



Short communication



The critically endangered flapper skate (*Dipturus intermedius*): Recommendations from the first flapper skate working group meeting

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ABSTRACT

The flapper skate, *Dipturus intermedius* (Parnell, 1837), is the largest of all European skate and rays (Superorder: Batoidea). It is found in coastal waters of the European continental shelf and slopes in the North-East (NE) Atlantic. With the 2006 IUCN Red List of Threatened Species classification of 'common skate' as Critically Endangered, and the recognition in 2010 that this name masked two species (flapper skate and blue skate *D. batis* (Linnaeus, 1758)), and to better support conservation on this regional scale, the Flapper Skate Working Group (SWG) was formed. The SWG is a consortium of government, NGOs, sport-fishing associates and academics, including participants from the UK, Ireland and the Netherlands. The purpose of the SWG is to consolidate relevant research, advocacy and policy expertise for the purpose of flapper skate conservation. The first SWG workshop took place in Belfast, November 2019, with discussions focussed on conservation in the NE Atlantic. Following two days of talks, workshops and discussions, we present the SWG's key recommendations for future collaborative conservation.

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1. Introduction

Species in the ‘common skate’ species complex (*Dipturus batis*) display characteristics that make them highly vulnerable to local extirpation, including low fecundity, strong site fidelity, and vulnerability to being captured as bycatch [1–3]. The ‘common skate’ complex, hereafter referred to as ‘common skate’ is composed of two species; the flapper *Dipturus intermedius* and the blue skate *Dipturus batis* (previously referred to as *Dipturus cf. flossada*), respectively [4–6]. These two species differ in size and general distribution, with the flapper skate being considerably larger and with a more coastal affinity [4,6].

Once considered abundant (i.e., ‘common’ skate), the species complex is now listed by the IUCN Red List of Threatened Species as Critically Endangered, with numbers decreasing [7,8]. In 1999, ‘common skate’ was listed on the Biodiversity Action Plan (BAP) in the UK [9], a Priority Marine Feature (PMF) in Scotland and Northern Ireland (NI) [10,11], and has more recently become a focal point for conservation in the Republic of Ireland. Additionally, in 2006, many fisheries in the UK adopted a voluntary measure refraining from landing ‘common skate’ (A. Hood, March 2020, personal communications). As of 2009 the landing of ‘common skate’ by commercial fishing vessels has been prohibited in accordance with EU fisheries legislation [[12], updated annually]. However, catch and release recreational angling continues in some regions, which can complement research activities. From 2011 onwards, ‘common skate’ were included in the Wildlife (Northern Ireland) Order (1985 (as amended) through the Wildlife and Natural Environment Act (Northern Ireland) 2011), followed by protection in Scotland in 2012 (Sharks, Skates and Rays (Prohibition of Fishing, Transshipment and Landing) (Scotland) Order 2012). The latter offers strengthened conservation of flapper skate by preventing the recreational sector from landing elasmobranchs listed as Prohibited to commercial sector. Continued research efforts from the Center for Environment Fisheries and Aquaculture Science (CEFAS) since 2010 has helped improve our understanding of ‘common skate’ through fisheries bycatch monitoring (e.g., [13]), with specific reference to the Celtic Sea [14].

This report focuses on the flapper skate *D. intermedius* species within the ‘common skate’ complex. This coastal species is a popular target for recreational sport-fishing and appears to have a more restricted distribution compared to *D. batis* (i.e., with a current distribution throughout the western and northern territorial waters of Scotland and Ireland and occasionally in the Celtic Sea, and appears to have disappeared from much of its former geographical range, including all European waters [4]).

The first stage in developing a coherent regional approach to flapper skate conservation is to reach a consensus across stakeholders in terms of conservation priorities and objectives. To this end, the Flapper Skate Working Group (SWG) was established as a forum where governmental, sports-fishing, non-governmental conservation bodies and scientists from across the three jurisdictions covering most of the current species’ range (the UK, Ireland, and experts from the Netherlands) could discuss, share knowledge and plan future collaborative conservation and research programs. An overview of the contributions by SWG’s invited speakers are detailed in [Appendix A](#).

2. Conservation priorities

The SWG recognized that effective flapper skate conservation requires both inputs and coordinated efforts from several key stakeholder sectors. Essentially, the group is based on a circular process whereby focussed research informs advocacy and policy, which is supported by public opinion and shapes outreach direction, leading back to directed scientific research (Fig. 1). The SWG further acknowledged that for effective flapper skate conservation, the connectivity between each component of this conservation ‘triangle’ (Fig. 1) needs to be consistent and prioritized equally. However, without scientific evidence, it is

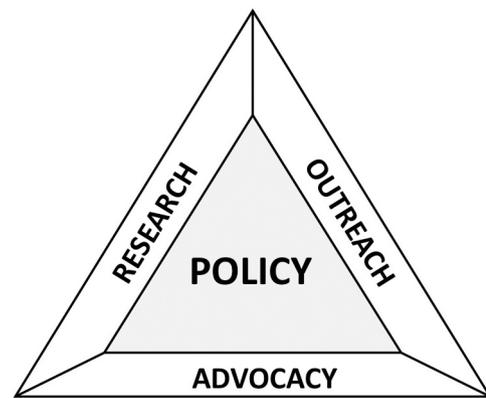


Fig. 1. The Conservation Triangle - this triangle denotes the essential components required for effective conservation. 1) Research, 2) Outreach, 3) Advocacy & 4) Policy. All four elements are the foundation of conservation efforts. The sides of the outer triangle are equally important and need to work in unison for proactive conservation, feeding into policy for effective implementation.

difficult for governments to respond with directed actions or provision of resources.

Pragmatically, the SWG accepted that conservation efforts to date were at different stages on a regional level, with some areas suggesting limited public awareness of the species (H. McIlvenny, November 2019, personal communications). Despite continued efforts from various outreach initiatives (e.g. The Shark Trust, SeaDeep and CEFAS work with commercial fishermen on handling and identification), flapper skate are yet to pique widescale public interest or concern in the same way as other, perhaps more charismatic, local megafauna (e.g. white-tailed sea eagles, otters, grey seals etc.) (e.g. [15]).

Arguably, the public profile of the flapper skate is hindered by the vernacular name – the Critically Endangered ‘common’ skate seems somewhat contradictory. Such nuances in nomenclature are compounded by the disappearance of the species from much of its native range. Vernacular names can hinder comparisons between historical and contemporary ranges, and can prove difficult in light of shifting baselines (*sensu* [16,17]). Additionally, the once commonly known species is no longer a commercial fisheries target, leading it to potentially fade from the collective cultural memory in all but a few fishing communities (H. McIlvenny, November 2019, personal communications). Within this overall context, the SWG highlighted the following conservation priorities for flapper skate without implied priority.

3. Conservation priority 1: poor taxonomic resolution

As with fundamental research and public awareness, there remains some gaps within policy. All legislative documents pre-dating the species separation [6] relate to the ‘common skate’ or refer to the species as *Dipturus batis* or *Raja batis* (e.g., [12,18], 7- IUCN) which generates additional confusion. Both of these names are now obsolete synonyms and reflect the early taxonomic efforts of Clark [19] to group together the somewhat similar species of *D. intermedius* and *D. batis*. Subsequent genetic and morphological analyses [6] confirmed that the ‘common skate’ is no longer valid and consists of two species. However, legislation and management still refer to ‘common skate’ (e.g., Wildlife and Natural Environment Act (Northern Ireland), 2011 and Loch Sunart to the Sound of Jura Nature Conservation Marine Protected Area Order 2014). Yet, on a broader political scale some efforts have been made to differentiate the two species (e.g., the usage of separate codes (DRJ [*D. intermedius*] and RJB [*D. batis*] by the Food and Agricultural Organization of the United Nations (FAO, 2010–2020)). Thus, support for ongoing efforts to standardize adoption of current nomenclature within legislative frameworks emerged as a clear recommendation from the SWG.

The SWG also acknowledged that all large batoids in NE Atlantic

waters are likely to have data gaps and share similar vulnerabilities to over-exploitation [20]. Under this scenario, the umbrella approach of using one species to confer protection for other similar species [21] might be an appropriate way forward. The SWG recommended that the IUCN status of each species within the ‘common skate’ complex should be reassessed as separate species. Although this separation would not increase species numbers, it would highlight the circumstances of each species and may reveal an even more unfavorable situation which would substantiate the urgent need for further work.

4. Conservation priority 2: lack of data on life history

Apart from site specific studies in the Loch Sunart to the Sound of Jura Marine Protected Area (MPA) in Scotland and CEFAS surveys and monitoring in the Celtic Sea, the SWG recognized that conservation of the species is hampered by a lack of data across much of its range [3,13,14,22,23]. The group acknowledged the value of previous studies but conceded that site-specific findings may not be representative across the entire species’ range. Within this context, a number of knowledge gaps emerged (listed without implied priority): longevity, reproduction rates, ontogenetic shifts in habitat use, ontogenetic shifts in diet, sexual space partitioning, territoriality and site fidelity.

5. Conservation priority 3: lack of regional approach to conservation

The current recognized distribution of *D. intermedius* ranges from Shetland, in a westward coastal arc, to southern Ireland (West Co. Cork) [6,24]. Records outside this area are in existence [6,8,13], but further interrogation of these records is required (S. P. Iglésias, 2020, personal communications, January). Recent efforts in Scotland were heralded as a success, with flapper skate being the only elasmobranch in Europe with a dedicated MPA designation (Loch Sunart to the Sound of Jura MPA in Scotland). However, as a motile species, further protective measures are required on a regional scale. This goal will require regional standardization in statutory data collection and steps towards a coherent, ecologically relevant MPA network across the species’ range.

6. Conservation priority 4: accounting for broader ecological shifts in skate conservation

The SWG recognized that the species is unlikely to re-occupy its ‘pre-collapse’ range naturally in the foreseeable future, given the current established fisheries regulations pertaining to the species. Establishing the bounds of historical distribution represents a challenge in itself given that historical landings were recorded under ‘common skate’. While additional mechanisms can be employed to establish historical presence and absence of a species, the historical use of the vernacular name remains an obstacle. The principal driver of extirpation, industrialized fishing, still presents an ongoing threat from incidental catch of both juveniles and adults despite prohibition on targeted fishing [20,25,26], but there is scope for improved mitigation. For example, ‘excluders’ built into fishing nets have been shown to reduce bycatch markedly (e.g. sea turtles [27]), with potential to reduce unwanted capture of large ray species [28]. The SWG recommended research into such technical innovations which may reduce skate bycatch [14] including the removal of “tickler” chains on bottom trawlers. This approach could reduce the bycatch of batoids without reductions in the capture of target species [29], but it has not yet been adopted widely.

More broadly, the ecological state of the NE European shelf has changed dramatically since the species was last considered common (a century ago), owing to fisheries-induced trophic shifts (e.g., [30,31]) habitat degradation [32] and climate change [33,34]. Encompassing such stressors within overall conservation strategies is not easy, but it is essential if genuine restoration is to be achieved.

7. SWG general recommendations

The SWG developed a series of research and conservation actions for those working on flapper skate conservation, to focus efforts across the species known range. The resulting framework for decision-making is inclusive of stakeholders, scientists, NGOs and government; transparent, collaborative and co-operative. We advocate three distinct yet interacting conservation ‘nodes’ feeding into policy (research, outreach advocacy and policy; Fig. 1). This structure will enable effective conservation through appropriate policy, underpinned by robust science and targeted advocacy, that is communicable through a solid outreach platform. It will also expedite research efforts through the sharing of good practice and advice from more developed conservation programs. Thus, many of the actions listed are already in place within some jurisdictions but are included as a benchmark to standardize efforts on a regional scale. More specifically, the SWG aspires to mirror recent successes at a national level on a geographical scale that is representative of the species overall range (i.e., the conservation of common natural heritage). Lastly, while a regional approach will be required for flapper skate conservation across its’ remaining range, we acknowledge the need for site-specific management objectives that are not listed here (i.e., what may be suitable for one site may not be transferable to all prospective populations of *D. intermedius*).

- File a petition for change in nomenclature used, to relevant authorities (e.g., IUCN and government bodies), relating to large batoid stock management/conservation. Common/vernacular names should be avoided for scientific and policy documentation as the Linnean system should suffice, with common names such as flapper skate reserved for communication with the general public. For gray areas, when species-specific resolution is uncertain, the use of taxonomic surrogacy to genus level (i.e., *Dipturus* spp. rather than the vernacular ‘common skate’ is recommended and supports a precautionary approach (*sensu* [35]).
- Identify ontogenetic shifts in distribution and critical habitats used by the species. Subsequently, the SWG recommends limitations on / or modifications to trawling within these areas, should evidence dictate, and that they are managed through national legislation where appropriate (e.g. Fisheries Act (Northern Ireland) [36], Marine (Scotland) Act 2010). The group noted that funding is required and should be sought for research into and implementation of ‘skate excluders’ on commercial fishing vessels/nets.
- The development of a coherent and ecologically relevant network of marine protected areas would be highly valuable to link fragmented habitats, ensure genetic diversity and support species recovery across differing life stages. Quantifying connectivity between hotspots is vital for the conservation of species with transnational ranges, evidenced by ongoing genetics and tracking programmes.
- Develop shared educational resources to avoid duplication of effort and provide a unified conservation message (e.g., resources developed by Shark Trust, SeaDeep, and CEFAS). Continued engagement with anglers/commercial fishers is encouraged to support co-development of identification and reporting protocols (e.g., to remove ambiguity surrounding *D. intermedius* morphology at different life history stages). This approach would encourage the documented release of incidentally caught individuals; or the retention (where permitted) of deceased skate to support research (e.g., [37]).
- Foster communication and coordination between all points of the ‘conservation triangle’ (Fig. 1) to raise the profile of the species, especially through the sharing of media. The main objective will be the development of a sense of public ownership of the species (mirroring successes amongst other species such as the otter, golden eagle, salmon etc.). Annual SWG workshops will serve as catalysts for collaboration, but mechanisms for routine communication between partners requires further development.

- Produce a collective guidance document aimed at conservation managers, politicians and legal practitioners etc. This is actionable science to support the development of an evidence base for policy implementation in Northern Ireland and the Republic of Ireland in particular. Furthermore, science would support reviews of existing protective measures in Northern Ireland and Scotland.
- Agree upon a standardized approach for statutory data collection where appropriate, such as a standardized method for logging bycatch/angling records or collecting morphological data. The SWG agreed that methods developed within the skate tagging programme in the Loch Sunart to the Sound of Jura MPA in Scotland, could serve as a template across the species range. This applies particularly to genetic sampling, animal handling, and recreational fishing best practice. This approach will enable future researchers to pool data across the region when required or deemed appropriate. Additionally, the SWG advocated for increased coordination and data-sharing to both promote and enhance conservation efforts. This applies to all links within the conservation triangle (Fig. 1), with particular emphasis on collaborations between outreach programmes.

CRedit authorship contribution statement

Amy Garbett: Conceptualization, Writing - Original Draft, Writing - Review & Editing, **Natasha D. Phillips:** Conceptualization, Writing - Original Draft, Writing - Review & Editing, **Jonathan D.R Houghton:** Conceptualization, Writing - Original Draft, Writing - Review & Editing, **Paulo Prodöhl:** Conceptualization, Writing - Review & Editing, **James Thorburn:** Conceptualization, Writing - Review & Editing, **Sophie L. Loca:** Conceptualization, **Lawrence E. Eagling:** Conceptualization, Writing - Review & Editing, **Gary Hannon:** Conceptualization, Writing - Review & Editing, **Daniel Wise:** Conceptualization, **Liz Pothanikat:** Conceptualization, Writing - Review & Editing, **Cat Gordon:** Conceptualization, Writing - Review & Editing, **Maurice Clarke:** Conceptualization, **Peter Williams:** Conceptualization, **Rebecca Hunter:** Conceptualization, **Ronan McShane:** Conceptualization, **Aafke Brader:** Conceptualization, **Jane Dodd:** Conceptualization, **Chris McGonigle:** Conceptualization, Writing - Review & Editing, **Heidi McIlvenny:** Conceptualization, **Olivia Daly:** Conceptualization, **Ronald Surgenor:** Conceptualization, **Sarah Varian:** Conceptualization, **Peter Verhoog:** Conceptualization, **Gijs Van Zonneveld:** Conceptualization, **Lylian R. Burke:** Conceptualization, Writing - Review & Editing, **Ian Davies:** Conceptualization, Writing - Review & Editing, **Terri A. Souster:** Conceptualization, **Paul A. Mayo:** Conceptualization, **Tanja N. Schwanck:** Conceptualization, Writing - Review & Editing, **Catherine S. Jones:** Conceptualization, Writing - Review & Editing, **Patrick C. Collins:** Conceptualization, Writing - Original Draft, Writing - Review & Editing.

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Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at [doi:10.1016/j.marpol.2020.104367](https://doi.org/10.1016/j.marpol.2020.104367).

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