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Environmental law reform needed to manage trade of Australia's threatened marine species

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Australia is reforming its ineffective Environment Protection and Biodiversity Conservation Act, which currently allows the export of four threatened species listed under the Act along with additional species recognized as globally threatened. We propose three recommendations for the new legislation: (1) apply the same precautions to commercially harvested species as other threatened species; (2) mandate annual reviews of threatened species status; and (3) assess species listed on global conservation conventions.

Australia identifies as a global leader in marine conservation¹. As a commitment to the protection of biodiversity, including marine species, Australia is a Party to all of the major international conservation treaties. The protection and regulation of international trade of Australia's native species is legislated by the Environment Protection and Biodiversity Conservation (EPBC) Act of 1999, which lists 583 threatened species (44 are marine species). However, Australia's biodiversity is in a dire state, and the EPBC Act has proven ineffective in offering adequate protection^{2–4}. The Australian Government is reforming its environmental laws to better protect its threatened species and the proposed changes are currently open for public comment. Here, we propose 3 recommendations relevant to the protection of threatened marine species, focusing on those with commercial value in international markets.

Australian commercial fisheries catch species listed as threatened Australian fauna under the EPBC Act⁵, both as target and incidental catch. Compliance of commercial fisheries with the EPBC Act is the responsibility of the Australian Fisheries Management Authority (AFMA) and state fisheries. The trade of species caught in commercial fisheries regulated by the EPBC Act (Part 13 A) must align with Australia's obligations to the two main international treaties that coordinate protection and regulate trade of threatened biodiversity: the Convention on Migratory Species (CMS) and the Convention of International Trade in Endangered Species (CITES). The interaction of listed species with multiple regulatory and management frameworks was highlighted as a weakness of the EPBC Act in an independent review (Samuel Review⁴). The concern is that these species, including commercially fished listed species, could be in decline due to inconsistent regulatory and management frameworks. We analyzed seafood trade data⁶ to determine the extent that listed species are caught in and

exported from Australia to formulate our recommendations for Australia's threatened species policy reform.

Anyone can nominate a species to be listed under the EPBC Act. The Threatened Species Scientific Committee determines if the nominated species is eligible for listing based on a set of specific criteria (Supplementary Table 1) and provides listing advice^{7–11} to the environment Minister who ultimately decides if a species is eligible for listing and under what category¹². Since the inception of the EPBC Act, 107KT (live weight equivalent; approximately 10% of all seafood exports) of four listed threatened species were caught in commercial fisheries and identified to be exported as seafood (Fig. 1): school shark (*Galeorhinus galeus*), orange roughy (*Hoplostethus atlanticus*), blue warehou (*Seriola lalandi*), and southern bluefin tuna (*Thunnus maccoyii*). These four species were exported primarily to Japan, China, New Zealand, Mauritius, and the United States of America (Fig. 2). They are categorized as Conservation Dependent, instead of the more standard denominations used in the EPBC Act for threatened species: Critically Endangered, Endangered, and Vulnerable (Supplementary Table 1).

The Conservation Dependent category is unique to Australia and only contains eight fish species caught in commercial fisheries. Conservation Dependent species are required to have a legally enforced management plan aimed at stopping their decline and supporting their recovery (Supplementary Table 1). Effectively, this exempts these species from regulations that would otherwise apply if listed under the standard threat categories. For example, the export of Australian native fauna and flora requires a permit, unless the species is included in the List of Exempt Native Specimens¹³, which excludes Conservation Dependent species but not species listed in the standard threat categories. Interestingly, the International Union for the Conservation of Nature's (IUCN) Red List of threatened species historically contained a Conservation Dependent category, but it was applied to low risk species, which is a stark contrast to the EPBC Act. All species listed as Conservation Dependent under the EPBC Act were eligible to be listed in a higher threat category according to the Threatened Species Scientific Committee: Critically Endangered (blue warehou, southern bluefin tuna) or Endangered (orange roughy, scalloped hammerhead, Harrison's dogfish, school shark, southern dogfish and gemfish). Yet, they were subsequently listed as Conservation Dependent^{7–11} (Supplementary Table 1).

When a species is listed as threatened under the EPBC Act, conservation advice and in some cases a recovery plan, are developed to assist its recovery. However, Conservation Dependent species are not eligible for recovery plans, and currently none have conservation advice (Supplementary Table 1; Supplementary Table 2). Instead, the management of these species relies on existing management plans and falls under the responsibility of AFMA and state fisheries, which has been largely ineffective, with

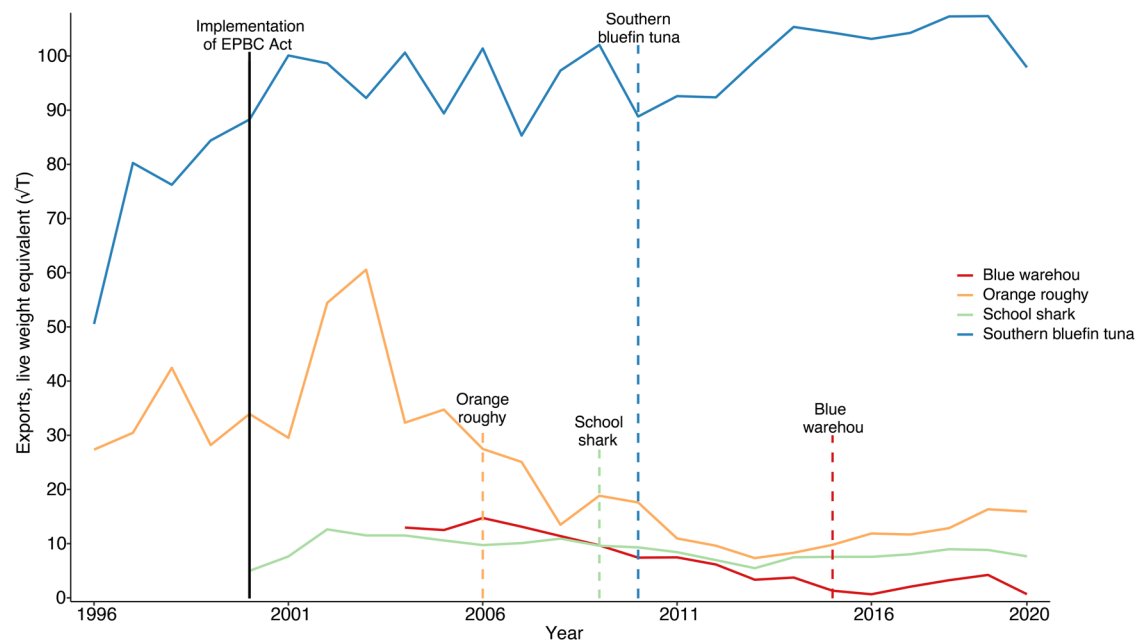
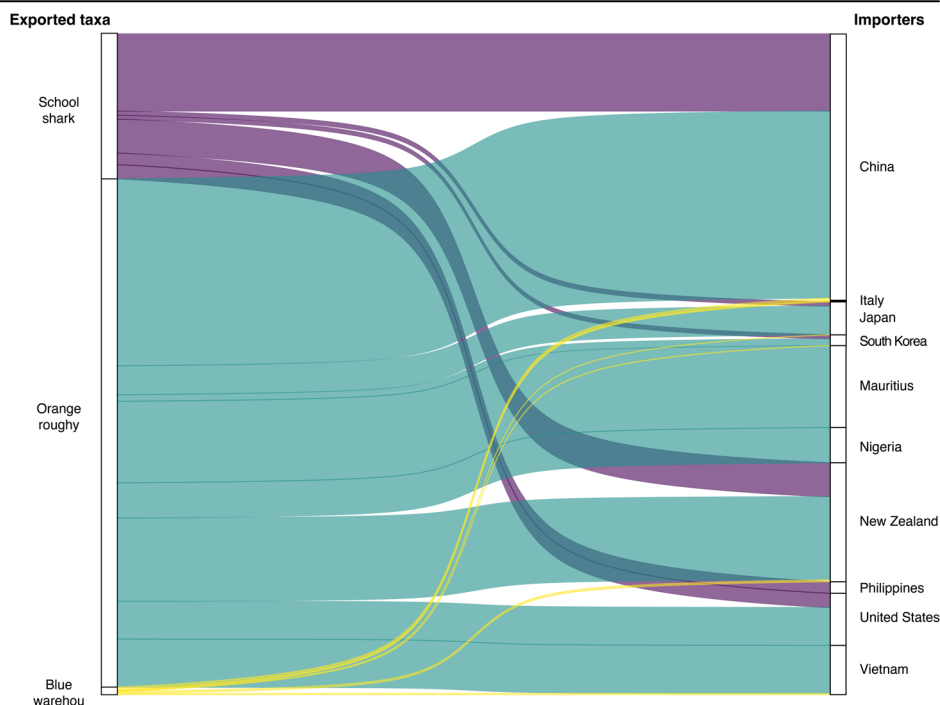


Fig. 1 | Volume (live-weight equivalent) of four threatened species listed under Australia's Environmental Protection and Biodiversity Conservation Act and exported from Australia. We applied a square root transformation to enhance data visibility in this figure. All four species are captured in commercial fisheries operating in Australia's exclusive economic zone (1996–2020). The dashed, vertical lines indicate the year that species were listed as threatened

under the Environmental Protection and Biodiversity Conservation Act. Data are from the Aquatic Resource Trade in Species Database⁶, which represents a species disaggregation of reported aquatic product trade based on a mass balance model that accounts for re-exports and uses bilateral trade data to trace products back to the producing country.

Fig. 2 | Domestic catch and export of threatened species listed under Australia's Environmental Protection and Biodiversity Conservation Act. The size of each path is proportional to the exported volume in tonnes⁶ (live-weight equivalent). Southern bluefin tuna was excluded from this figure, as all reported exports go to Japan.



the exception of the southern bluefin tuna⁵. Several school shark, blue warehou, and orange roughy stocks have not improved, remain overfished, or are unassessed in Australia¹⁴ (Supplementary Table 2). Given the lack of recovery evidence and the continued poor status of these species — according to both fishery and conservation metrics in most cases^{5,15} — the regulatory and management frameworks used for these Conservation Dependent species are inadequate for ensuring their conservation. We recommend that Australia's new legislation treats commercially harvested threatened species the same as other threatened species. Each threatened species must have a species recovery plan that corresponds to its highest eligible threat category. These plans must demonstrate improvements in the species conservation status and be overseen by a single independent environment commission⁴. Fisheries management decisions must operate within the bounds of this recovery plan. This recommendation may result in omission of the Conservation Dependent category from the new legislation — but only as a means to strengthen, not weaken, the protection of commercially harvested threatened species.

The southern bluefin tuna presents a unique case relative to the other three species, as it accounts for a majority of the EPBC Act's listed species exports (91.2%), is not currently assessed as overfished, and an inter-governmental organization (Commission for the Conservation of Southern Bluefin Tuna) is responsible for its management, which includes a rebuilding strategy and internationally managed quota. Production of southern bluefin tuna includes wild fisheries and ranching, where juveniles are taken from the wild and put into aquaculture pens until they reach commercial size. The international management of southern bluefin tuna creates oversight from other players, potentially improving domestic governance and contributing to the species' recovery^{16,17}. However, management of this species remains internationally contentious, due to its recent history of decline from overfishing. The IUCN Red List classified it as endangered but recovering in 2021, a less threatened category since its previous two assessments in 1996 and 2011 (Supplementary Table 2). Australia's Threatened Species Scientific Committee has only assessed the species three times: in 2005, 2010, and it is currently under review (Supplementary Table 2). In light of this, we recommend that Australia's new threatened species legislation mandate an annual review of the status of all threatened species, informed by changes in their population size or other proxies that correspond directly to the new legislation's listing categories¹⁸. This will ensure that species can be delisted when their population is no longer at risk of extinction, as may happen with southern bluefin tuna.

The EPBC Act's threatened species list has been criticized as incomplete, not representing the range of threatened species in Australia⁴. Thus, we questioned if it has omitted exported species that are globally recognized as threatened. We found that Australia exported an additional 46KT of 13 commercially fished species since their listing under the IUCN Red List, 11 of which are assessed as declining (Supplementary Table 2). We looked at historical listing documents from the EPBC Act to determine if other exported species have been proposed for assessment and found two: Patagonian toothfish (*Dissostichus eleginoides*) and porbeagle shark (*Lamna nasus*). Although the population of the Patagonian toothfish is stable⁵, the porbeagle shark's declining population is globally acknowledged through its listing under the IUCN Red List (globally vulnerable in 1996 with a decreasing population), CMS (Appendix II, 2009), and CITES (Appendix II, 2015). The porbeagle was proposed for assessment under the EPBC Act twice (2011, 2012) but not assessed due to data deficiency. Since its listing under CMS and the IUCN Red List, this species has been exported to China, but there have been no further reported exports since its listing under CITES (Supplementary Table 2). The reported data shows that Australia does not export species listed under both the EPBC Act and CITES. However, the

export of threatened species is likely to occur as catch data is often reported in broad groups (e.g., 'sharks and rays'), masking species identity⁶, and DNA studies of internationally traded seafood show that threatened species are often sold under other names^{19,20}. In light of these findings and substantial domestic markets for these species, we recommend species acknowledged as threatened under the IUCN Red List or global conventions (e.g., CMS, and CITES) be assessed in Australia's new threatened species legislation. This recommendation is subject to the caveats that: (1) For data deficient species, the precautionary principle should apply²¹. Data deficient species should not be rejected for listing under the EPBC Act. Instead, if listed under the IUCN Red List, CMS, or CITES, they should receive protection under the EPBC Act until adequate data are available to assess their status. (2) Australia must not be allowed to take out reservations for threatened species if it weakens the protection for that species, restriction that should be included in the new legislation. Reservations for listed species are allowed under CMS and CITES, meaning the convention's regulations do not apply to those species in that country. This creates a loophole that could undermine the protection of certain species²². Currently, Australia has reservations on ten CMS species, all sharks, which is more than any other country.

Australia does not export threatened terrestrial species, only marine species. Since 2000, we found that approximately 10% of the volume of Australia's exported commercially harvested seafood was listed under the EPBC Act⁶, the legislation that was designed to protect threatened species. The EPBC Act's Conservation Dependent category, where these species are listed, was not explicitly mentioned in The Samuel Review⁴ — threatened species in this category have been overlooked for decades, highlighting the importance of our recommendations. The export of threatened species must cease if Australia is serious about meeting its international conservation and sustainability obligations outlined in the United Nations Sustainable Development Goals and Convention on Biological Diversity. Our three recommendations for Australia's environmental legislation reform are critical to ensuring the protection of its marine biodiversity. While there are complex social, economic and political factors and challenges to implementing these recommendations, Australia must act decisively to avoid failing its conservation commitments. Given the ubiquitous trade of globally threatened marine species for seafood²³, these recommendations may be applicable to other countries' environmental legislation. In addition, countries that import seafood can also adopt regulations that limit the import of threatened species. For example, the United States of America is the third biggest importer of Australia's threatened species, but its legislation allows it to list species regardless of their country of origin, which in most cases prohibits their import²⁴. Without adoption of these recommendations, in addition to other measures to protect marine biodiversity^{25–28} (e.g., combating Illegal, Unreported, and Unregulated fishing and sustainable management of domestically consumed species), Australia's threatened marine biodiversity remains at risk.

Data availability

The Aquatic Resource Trade in Species (ARTIS) database is archived on Zenodo (<https://doi.org/10.5281/zenodo.10034319>) and will be made public following publication. For earlier access to ARTIS, contact J.G. The list of threatened species listed under the Environment Protection and Biodiversity Conservation Act of 1999 is available here: <http://www.environment.gov.au/cgi-tmp/publiclistchanges.4a75659decf8414f493f.html#species>. The list of threatened species listed under the Convention on International Trade in Endangered Species of Wild Fauna and Flora is available for download here: https://checklist.cites.org/#/en/search/output_layout=alphabetical&level_of_listing=0&show_synonyms=1&show_author=1&show_english=1&show_spanish=1&show_french=1

1&scientific_name=Pristidae&page=1&per_page=20. The consolidated Commonwealth Acts database, which includes the Environment Protection and Biodiversity Conservation Act of 1999, is publicly available and can be accessed through: http://www8.austlii.edu.au/cgi-bin/viewdb/au/legis/cth/consol_act/.

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Author contributions

C.K., J.G., L.R., and R.D.M. developed the initial arguments. C.K. and R.D.M. wrote the initial draft of the paper. R.D.M. prepared figures and analyzed data. C.K., J.G., L.R., R.D.M., C.W., and G.S. contributed to the development and refinement of the ideas and reviewed the paper.

Competing interests

J.G. is an unpaid member of Oceana's science advisory board.

Additional information

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