

Towed demersal gears (otter trawls and dredges) are known to take flapper skate and or other analogous large skate species as catch or bycatch (adults, juveniles and eggs) (STCEF, 2017, Fox, 2010).

Mitigation of bycatch risk is possible (e.g. the removal of tickler chains on trawls to reduce by catch, Kynoch *et al.*, 2015). For example, this measure in combination with temporal/spatial restrictions forms part of the management measures used in the Loch Sunart to the Sound of Jura MPA ([Loch Sunart to the Sound of Jura Marine Conservation Order 2016](#)).

Eggs and newly hatched flapper skate (around 220 mm and 280 mm long respectively, Gordon *et al.*, 2009; Benjamins *et al.*, 2021) are also vulnerable to bycatch in demersal towed gear due to their relatively large size.

Pelagic mobile/active gear

Gears targeting pelagic species that do not make contact with the seabed are unlikely to interact with skate (all life stages). Studies of bycatch in pelagic fisheries give no indication of skate or ray species being taken (e.g. Pierce *et al.*, 2002). These gears are unlikely to be a high risk.

Static gears (including drift nets, gillnets, trammel nets, longlines, pots, and traps)

Flapper skate (and analogous large skate species) are taken (recorded as catch or bycatch) in fisheries using gill and trammel nets, demersal drift nets and longlines (e.g. STECF,

2017). There is no evidence of interactions with eggs of flapper skate or analogous species by these gears.

There is no indication from the scientific literature to suggest that bycatch or entanglement of flapper skate in pot/creel fisheries is a concern.

There is the potential for disturbance of skate eggs / egg-laying habitat by all static gears noted here, as a result of abrasion/contact during fishing and recovery of gear. The nature of the egg-laying habitat (such as the boulder and cobble substrate found in the Red Rocks and Longay pMPA) may mitigate the effects of disturbance where the eggs are in crevices and cracks. In any event, it is likely that the potential for disturbance or abrasion caused by static fishing gears will be related to fishing intensity, however, there is no current research or evidence available to provide advice on a threshold for this risk.

Recreational angling

Flapper skate have been a popular target species for recreational anglers. However, landing is now prohibited under both [domestic Scottish legislation](#) and [Council regulation 2020/123](#), (as amended), (see above), and skate must be released promptly. Nevertheless skate are vulnerable to damage during angling and [best practice guidelines](#) on the gear used (particularly barbless hooks) and how they are handled should be followed. To reduce handling, for example, skate are no longer weighed after capture. Instead, the weight is estimated via a calculation based on length and wingspan.

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All fishing vessels and recreational anglers – the landing of flapper skate is prohibited under retained EU law and [domestic Scottish legislation](#) (see above). If caught incidentally flapper skate are required to be returned to the sea unharmed and as soon as possible.

Towed gears (adult and juvenile flapper skate) – due to the potential for incidental capture and mortality, reducing or limiting towed demersal gears in areas protected for flapper skate is recommended. In addition to the general prohibition on landing flapper skate (see above) appropriate measures could include spatial measures (including seasonal or permanent exclusions) and technical measures such as the removal of tickler chains to reduce bycatch (Kynoch *et al.*, 2015). For example, see the measures currently in place in the Loch Sunart to the Sound of Jura MPA.

To reduce the potential for stress on captured flapper skate, best practice in handling is important. Vessels should consider carrying large (1 m x 1 m) squares of fishing net or “lifting tarps” (1 m x 1 m of tarpaulin with carrying straps at each corner) to aid with the safe return of flapper skate. Tying ropes around the tail to return the flapper skate should be avoided wherever possible. However, if rope is used a slip knot should be tied so that the rope does not remain on the skate causing restriction of blood to the tail and eventual tail loss.

Towed gears (skate eggs and egg-laying habitat) – due to the risk of mortality of eggs and/or degradation of egg-laying habitat, the removal or avoidance of towed gears in areas protected for egg laying is a recommendation.

Static gear – nets - (adult and juvenile skate) – The removal or avoidance of demersal nets set on the seabed (drift, tangle, trammel, gill) to avoid the risk of entanglement / bycatch of flapper skate is recommended in areas protected for this species.

Static gear - pots/creels – (skate eggs and egg-laying habitat) – The risk of abrasion from fishing with pots and creels is currently unclear, but is likely to be related to the intensity of fishing. In areas identified as of importance for skate egg-laying, reducing or limiting pot/creel fishing should be considered.

Recreational angling (adult and juvenile flapper skate) – In addition to the general prohibition on landing of flapper skate (see above) best practice in angling and handling is important. The use of bronze, barbless hooks of an appropriate size is advised for flapper skate angling. Avoid lifting large flapper skate aboard angling vessels unless a gate opening close to the waterline is available. Gaffing should be avoided wherever possible. Avoid weighing skate directly; use length/width to estimate weight instead. The use of lifting tarps (as mentioned above in relation to towed gears) would also be beneficial on angling vessels.

Recreational angling (flapper skate eggs and egg laying habitat) – In areas protected for skate egg-laying, there is a risk of disturbance and stress to the breeding females during capture (including the potential loss of eggs prematurely). Therefore, the removal or avoidance of angling for flapper skate in sites protected for flapper skate eggs is recommended.

Confidence in advice

Commercial Fishing - Towed gears – High certainty. Conclusions relating to the sensitivity of skate to demersal trawls is supported by publications and grey literature reports.

Commercial Fishing – Static gears – For demersal set nets and longlines – High Certainty. For pots/creels – Medium to Low certainty due to limited evidence base for interactions with this gear type.

Recreational Fishing – High certainty.

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