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GLOBAL REVIEW OF DIRECT TAKE OF SEABIRDS

(Prepared by the Secretariat)

Summary:

This document contains the report *Global Review of Direct Take of Seabirds* that was written in response to Decision 14.72 (b).

Global review of direct take of seabirds

June 2025: Final Report - Activity 2 of the Avian Wild Meat Impact Assessment

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Executive summary

Seabirds are the most threatened group of birds, facing pressures both at-sea and on land. The most recent global review of threats to seabirds (Dias *et al*. 2019) found "hunting and trapping", including egg and chick collection, to be the fourth biggest threat after invasive species, fisheries and climate impacts, affecting 27% of all seabird species. Despite the prevalence of this pressure on seabird populations, intentional take of seabirds receives comparatively less attention and has not been comprehensively reviewed.

This report presents a global review of the direct, intentional take, of migratory seabirds for human consumption and use, with data drawn from over 2,800 scientific records, covering all 318 migratory seabird species. Results reflect evidence from a literature review of the English scientific literature from 2010 onwards, combined with information from the IUCN Red List assessments that comprise the most recent global assessment of threats to seabirds, published as Dias *et al*. (2019).

Records of seabird take were identified for 105 migratory seabird species (33% of those assessed), 20 of which are globally threatened (CR, EN, VU), and 33 of which are listened on the CMS Appendices, with a further 15 noted as likely meeting the criteria for listing (UNEP/CMS/Res14.20). Records of seabird take were found across 56 countries and territories, with the most records for: the USA, Canada, Greenland, New Caledonia, and Norway recording the highest numbers. Seabird take occurs in both CMS Parties and non-Party States, indicating that this is a widespread issue that could benefit from internationally coordinated action. Records of seabird take were most common for adult seabirds and eggs during the breeding season. The majority of records were of legal take or of take with an undefined legal status, and were predominantly conducted by Indigenous peoples and local communities (IPLCs) for subsistence use. Illegal take, when documented, tended to be associated with poachers and fishers.

Only a minority of records included data on the number of birds taken or the presence of management or enforcement mechanisms. Few studies assessed population trends linked to take, but where documented, seabird populations showed signs of decline or extirpation due to take, among other pressures acting on species. Human health risks were not the focus of many of the papers reviewed, but where these were reported, studies commonly looked at risks to IPLCs from consuming contaminated seabirds, particularly in relation to heavy metals and zoonotic diseases.

Overall, this review highlights key data gaps in the understanding of seabird take that are important to address to inform evidence-based conservation strategies. We highlight examples of where take is being managed, and monitoring is reported to inform future strategies. This report highlights the need for internationally coordinated conservation action among CMS Parties and relevant Range States, in conjunction with the Agreement

on the Conservation of African-Eurasian Waterbirds (AEWA) and the Agreement on the Conservation of Albatrosses and Petrels (ACAP), to safeguard seabird populations and the communities that rely upon them.

Key policy recommendations:

1. Review action plans for Appendix I-listed species to ensure the issue of take is adequately addressed, including monitoring, enforcement and compliance.
2. Consider further species for listing in the Appendices of the Convention.
3. Enhance cooperation and coordination between AEWA, ACAP and CMS.
4. Consider engagement with non-Party Range States.
5. Consider setting scientific priorities at the national level to improve the evidence base on seabird take
6. Consider mechanisms for co-management of seabird harvest with IPLCs, particularly for communities where health risks from seabird consumption may be present.
7. Strengthen Wildlife Health Management
8. Consider research to better understand the drivers of illegal seabird take.

Contents

Acronyms

ACAP	Agreement on the Conservation of Albatrosses and Petrels
AEWA	Agreements including the African-Eurasian Migratory Waterbird Agreement
CMS	Convention on the Conservation of Migratory Species of Wild Animals (CMS), also known as the Bonn Convention
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
LC	Least Concern
NT	Near Threatened
VU	Vulnerable
EN	Endangered
CR	Critically Endangered
IPLC	Indigenous People and Local Communities

Disclaimer

The geographical designations employed and the presentation of material in this report do not imply the expression of any opinion whatsoever on the part of BirdLife International or the Secretariat of the Convention of Migratory Species concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. The responsibility for the contents of the document rests exclusively with its author.

Introduction

The conservation of migratory species is challenging due to their expansive movements that can span diverse geographical regions and multiple national and international jurisdictions (Beal et al. 2021; Ingram et al. 2022). These wide-ranging animals encounter numerous anthropogenic stressors throughout their life cycles, with overexploitation identified as a leading threat (UNEP-WCMC 2024). Overexploitation of migratory species is linked to their predictability in returning in large numbers to the same sites at specific times of year (Boertmann et al. 2004). Overexploitation can lead to local population declines (Inch et al. 2024), extirpation of species (Jakubas, Wojczulanis-Jakubas, and Petersen 2022), population declines throughout their range (Doyle, Gray, and McMahon 2020; Holopainen et al. 2018), and even species extinction (Nicolson 2018). Addressing overexploitation requires context specific interventions (Ingram et al. 2021; Milner-Gulland and Bennett 2003), given overexploitation of species occurs globally (Di Minin et al. 2019), a critical first step to tackle this threat to migratory species is to understand the scale and drivers of exploitation across species groups (Ingram et al. 2022).

The Convention on the Conservation of Migratory Species of Wild Animals (CMS), also known as the Bonn Convention (UNEP-WCMC 2024), provides a global platform for the conservation and sustainable use of migratory animals and their habitats. The CMS brings together the states through which migratory animals pass, and has been adopted by 133 Contracting Parties, with a further 28 countries being Signatories of daughter Agreements. The CMS provides a legal framework for internationally coordinated conservation measures throughout a transboundary species range. Migratory species are not biologically defined under CMS, instead as those species where “the entire population or any geographically separate part of the population of any species or lower taxon of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries” (CMS 1979). The transboundary aspect of the range is key given the need for countries to coordinate their conservation efforts.

The CMS has two Appendices that list migratory species to which the Convention applies: Appendix I comprises migratory species threatened with extinction throughout all or a significant portion of their range, and mandates no taking of those species listed (with very limited exceptions, such as scientific research or traditional subsistence use; see Article III 5. of the Convention text); and Appendix II covers migratory species that have an unfavourable conservation status and that require international agreements for their conservation and management, and mandates stronger international cooperation between the range states to strengthen overall conservation impact. Therefore, an individual species can be listed on both Appendices, unlike under other treaties (e.g., CITES). To date, there are 79 seabirds listed in the Appendices of the Convention, with at least a further 72 noted as likely meeting the criteria for listing (UNEP/CMS/Res.14.20).

Seabirds are the most threatened group of birds, facing threats when they nest on land and while foraging at-sea. The most recent global review of threats to seabirds found "hunting and trapping", including egg and chick collection to be the fourth biggest threat after invasive species, fisheries, and climate impacts; impacting 27% of all seabird species (Dias *et al*. 2019). Harvesting of species (both legal and illegal) was the second major land-based threat in terms of number of species affected, and the top threat to coastal globally threatened species (Dias et al. 2019). Seabird harvest at colonies where they are accessible and predictable has a long history (e.g. Gaston and Robertson 2010; Merkel et al. 2014; Phillips et al. 2016; Mondreti, Davidar, and Grémillet 2018), with records confirming take of seabirds on islands in the North Atlantic from as early as the ninth century (Tierney 1967). Less well documented, but known to occur, is the direct take of seabirds at-sea (distinguished from incidental take, or bycatch, in fisheries) (Bugoni et al. 2008; Alfaro-Shigueto et al. 2016; Frederiksen et al. 2016). Despite the prevalence of intentional take of seabirds, it receives comparatively less attention that other pressures of a similar magnitude and has not been comprehensively reviewed. Consequently, there is limited understanding of the scope and severity of seabird take, or how the cumulative impact of this and other pressures are impacting global seabird populations.

Seabird harvest is known to occur for a number of reasons, with eggs primarily harvested for food, and birds also harvested for meat, feathers, oil, decorative objects and clothing (Shrubb 2013). Seabirds can have important cultural significance, with the harvest of seabirds or their byproducts deeply entrenched in cultural traditions including oral histories, song, and art (Clucas et al. 2012; Chen et al. 2015). As many seabirds are migratory, they are a shared resource and often birds harvested in one country may be from the breeding population of another country. For example, Thick-billed Murre (*Uria lomvia*) that breed in Canda, Greenland, Iceland, Norway and Russia are shot during winter in Southwest Greenland (Lyngs 2003; Boertmann et al. 2004). More efficient harvesting techniques, such as guns and tools, in addition to improved access has increased the harvest of certain species of seabirds and consequently sustainability concerns (Doyle, Gray, and McMahon 2020; Koneff et al. 2017). More recently, concerns have arisen on the impact on human health from consuming seabirds through exposure to toxins and diseases, including lead (Johansen, Asmund, and Riget 2001), and *Chlamydophila psittaci*, a bacterial disease that can develop into a life-threatening pneumonia (Fossádal, Grand, and Gaini 2018).

This review aims to summarise the available literature on seabird take in the context of 'intentional use[1]', where species assessed are the target species to better characterise this issue to migratory species, in terms of species, location, life-history stage, purpose

[1] Recognising that there is a large body of literature on 'unintentional use / incidental take' particularly in fisheries (e.g., Crawford et al. 2017; Phillips et al. 2024), that is beyond the scope of this review.

and demographics of takers. The focus of this review is on the status quo of seabird take rather than a historical perspective, which can be found elsewhere (e.g., Nicolson 2018). This review also collated information on any reported management of take, enforcement mechanisms, seabird population impacts, and any health risks from consuming seabirds (Box 1). Research gaps and policy recommendations are summarised at the end of the report and are intended to inform the work of the CMS Aquatic Wild Meat Working Group.

Box 1: Research questions informing the review of seabird take, where take is considered in the context of 'intentional use' for human consumption / use.

1. How many migratory seabird species are documented to be subject to take? And how are species reflected in the CMS Appendices?
2. How many migratory seabird species per country are documented to be subjected to take?
3. What is the main life-stage taken, and in what season and habitat does this take occur?
4. Which groups of people participate in seabird take, why might they do it, and is it legal or not?
5. When seabird take does occur, how is it managed and what reporting evidence is collected?
6. When seabird take does occur, is it possible to determine the population impact to species?
7. For groups participating in seabird take, are there health risks, and from what species do these health risks originate?
8. Are there enforcement mechanisms in place for regulating seabird take?

Methods

Defining seabird 'take':

To define seabird 'take' we applied the broad definition of 'taking' given by the Convention on the Conservation of Migratory Species of Wild Animals (CMS) (Article I (1)(j)): 'taking, hunting, fishing capturing, harassing, deliberate killing, or attempting to engage in any such conduct', considering any take of seabirds for the delivery of meat or other wildlife parts (nests, eggs, etc.) for human consumption (food or non-food, including for "medicinal use"), legal or illegal by law. We focused on records of seabird take that related to 'intentional use' for human consumption / use.

Species list

We considered all migratory seabird species, based on the CMS definition of migratory species: "the entire population or any geographically separate part of the population of any species or lower taxon of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries"; 318 of the 365 seabird species, as recognised by BirdLife International, met this definition (Supplementary data 1).

Literature search

We formulated our key search terms based on the CMS definition of 'taking' and individual seabird names (Appendix 1). We used Web of Science for the search because it better facilitates download of titles and abstracts from a screened selection of higher quality journals, enabling a more rapid screening of reputable literature. Web of Science also increases research reproducibility because consistent search results are returned and timestamped to when the search was performed.

We conducted a systematic review of the available literature via Web of Science, using the Core Collection database, searching under the Topic option. The Topic option searches through keywords within the title, abstract, keyword plus, and author keywords. The search was conducted between 26 November and 5 December 2024.

The search terms considered for the review were:

- ("Latin name" OR "Common name") AND (harvest OR hunt* OR harass* OR kill* OR poach* OR trophy OR cultur* OR conflict OR medicine OR trade OR sale OR traffic* OR poison* OR consum* OR "human health") NOT bycatch NOT bycaught

We downloaded supporting material in Excel format, relating to all Document Types from returned searches (e.g. Articles, Review Articles, Editorial Material, Proceeding Paper, Notes, Meeting Abstracts). Key fields of data recorded were Author(s), Title, Abstract, and Keywords, among other available fields.

We retained papers from 2010 onward for the review, and only selected records that related to contemporary take (as opposed to historical). This review was intended to complement the existing compilation of data on threats to seabirds evaluated via the IUCN Red List assessment and published as Dias et al., 2019. Data from both the review and Dias *et al*., (2019) were considered (Appendix 2). In addition to the species-specific literature search through Web of Science, we also conducted a broader online literature search for papers on the topic of seabird take more broadly and have provided two case studies to contextualise our findings.

All papers for the review were assessed for relevance by screening titles and abstracts, and were only retained when the research related to seabird take. Expert feedback on preliminary results from this review and seabird take more broadly was obtained from CMS Task Forces and the Aquatic Wild Meat Working group.

Data extraction

We extracted the conservation status of each species from the IUCN Red List database. We identified species listed in the Appendices of the Convention, daughter Agreements including the African-Eurasian Migratory Waterbird Agreement (AEWA), Agreement on the Conservation of Albatrosses and Petrels (ACAP), and also those that have been noted as likely to meet the criteria for listing in the Appendices of the Convention (UNEP/CMS/Resolution 14.20) to enable identification of species that would benefit most from conservation action.

Through the literature review, we aimed to capture data on seabird take, including focal species, spatiotemporal details, type of take, methods of take, demographics of takers and reason for take, human health impacts, management (including monitoring and/or impact to species population trends), and whether enforcement mechanisms were in place where management regulations occurred. Initial coding of data relevant to the aims of the study (see: Appendix 3) was simplified following screening of all literature (Table 1).

Data extraction coding

Table 1: 'Seabird take' data recorded through the literature review (where data were available), which focussed on the review of records from English scientific literature (2010 onwards) and from Dias et al. (2019).

Species data
Seabird family
Scientific name
Common name
Red List category: Global
Species CMS migratory status (according to CMS definition)
Species listing on CMS Appendices (Appendix I, I&II, II, or Resolution 14.20)
Study topics
Country of study
Habitat (Terrestrial, Marine, Not reported)
Take Life-stage (Nest, Egg, Chick, Juvenile, Adult, Not reported)
Season (Breeding, Non-breeding, Year-round, Not reported)
Demographic of group engaging in seabird take / Demographic of taker (Fisherman, Hunt (other), Hunt (sports), IPLC, Not reported, Poacher, Seasonal workers)
Use of seabird take (Commercial, Functional, Hunting, Incidental, Not reported, Poaching, Recreational, Subsistence)
Use notes: descriptive field
Method of seabird take (Active, Passive, Not reported)
Legality of take (Legal, Illegal, Not reported)
Take managed (Yes, No, Not reported)
Take recorded (Count of take recorded: Yes, No, Not reported)
Take recorded units: descriptive text
Management mechanism for take (Analytical Framework, IPLC management, Monitoring body, Not reported, Quota, Temporal ban)
Management notes: descriptive field
Reporting mechanism for take (Database, IPLC Knowledge, NR)
Enforcement consequence for take (Yes, No, Not reported)
Enforcement consequence for take details: descriptive field
Enforcement effectiveness for controlling seabird take: descriptive field
Population impact documented (Yes, No, Not Reported)
Species numbers monitored (Yes, No, Not Reported)
Impact to population (decline, potential extirpation, stable, increase, Not reported)
Species population monitoring possibility (Yes, No, Not reported)
Population impact global (Yes, No, Not reported)
Population impact global effect: descriptive field
Population impact site other (Yes, No, Not reported)
Population impact site other effect: descriptive field

Human health impacted (Yes, No, Not reported)
Human health impact notes: descriptive field
Supplementary data
Region of study
Country CMS status

Analysis

Our analysis focussed at the species-country-topic level, where "topic" refers to the relevant categorical data our review captured. Given some species-country-topic publications reflected duplicated reporting as opposed to truly independent events of seabird take, only unique records were retained for subsequent analyses. We summarised the data in relation to our key research questions, using various data visualisation approaches, qualitative summaries, and two focal case studies to further contextualise our results.

Data processing and analyses were performed using R Statistical Software (R Core Team 2024).

Results

Records from the literature review

The Web of Science search delivered a total of 2,667 records that we reviewed. We supplemented this dataset with references from the latest global threat assessment (145 records; Dias et al. 2019). Combined, this led to a total of 245 unique species/country records for the final analysis (Supporting data 1). For a large proportion of key topics (Table 1), papers did not report ('NR') associated evidence (Figure 1).

Species with records of take

We found records of seabird take in the context of 'intentional use' for 105 (33%) of the 318 migratory seabird species. Of these species, 21 species were unique to the Web of Science review, 39 species were common across both data sources, and references for 45 species were unique to Dias et al. (2019), which also included expert solicitation and references prior to 2010. A further 28 migratory species had "Hunting/trapping" recorded as a past threat to these species but it is not expected to reoccur (Dias *et al*. 2019) and so these 28 species were not included in the analysis (Supplementary data 1).

Across seabird families, Laridae (second largest seabird family), followed by Procellariidae (largest seabird family) had the greatest number of species that were subject to take. Proportionally, Anatidae (sea ducks) and Fregatidae (frigatebirds) had the highest number of species subject to take within seabird families. No records for seabird take were found for four families that include migratory seabird species: Hydrobatidae (Northern storm petrels), Oceanitidae (Southern storm petrels), Podicipedidae and Scolopacidae (Figure 2).

Of the 105 migratory species with records of take, 8 (including a sub-population) are listed in CMS Appendix I, 23 are listed in CMS Appendix II, 2 are listed in both Appendix I and II, and 15 species were noted as likely meeting the criteria for listing in the Appendices of the Convention (Resolution 14.20; Supplementary data 2).

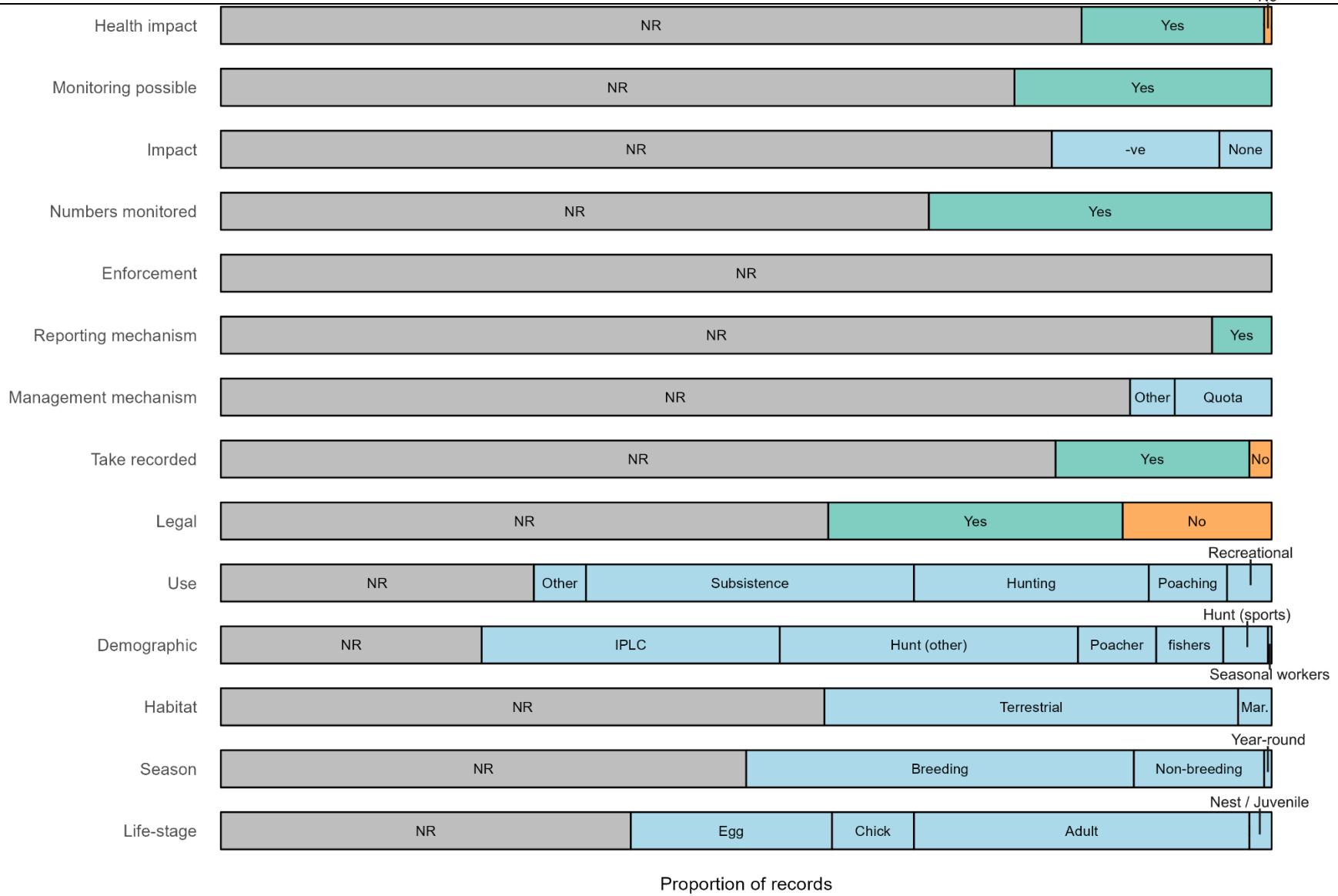

Figure 1: Overall summary of records of seabird take, based on the review of English scientific literature (2010 onwards) and from Dias et al. (2019). Records reflect a single representation of each species-country-topic data record to avoid overweighting results when multiple studies reflect the same instance of seabird take. NR = "Not reported", grey. Yes / No records highlighted in green / orange, respectively. All other records represented by blue bars.

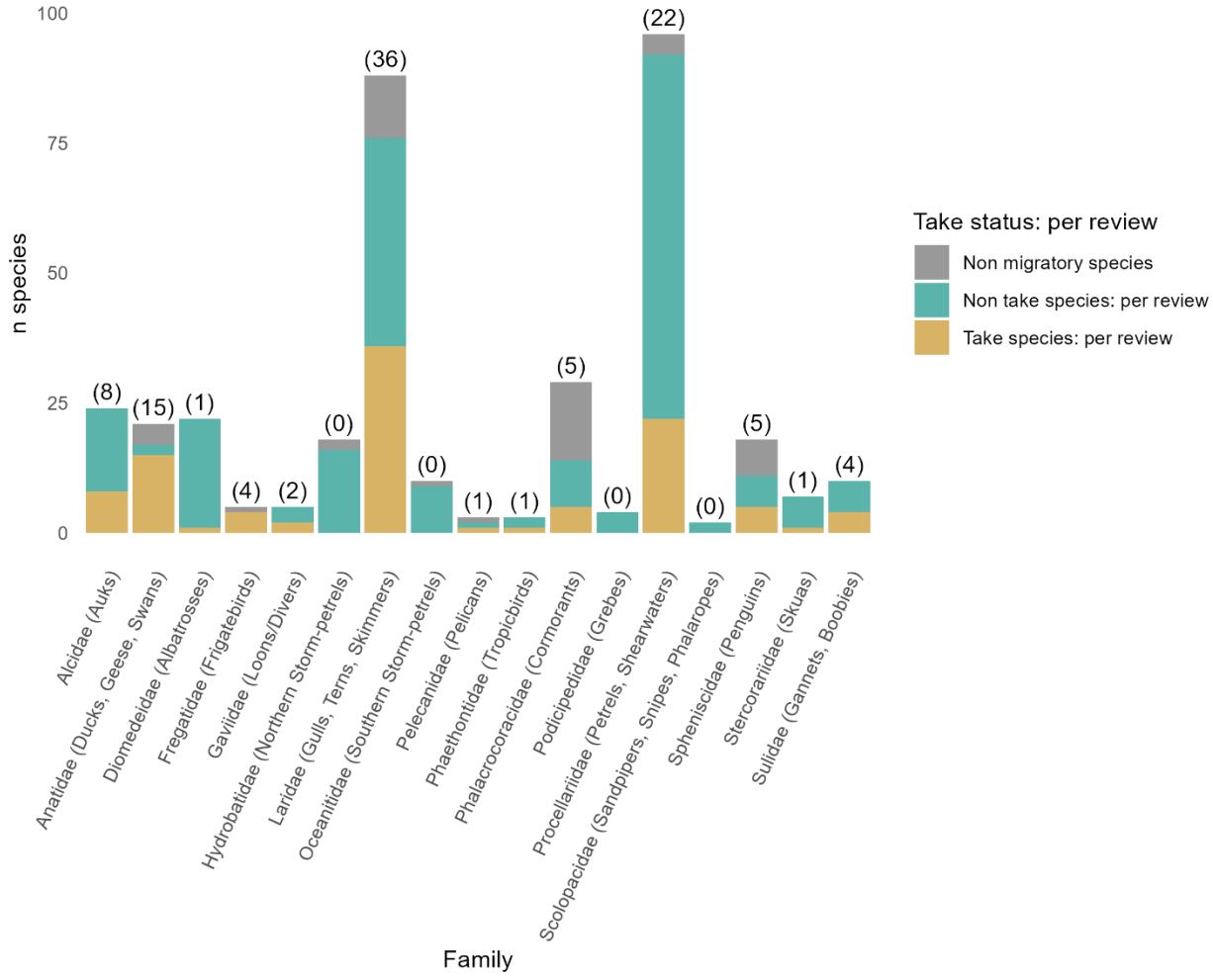

Figure 2: Migratory seabird species (318 species assessed), per family, with records of species being subject to take from the literature review and Dias et al. (2019). Total number of species subject to take within families is indicated in brackets. The 47 non-migratory seabird species (365 seabird species in total) are also represented in the plot (grey bars).

Documented countries per species

The species with the most unique records of take per country were Common Eider (*Somateria mollissima;* NT), Great White Pelican (*Pelecanus onocrotalus;* LC), Glaucous Gull (*Larus hyperboreus*; LC), Least Tern (*Sternula antillarum;* LC), and Common Goldeneye (*Bucephala clangula;* LC). Four of these five species (except the Least Tern) are listed in the CMS Appendices or AEWA, with the Palearctic populations of the Great White Pelican also listed in Appendix I.

20 globally threatened species (CR, EN, VU) were found to be subject to take, with the Atlantic Puffin (*Fratercula arctica;* VU) documented to be a target of seabird take across the highest number of countries (n=3). All 20 globally threatened species are listed in the CMS Appendices (5 on Appendix I, 1 on Appendix I&II, 6 on Appendix II) or are noted as potential taxa for listing under CMS Resolution 14.20 (8 species; Table 2). Seven of these 20 species are AEWA or ACAP listed species.

Table 2: The number of countries/territories per migratory seabird species where species were documented to be the subject of take. The top five species based on the highest number of records are shown in panel A. All globally threatened species are shown in panel B. "Res.14.20" indicates those species that have been noted as likely to meet the criteria for listing in the Appendices of the Convention (UNEP/CMS/Resolution 14.20).

Species	Common name	Red List (2024)	CMS status	Other CMS Agreement	n countries	Countries/territories
Panel A: Top five species subject to take across most countries						
Somateria mollissima	Common Eider	NT	Appendix II	AEWA	9	Canada, Denmark, Finland, Greenland (to Denmark), Netherlands, Norway, Species range, Sweden, USA
Pelecanus onocrotalus	Great White Pelican	LC	Appendix I* (*palearctic pop.)	AEWA	8	Bulgaria, Greece, Iran, Islamic Republic of, Israel, Kenya, Namibia, South Africa, Turkey
Larus hyperboreus	Glaucous Gull	LC		AEWA	7	Canada, Greenland (to Denmark), Iceland, Norway, Russia, Species range, USA
Sternula antillarum	Least Tern	LC			6	Brazil, Cuba, Guadeloupe (to France), Guyana, Haiti, Trinidad and Tobago
Bucephala clangula	Common Goldeneye	LC	Appendix II	AEWA	5	Denmark, Finland, Norway, Species range, USA
Panel B: Globally threatened species						
Fratercula arctica	Atlantic Puffin	VU	Res. 14.20	AEWA	3	Canada, Faroe Islands (to Denmark), Iceland
Clangula hyemalis	Long-tailed Duck	VU	Appendix II	AEWA	2	Canada, USA
Fregata andrewsi	Christmas Island Frigatebird	VU	Appendix I		2	Indonesia, Malaysia
Polysticta stelleri	Steller's Eider	VU	Appendix I&II	AEWA	2	Russia, USA
Pterodroma brevipes	Collared Petrel	VU	Res. 14.20		2	Fiji, Vanuatu
Pterodroma hasitata	Black-capped Petrel	EN	Res. 14.20		2	Dominican Republic, Haiti
Rissa tridactyla	Black-legged Kittiwake	VU	Res. 14.20	AEWA	2	Canada, Greenland (to Denmark)

Ardenna creatopus	Pink-footed Shearwater	VU	Appendix I	ACAP	1	Chile
Eudyptes moseleyi	Northern Rockhopper Penguin	EN	Res. 14.20		1	St Helena (to UK)
Melanitta fusca	Velvet Scoter	VU	Appendix II	AEWA	1	Sweden
Papasula abbotti	Abbott's Booby	EN	Res. 14.20		1	Species range
Phalacrocorax nigrogularis	Socotra Cormorant	VU	Appendix II	AEWA	1	United Arab Emirates
Phoebastria irrorata	Waved Albatross	CR	Appendix II	ACAP	1	Ecuador
Procellaria westlandica	Westland Petrel	EN	Appendix II	ACAP	1	New Zealand
Pterodroma alba	Phoenix Petrel	VU	Res. 14.20		1	Kiribati
Rissa brevirostris	Red-legged Kittiwake	VU	Res. 14.20		1	USA
Saundersilarus saundersi	Saunders's Gull	VU	Appendix I		1	China
Spheniscus demersus	African Penguin	CR	Appendix II	AEWA	1	Species range
Spheniscus humboldti	Humboldt Penguin	VU	Appendix I		1	Chile
Thalasseus bernsteini	Chinese Crested Tern	CR	Appendix I		1	China

Geography of seabird take

In total, we identified 56 countries or territories where seabird take for human consumption is documented. 21 of 245 records focussed on regions as opposed to countries and these records were not included in country-specific analyses. The USA, followed by Canada had the highest number of species documented to be the subject of take. New Caledonia (to France), Norway, then Chile, are the CMS Party countries with highest number of species documented from the review (

Figure 3). Greenland (to Denmark) also hosts a high number of species documented in the review.

Seabird take of globally threatened species (CR, EN, VU) for human consumption was documented in 20 countries or territories. Canada, USA, and Chile remained the countries with the highest number of seabird species documented to be subject to take, with China also joining the top group of countries (Appendix 4).

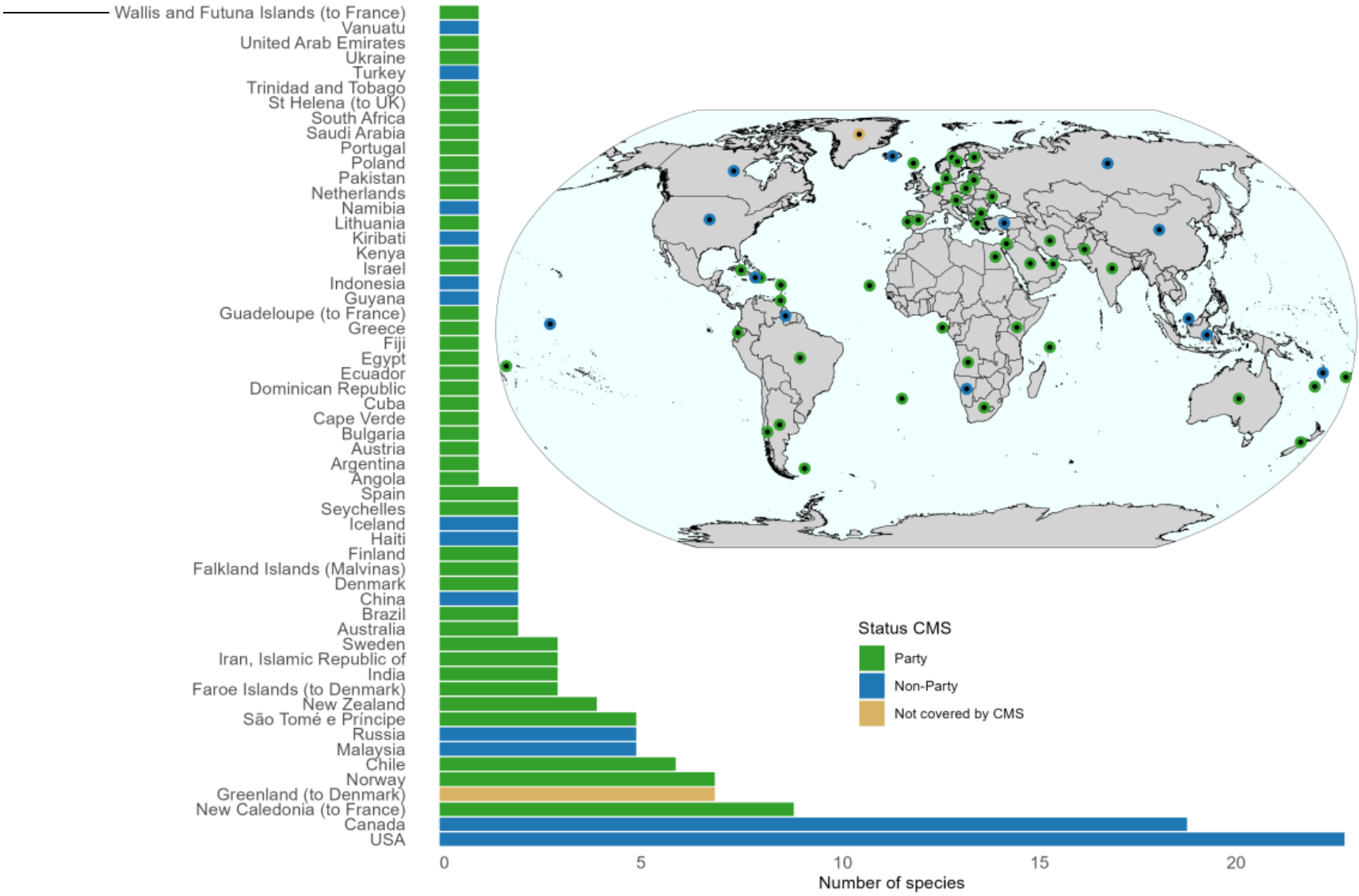

Figure 3: Number of migratory seabirds species (318 of 365 species) per country/territory for which records of take were recorded in the review of English scientific literature (2010 onwards) and from Dias et al. (2019).

Life-stage, seasonality and habitat

The majority of records (38%) of seabird take did not readily indicate which particular life-stages of seabirds were targeted (Figure 4, 'NR'). Where records did provide details, take was most common for adults (30%; e.g., Common Golden eye in Finland; Holopainen et al. 2018) and eggs (22%; e.g., Glaucous Gull in Greenland; Petersen et al. 2015) during the breeding period. A smaller number of records also detailed take of chicks (8%; e.g., Wedge-tailed Shearwater in New Caledonia; Borsa et al. 2010), juvenile birds (1%; e.g., Northern Fulmar in the Faroe Islands; Fossádal, Grand, and Gaini 2018), and nesting material (1%; e.g., Common Eider in Canada; Giroux et al. 2021). Where documented, the majority of seabird take was reported to occur on land, but there were some records for take at-sea, predominantly of non-breeding adults.

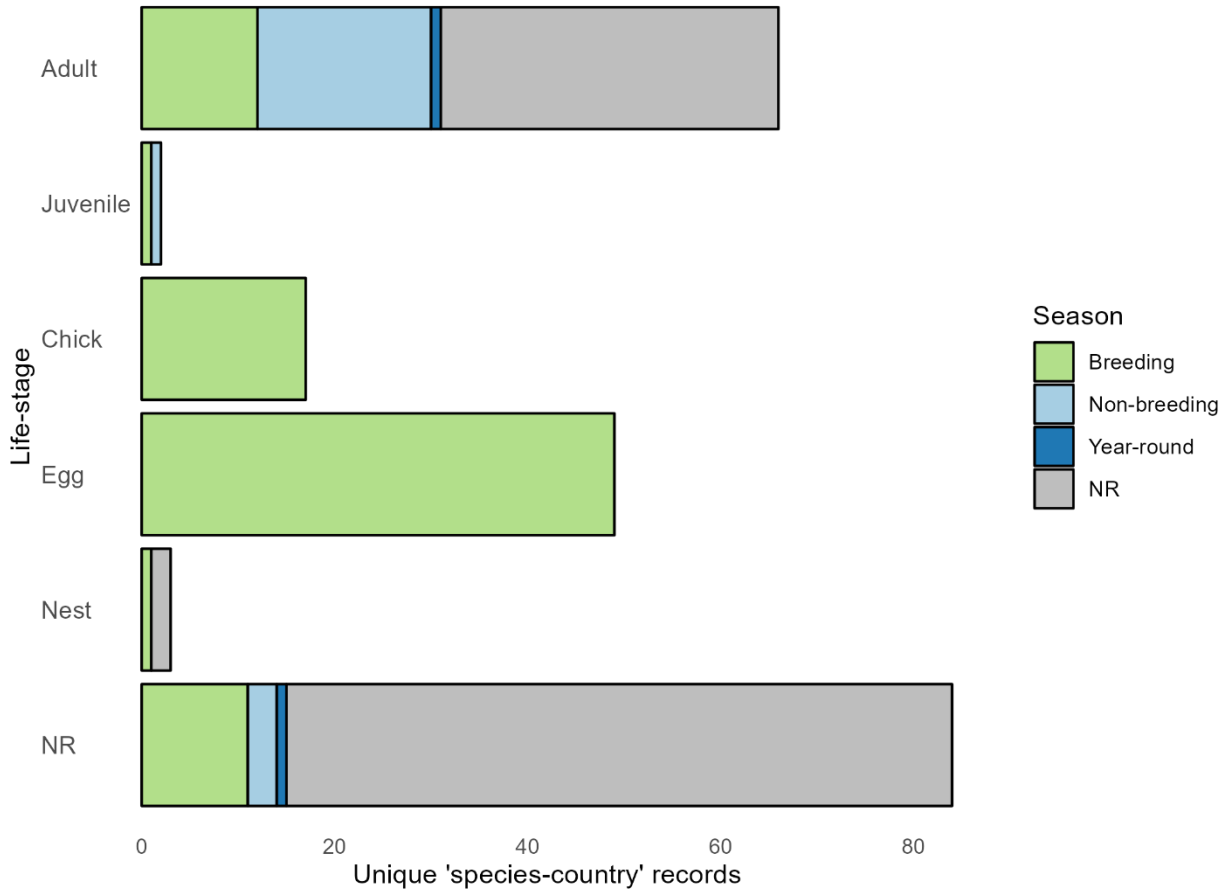

Figure 4: Summary of records for seabird take across life-stages and key seasons. NR = "Not Reported". The review considered English scientific literature (2010 onwards) and records from Dias et al. (2019) for migratory seabirds (318 of 365 species).

Demographics, uses, and legality

Forty-two percent of records reported the (national) legality of take (27% legal, 15% illegal) and the remaining 58% of records did not report on the legality. The majority of seabird take records were classified as occuring by indigenous people and local communities (IPLC) and hunters (e.g. IPLC in Greenland (Dietz et al. 2018) and New Zealand (Clucas et al. 2012)). In 26% of records, the demographic group was not clearly reported. Where take by IPLC was reported, it was typically for subsistence. The purpose of take by hunters was not always clear from the records, with records reporting several uses. Illegal take typically related to records from poachers and fisherman (e.g., Mondreti, Davidar, and Grémillet 2018). For illegal take specifically, the review indicated New Caledonia, Malaysia, and then India and the USA as the countries or territories with the highest number of species subject to illegal take (Figure 6A, Figure 5).

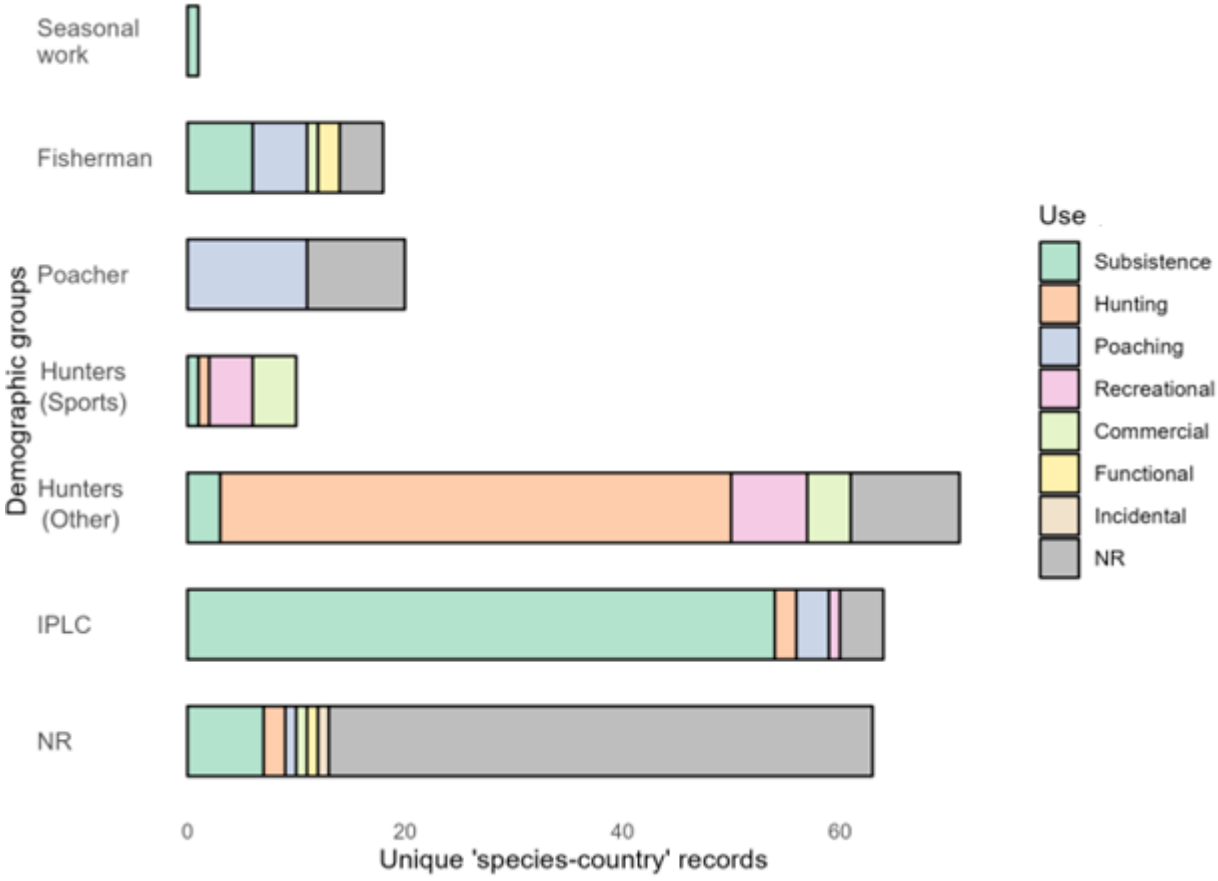

Figure 5: Summary of records describing global data availability for seabird take by key demographic groups and associated use. NR = "Not Reported". The review considered English scientific literature (2010 onwards) and records from Dias et al. (2019) for migratory seabirds (318 of 365 species).

Management and reporting

A minority of records (n = 45) detailed whether the numbers of seabirds taken was recorded or not ('Take recorded', Figure 1). When numbers of birds taken was reported, further details on how take was managed ('Management mechanism') or how numbers taken were recorded ('Reporting mechanism') was often not reported. Where information did exist, the primary route to managing take was via a quota system (e.g., sea duck quotas; Koneff et al. 2017) with information being stored in a relevant database (e.g., the Piniarneq/LULI database; V. Hansen et al. 2020) (Figure 1). For species subject to take in countries where 'Take recorded' was documented as 'No' or 'Not reported', the countries/territories with the highest number of species and potential opportunities for improved take reporting are the USA, Canada, New Caledonia (to France), Norway and then Chile and Greenland (to Denmark) (Figure 6B).

Population impact and monitoring

The majority of records documenting seabird take did not report on whether seabird population numbers were monitored or not ('Numbers monitored', Figure 1). For studies, where population numbers were monitored, the majority of records did not indicate if population numbers were impacted by seabird take ('Impact'). Where negative impact was reported, this related to population decline or potential extirpation as a response to seabird take (e.g. the extirpation of Bridled Tern (*Onychoprion anaethetus*) and Black-naped Tern (*Sterna sumatrana*) from the Seribuat Archipelago, Malaysia; Hamza, Mamat, and Abdullah 2019). Canada, Malaysia, and then Greenland, Sweden and the USA had the greatest number of species where populations were recorded to be the subject of negative impacts (Figure 6C). For a subset of studies, when monitoring of population numbers was not reported, nor impacts to species, there were records which suggested population monitoring would be feasible ('Monitoring possible' Figure 1), with the key countries/territories being São Tomé and Príncipe, Canada, Falkland Islands (Malvinas), New Zealand and Seychelles (Figure 6D). A few records also indicated other pressures occurring within the study sites, including climate change, habitat loss, invasive species, disturbance, disease, anthropogenic waste, and predation (Hansen et al. 2021; Leopold et al. 2019; Borsa et al. 2010; Henri et al. 2020; Milton et al. 2016).

Case study 1: Managing take through traditional and scientific knowledge

Sooty Shearwaters (*Ardenna grisea*, NT; UNEP/CMS/Res.14.20) have been harvested from sites across southern New Zealand (CMS Party) in a practice known as muttonbirding for centuries. This is a traditional practice of the Rakiura Māori, for whom the annual chick harvest is economically and socially integral to their cultural identity. Concerns were raised about the long-term viability of this practice following declines in Sooty Shearwater populations recorded through population counts and hunting success accounts from muttonbirders. Population declines are likely a consequence of multiple

pressures, including bycatch in fisheries, climate change, and plastic pollution. A long-term collaboration, "Kia Mau te Tītī Mo Ake Tonu Atu" (Keep the Tītī Forever), between Rakiura Māori and the University of Otago, was established to assess changes in chick abundance and potential causes (using data from muttonbirding diaries and contemporary records). This partnership exemplifies an adaptive co-management approach, combining science and traditional knowledge to enable conservation of Sooty Shearwater in New Zealand. It recognises that sustainable and customary harvest of species will not only enable the persistence of important cultural practices, but also aid in poaching reduction, and provide a means for monitoring populations of this culturally important seabird (Clucas et al. 2012; Clucas 2011; Humphries 2015; Geary et al. 2019).

Mutton-bird egging (1893) on Mount Chappell Island, Australia where this practice is also culturally important to Aboriginal people.
Photo by A.J. Campbell: https://collections.museumsvictoria.com.au/items/1275114, CC0

Human health related risks from seabird take

The majority of records reviewed did not focus on human health risk related to seabird take. There were 36 records that reported on health concerns, with the primary group at risk reported to be indigenous people and local communities (IPLC), associated with the take of 19 seabird species (Table) across the Auks, Gulls/Terns, Petrels/Shearwaters, and Seaduck families. By country, Canada, then Greenland and the USA had the most number of species subject to take associated with human health risks (Figure 6E). Health risks for the remaining 86 species were largely not reported, and only a minority of records specficically indicated no health risk to humans (2 species from two countries). Across countries, the USA (n = 16), New Caledonia (to France) (n = 9), Canada (n = 7), Chile (n = 6), Malaysia (n = 5), and then São Tomé and Príncipe (n = 5) had the most number of species subject to take but for which health risks were not reported (51 countries total, Supplementary data 3). Records that included detail on risks to human health included a variety of issues, such as bacterial (*Chlamydophila psittaci*) infection from juvenile Northern Fulmars (Fossádal, Grand, and Gaini 2018), heavy metal poisoning from high Arctic species (Provencher et al. 2014; Bond et al. 2015) and seabirds presenting as vectors of disease (Spaulding et al. 2022).

Case study 2: Subsistence and concerns of mercury poisoning

A young egger carries one glaucous gull, two mew gull, and four black turnstone eggs. *Image from: https://ediblealaska.ediblecommunities.com/things-do/things-do-spring-traditions-yukon-wild-bird-egg-harvest/*

Across local communities inhabiting northern parts of Canada (CMS Non-Party, AEWA Signatory), many marine bird species are harvested under planned sustainable harvest regimes and are a traditional and important food source for First Nation communities. Eggs of several CMS listed, or CMS instrument related species (see table within case study), such as Arctic Tern (*Sterna paradisaea*), Black-legged Kittiwake (*Rissa tridactyla*), Glaucous Gull (*Larus hyperboreus*), Ivory Gull (*Pagophila eburnea*), Black Guillemot (*Cepphus grylle*), Thick-billed Murre, Northern Fulmar (*Fulmarus glacialis*), Common Eider and Long-tailed Duck (*Camptorhynchus labradorius*) are collected for consumption. Traditionally harvested seabird eggs are important for cultural continuity, but of growing concern is the risk of mercury poisoning from consuming seabird eggs, particularly Ivory Gull, Glaucous Gull and Arctic Terns that have notably high mercury levels. Risk of mercury poisoning has been considered as part of the 'Arctic dilemma' described in the Arctic Monitoring and Assessment Programme: "Traditional

food is nutritionally, culturally, economically, and spiritually important but is also the major source of exposure to POPs [persistent organic pollutants] and metals. Nevertheless, the results of this assessment support the importance of promoting the consumption of traditional food after providing information which allows informed choice". The Minamata Convention (2017), partly prompted by the documentation of high mercury concentrations within the Arctic marine ecosystem and hunting societies, is hoped to facilitate a reduction of long-range transport of mercury into Arctic environments (Dietz et al. 2018; AMAP 2021; Provencher et al. 2014).

Common name	**Species**	**Red List Category**	**CMS Listing**	**CMS instrument**
Arctic Tern	*Sterna paradisaea*	LC		AEWA
Black-legged Kittiwake	*Rissa tridactyla*	VU	Res 14.20	AEWA
Glaucous Gull	*Larus hyperboreus*	LC		AEWA
Ivory Gull	*Pagophila eburnea*	NT	Res 14.20	
Black Guillemot	*Cepphus grylle*	LC		AEWA
Thick-billed Murre	*Uria lomvia*	LC		AEWA
Northern Fulmar	*Fulmarus glacialis*	LC		
Common Eider	*Somateria mollissima*	NT	Appendix II	AEWA
Long-tailed Duck	*Clangula hyemalis*	VU	Appendix II	AEWA

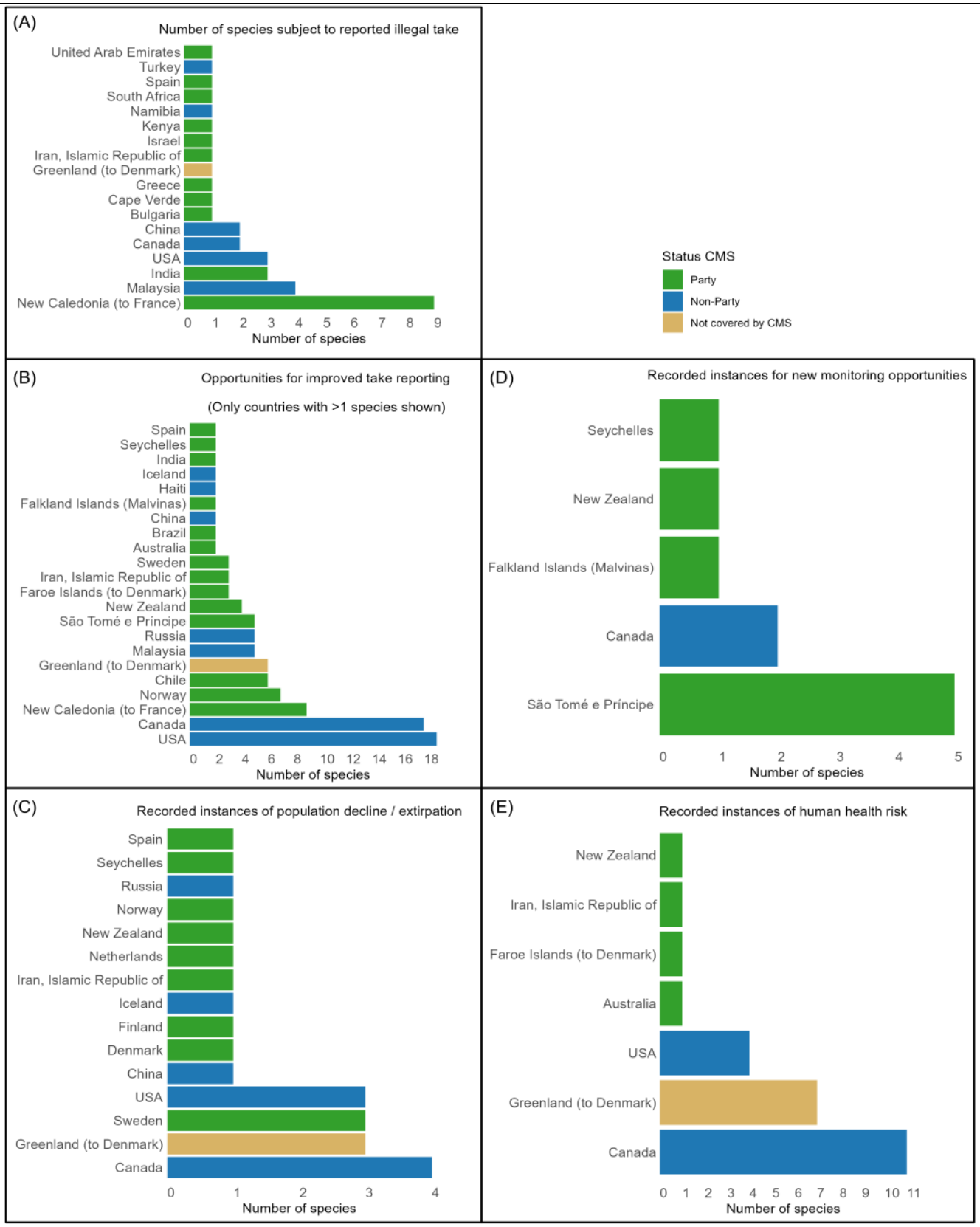

Figure 6: Number of seabird species that are documented as subject to take per country/territory in relation to documented key topics of: legality (A), reporting (B), population impact (C), monitoring (D), and human health (E). Bars are coloured by the countries'/territories' status as CMS Parties.

Table 3: Migratory seabird species (n = 19) with documented impacts to human health when consumed (as per the literature review), and associated countries/territories and demographic groups involved in seabird take. Supplementary data 3 indicates the countries/territories and remaining 86 species subject to take but for which health risks were not identified, i.e., potential research gaps.

Species	Country/territory (CMS status)	Demographic	Reference
Alca torda (Razorbill)	Canada (Non-Party)	IPLC	Heavy metals (Bond et al. 2015)
Alle alle (Little Auk)	Greenland (to Denmark) (Undefined)	IPLC	Heavy metals (Dietz et al. 2018)
Ardenna tenuirostris (Short-tailed Shearwater)	Australia (Party)	IPLC	Heavy metals (Lavers and Bond 2013)
Aythya marila (Greater Scaup)	USA (Non-Party)	IPLC	Avian-influenza (Spaulding et al. 2022)
Cepphus grylle (Black Guillemot)	Canada (Non-Party)	IPLC	Heavy metals (Provencher et al. 2014)
Clangula hyemalis (Long-tailed Duck)	Canada (Non-Party)	IPLC	Heavy metals (Provencher et al. 2014)
Fulmarus glacialis (Northern Fulmar)	Canada (Non-Party)	IPLC	Heavy metals (Provencher et al. 2014)
Fulmarus glacialis (Northern Fulmar)	Faroe Islands (to Denmark) (Party)	IPLC	Bacterial (Fossádal, Grand, and Gaini 2018)
Fulmarus glacialis (Northern Fulmar)	Greenland (to Denmark) (Undefined)	Hunters (other)	Heavy metals (V. Hansen et al. 2020)
Larus argentatus (European Herring Gull)	USA (Non-Party)	IPLC	Heavy metals (Burger and Elbin 2015)
Larus hyperboreus (Glaucous Gull)	Canada (Non-Party)	IPLC	Heavy metals (Provencher et al. 2014)
Larus hyperboreus (Glaucous Gull)	Greenland (to Denmark) (Undefined)	Hunters (other)	Heavy metals (V. Hansen et al. 2020)
Larus marinus (Great Black-backed Gull)	USA (Non-Party)	IPLC	Heavy metals (Burger and Elbin 2015)
Pagophila eburnea (Ivory Gull)	Canada (Non-Party)	IPLC	Heavy metals (Provencher et al. 2014)
Phalacrocorax carbo (Great Cormorant)	Iran, Islamic Republic of (Party)	Fisherman	Heavy metals (Dahmardeh Behrooz and Burger 2022)
Pterodroma gouldi (Grey-faced Petrel)	New Zealand (Party)	IPLC	Heavy metals (P. O. B. Lyver et al. 2017)
Rissa tridactyla (Black-legged Kittiwake)	Canada (Non-Party)	IPLC	Heavy metals (Provencher et al. 2014)
Rissa tridactyla (Black-legged Kittiwake)	Greenland (to Denmark) (Undefined)	IPLC	Heavy metals (Dietz et al. 2018)
Somateria mollissima (Common Eider)	Canada (Non-Party)	IPLC	Heavy metals (C. D. Mallory et al. 2017; Provencher et al. 2014)
Somateria mollissima (Common Eider)	Greenland (to Denmark) (Undefined)	Hunters (other)	Heavy metals (V. Hansen et al. 2020; Dietz et al. 2018)
Sterna hirundo (Common Tern)	USA (Non-Party)	IPLC	Heavy metals (Burger and Elbin 2015)
Sterna paradisaea (Arctic Tern)	Canada (Non-Party)	IPLC	Heavy metals (Provencher et al. 2014)
Uria aalge (Common Murre)	Canada (Non-Party)	IPLC	Heavy metals (Bond et al. 2015; Dietz et al. 2018)
Uria aalge (Common Murre)	Greenland (to Denmark) (Undefined)	IPLC	Heavy metals (Dietz et al. 2018)
Uria lomvia (Thick-billed Murre)	Canada (Non-Party)	IPLC	Heavy metals (Bond et al. 2015; Provencher et al. 2014)
Uria lomvia (Thick-billed Murre)	Greenland (to Denmark) (Undefined)	Hunters (other)	Heavy metals (V. Hansen et al. 2020; Dietz et al. 2018)

Discussion

We found published records of seabird take for a large proportion of migratory seabirds across 56 countries, highlighting the prevalence of this practice. Our review highlighted the complexity of seabird take, with instances of long-standing cultural importance and subsistence use by IPLC, in addition to hunting and poaching. Given the varied demographic groups involved in seabird take and the reasons for taking seabirds, the necessary interventions to ensure conservation of species, will likely need to be considered on a case-by-case basis, but should always be implemented through multistakeholder engagement. Our results highlight an urgent need for improved data collection on seabird take to better understand the scope and severity of this issue at a population level, and to ultimately inform the implementation and monitoring of conservation interventions. We provide eight recommendations that could support next steps for seabird take.

Species and cooperative actions

Our findings include records for 21 species subject to take that do not have this anthropogenic pressure listed as a threat in their IUCN Red List assessments. Further assessment to determine if take is impacting the population status of these 21 species should be undertaken following the standardised Red List assessment process. Red List assessments serve as a critical starting point for practitioners to understand the relative population-level impacts to a species and the necessary interventions that may be required to support species reaching or maintaining a favourable conservation status (IUCN 2024; Butchart et al. 2025).

Of the 105 species with records of take, 10 were species listed in Appendix I, namely: Palearctic Sub-population of the Great White Pelican, Christmas Island Frigatebird, Pink-footed Shearwater, Saunders's Gull, Humboldt Penguin, Chinese Crested Tern, Olrog's Gull, the Peruvian Diving-petrel and Stellars Eider and White-eyed Gull (the latter two also listed on Appendix II). A thorough assessment is required within relevant CMS Parties to investigate the specific circumstances of the take of each of these species, including differences across sub-populations (i.e. Great White Pelican), if take is currently on-going, it's scope and severity including population-level impacts, given the mandate of Appendix I to prohibit taking (Article III 5). Complementary, would be a review of the current national actions by relevant Parties to implement CMS Appendix I and identification of any areas to strengthen, where needed.

23 species are listed in CMS Appendix II (2 of these are also listed on Appendix I), 49 are listed in AEWA (18 of these in CMS Appendices) and 3 are listed in ACAP (all 3 in CMS Appendices). We also identified 15 species subject to take that are recognised as likely to meet the criteria for listing in the Appendices of the Convention (UNEP/CMS/Res.14.20), with records of take within 7 countries Party to the CMS.

Developing listing proposals for these species would be a strategic step towards focussing the attention of the Convention on species that would benefit most from coordinated conservation action. AEWA has developed a Priority Action to "assess and address hunting and egg harvesting (legal and illegal)", including considering a flyway assessment of take across the entire range of the focal migratory species. This would be an important action to further gather existing data in other sources and to develop appropriate conservation recommendations within the AEWA region. The ACAP working group on Population and Conservation could be the most appropriate group for considering seabird take recommendations for the three species with records of take. Coordination across CMS, AEWA and ACAP could enhance standardized data collection on seabird take (including species, numbers, locations, and seasons) and support the implementation of conservation actions for species subject to take across multiple countries, while also addressing cumulative impacts. Engagement with Non-Party and relevant Range States where seabird take takes place should be sought, in particular with Canada, USA, and China. The Marine Flyways framework (draft Resolution to CMS COP 15) could provide a useful framework for cooperative and coordination action to better address the threats to seabirds, including take. The Conservation of Arctic Flora and Fauna (CAFF) also provides an opportunity to further engage with Canada and the USA who are signatories to the Agreement. CAFF's mission is to conserve Arctic biodiversity and share findings with Arctic governments and residents to promote sustainable practices for the region's living resources (CAFF 1998), and provides an opportunity for relevant stakeholders to engage on issues related to seabird take. CAFF is facilitating CMS relevant conservation actions for species including Common Eiders (Appendix II), Thick-billed Murres (AEWA), Ivory Gulls (CMS Res 14.20), and through the Arctic Migratory Birds Initiative (AMBI) work plan which designates these species as priorities for conservation actions across the circumpolar flyway (CAFF 2019).

Seabird take interventions

Engagement with relevant stakeholders at a local level will be critical to identify appropriate interventions for seabird take and to ensure species are able to achieve or maintain a favourable conservation status, as evidenced across wild meat harvest interventions more broadly (Ingram et al. 2021; Brochet et al. 2019). For seabird harvest, key stakeholders for documented legal take are IPLC and hunters. Successful engagement with IPLC is already underway for several seabird species such as Grey-faced Petrels in New Zealand (where customary harvest was reinstated after a 50 year moratorium; Whitehead et al. 2014), Common Eiders in the eastern Canadian Arctic (where population monitoring efforts are improved; Richard et al. 2023), and for Northern Rockhopper Penguins in Tristan da Cunha (where local residents are being shown methods to harvest B eggs as opposed to A eggs; Bond et al. 2016). Similarly, successful engagement with hunters is, for example, occuring for sea duck harvest in Denmark (Tjørnløv et al. 2019; Meltofte and Tøttrup 2024). These examples demonstrate

mechanisms to engage with diverse stakeholder groups and serve as exemplar practices to be considered elsewhere. In all instances, however, it's likely that capacity building to deliver the data needed and action the necessary steps for species conservation will require capacity building of respective stakeholders.

The required interventions to regulate impacts of harvesting will likely vary depending on the life-history strategy of the species and its conservation status. Such interventions have included: i) multi-year moratoriums on egg harvesting (e.g., Sooty Terns (*Onychoprion fuscatus*) in the Seychelles; Inch et al. 2024); ii) spatiotemporal bans on hunting of adults during particular periods of the year (e.g., spring hunting of Thick-billed Murre (*Uria lomvia*) near the colonies is now prohibited in Greenland; Merkel et al. 2014); iii) setting of strict quotas / bag-limits (e.g., harvest limits of Short-tailed Shearwater (*Puffinus tenuirostris*) in Australia; Lavers and Bond 2013). All interventions should be evidence-based, and implemented through multistakeholder engagement to better ensure positive outcomes are achieved (Henri et al. 2020; Mallory et al. 2022; Patterson et al. 2024).

Building the necessary evidence-base (population monitoring, including demographic parameters, and quantitative estimates of take) for effectively regulating seabird take, is a priority for almost all species across all countries (i.e., the majority of reviewed records did not detail effective population monitoring, and reporting or management of take. Determining the success of any harvest intervention is only possible through monitoring both the numbers taken alongside the abundance, distribution, and trends of affected species (Di Minin et al. 2019; Ingram et al. 2021). Exemplar efforts enabling sustainability of seabird harvests include spring migration counts for Common Eider in Alaska (McGuire et al. 2019), island-wide surveys of breeding burrows conducted in conjunction with use of records from traditional knowledge holders for Grey-faced Petrels (*Pterodroma gouldi*) in New Zealand (Whitehead et al. 2014; Lyver et al. 2015), and the establishment of a long-term field station that has monitored Thick-billed Murre populations in Canda for decades (Patterson et al. 2024). The challenge though is to scale monitoring efforts (Moussy et al. 2021) and recording of take across entire species ranges, especially for those species where take occurs in numerous countries. Although such efforts are rare, successful approaches such as the Piniarneq/LULI database, across four countries (Hansen et al. 2020), demonstrates feasibility of regional approaches. Examining such efforts will be valuable starting points for establishing or scaling approaches for managing species take elsewhere.

Further understanding illegal take

Although seldom reported in the academic literature we reviewed, it was evident that illegal take occurs across many regions where seabirds breed. Reasons why people harvest illegally can include poverty, food insecurity, economic interests or social disasters (see Janssen *et al*. 2024). Improving the understanding of what motivates

people to harvest seabirds illegally is a priority to develop effective conservation measures.

Illegal seabird harvest has been addressed in the Canary Islands through intense warden campaigns involving government surveillance and volunteer support from various NGOs, which effectively reduced the poaching of Cory's Shearwater (*Calonectris borealis*). These anti-poaching efforts led to higher reproductive success rates in colonies that were previously affected by poaching. However, poaching is still prevalent in some colonies across the Canary Islands, and it's been recognised that further response through education, prevention and enforcement is needed (Lopez-Darias et al. 2011).

Support human health

Seabirds are excellent bioindicators because they are higher trophic predators and are vulnerable to contaminant exposure from their diet and to accumulating high levels of many compounds (Braune et al. 2005). Contaminants have been monitored in seabird eggs in the Canadian Arctic since the mid-1970s. This growing body of literature has raised concerns for the subsequent impacts on human health from consuming seabirds and their eggs. Our report highlights the most frequent documentation of seabird consumption is by IPLC potentially putting them at risk from the increase in environmental impacts of synthetic chemicals or contaminants. Any intervention needs to not only support seabird health, but also allow for the continued practice of long-standing cultural traditions in a way that prioritizes the health and safety of those involved in hunting or consuming seabird products.

Interventions to minimise human health risks can range from species-specific approaches, such as reducing bacterial infections like *Chlamydophila psittaci* in juvenile Northern Fulmars through strict hygiene protocols (Fossádal, Grand, and Gaini 2018), to region-wide strategies addressing disease transmission between seabirds and people (Spaulding et al. 2022; Iverson et al. 2016). Some interventions may even require entire systems changes to tackle heavy metal poisoning in both people and wildlife (Dahmardeh Behrooz and Burger 2022; Lavers and Bond 2013). Crucially, any effective intervention will require long-term baseline data on species health, which is often lacking for many seabirds or other marine species that are harvested (Barratclough et al. 2023; De Jersey et al. 2025). Simple sampling protocols are now available for seabirds that can significantly enhance our ability to gather baseline data and support understanding of disease prevalence across species and regions (Dewar et al. 2023; Wells et al. 2023).

Overall, there were limited studies focussing on the human health impacts of seabird take and impacts are likely to be species and location specific, further highlighting the need for further research in this area. There is also growing research on the impacts of plastics on seabirds (e.g., De Jersey et al. 2025), and as this research area grows also considering if there are any subsequent impacts on those consuming seabirds should be considered.

Study limitations

The literature search focussed on English academic literature, biasing our results toward anglophone countries (Nuñez and Amano 2021) and likely resulted in the exclusion of relevant studies that could provide further insight into the details of seabird take. Given quantifying numbers of birds taken was not feasible, our results reflect prevalence of take rather than magnitude of take for species. This is in line with biodiversity monitoring efforts more generally, that have been reported to be sparse and uncoordinated, with most of the data generated found to be elusive (Moussy et al. 2021). Results from our study are refined to the species-country-topic level. However, papers varied in spatial scope, with some studies focussing on specific sites, and others reporting across multiple sites in a country, or even broader regions. Actions directed to specific countries in the general discussion should further consider unique studies recorded in the summary data for the analyses.

Conclusions

Our review demonstrates intentional use of seabirds for human consumption as a widespread phenomenon, while also highlighting the limited evidence available in the English academic literature documenting the scale and drivers of intentional take of migratory seabirds. Improved and consistent data collection across the topics discussed here is critical to effectively understand and ensure the sustainability of seabird harvest. Monitoring of seabird take should incorporate the knowledge of IPLCs alongside globally established monitoring protocols, with results considered alongside the other pressures facing seabirds to better understand the cumulative impacts driving population trends. Ultimately, a sustained, collaborative, and interdisciplinary commitment between those working toward conserving seabirds and those harvesting species, will be imperative to ensure favourable conservation status of seabird populations and the often long-standing practices tied to their harvest.

Summary policy recommendations

1. **Review action plans for Appendix I-listed species to ensure the issue of take is adequately addressed, including monitoring, enforcement and compliance**

A total of ten species subject to take are listed on Appendix I, namely the Palearctic Sub-population of the Great White Pelican, Christmas Island Frigatebird, , Pink-footed Shearwater, Saunders's Gull, Humboldt Penguin, Chinese Crested Tern, Olrog's Gull, Peruvian Diving-petrel, and Stellars Eider and White-eyed Gull (the latter two also listed on Appendix II). CMS Parties are required to prohibit the killing, capturing, or harming of Appendix I species. A thorough national-level assessment on the specific circumstances of the take of each of these species is needed, in addition to reviewing the Actions Plans and compliance with the prohibition of take, including the monitoring and enforcement mechanisms in place, should be considered.

2. Consider further species for listing in the Appendices of the Convention

15 species were found to be subject to take and have also been noted as likely to meet the criteria for listing in the Appendices of the Convention based on their conservation status and migratory movements (UNEP/CMS/Res.14.20). Developing collaborative listing proposals for these species alongside Concerted Actions on seabird take or wider conservation interventions should be considered by CMS Parties to be able to better address the cumulative impacts facing migratory seabirds.

3. Enhance cooperation and coordination between AEWA, ACAP and CMS

Of the 105 species with records of take, some are already listed on AEWA (n=49) and ACAP (n=3). AEWA has already developed a Priority Action to "assess and address hunting and egg harvesting (legal and illegal)", including considering a flyway assessment of take across the entire range of the focal migratory species. This would be an important action to further gather existing data in other sources and to develop appropriate conservation recommendations within the AEWA region. The ACAP working group on Population and Conservation could be the most appropriate group for considering seabird take recommendations, although noting that records of seabird take were found for a small proportion of ACAP listed species (3/31). Coordination across CMS, AEWA, ACAP and other CMS instruments will be needed to improve standardised data collection of seabird take (including species, numbers, location, and season) and to implement conservation actions for species subject to take across multiple countries, in addition for consideration of cumulative impacts.

4. Increase engagement with non-Party Range States:

Engagement with Range States of migratory seabirds, including non-CMS Parties that are relevant to seabird take should be sought, in particular Canada and the USA, in any forthcoming action plans or focal work on seabird take.

5. Consider setting scientific priorities at the national level to improve the evidence base on seabird take

This review highlights that data collection of seabird take is irregular and that important factors are not always collected, leading to key gaps in the literature. Encouraging research at a national level to further build the evidence base on seabird take, including monitoring of take and seabird populations, would be a valuable priority to be able to make evidence-based recommendations and provide appropriate considerations for adaptive management. A comprehensive assessment across all relevant countries and species on the impacts of human health from seabird consumption is also needed.

6. Consider mechanisms for co-management of seabird harvest with IPLCs, particularly for communities where health risks from seabird consumption may be present

The importance of seabird take to IPLC including for subsistence must be considered in any future management recommendations. Exploring co-management approaches, including those successfully implemented in New Zealand (*Case study 1*) alongside

academic collaboration would be an opportunity to support capacity to ensure traditional practices can be maintained sustainably (e.g., Mallory et al. 2022).

7. Strengthen Wildlife Health Management

Building on the existing work and Resolutions under the Convention since COP8 on Avian Flu and other wildlife health issues, also with other relevant organizations such as FAO, continue to support the Scientific Task Force on Avian Influenza and Wild Birds to strengthen the monitoring and management of zoonotic diseases relevant to seabirds. Consider promoting further research into associated potential human health impacts, particularly where consumption has important subsistence or cultural linkages.

8. Consider research to better understand the drivers of illegal take

Illegal harvest of wildlife, including seabirds, is a complex issue. Reasons why people harvest illegally can include poverty, food insecurity, economic interests or social disasters (see Janssen *et al*. 2024). Improving the understanding of what motivates people to harvest seabirds illegally is needed to develop effective conservation measures.

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Appendix 1: Search term selection

"Common eider" OR "Somateria mollissima" example

Search terms	Search Source	Number of hits
("Common eider" OR "Somateria mollissima") AND (Collect* OR catch* OR caught OR harvest OR hunt* OR captur* OR harass* OR kill*) NOT bycatch NOT bycaught	Searching in Web of Science "Core Collection", under the option of "All Fields"	359 documents returned; Variety of relevance.
("Common eider" OR "Somateria mollissima") AND (Collect* OR catch* OR caught OR harvest OR hunt* OR captur* OR harass* OR kill*) NOT bycatch NOT bycaught	Searching in Web of Science "Core Collection", under the option of "All Fields"	347 documents returned
("Common eider" OR "Somateria mollissima") AND (Collect* OR catch* OR caught OR harvest OR hunt* OR captur* OR harass* OR kill*) NOT bycatch NOT bycaught	Searching in Web of Science "Core Collection", under the option of "Topic"	289 documents returned
("Common eider" OR "Somateria mollissima") AND (Collect* OR catch* OR caught OR harvest OR hunt* OR captur* OR harass* OR kill*) NOT bycatch NOT bycaught	Searching in Web of Science "Core Collection", under the option of "Topic"	278 documents returned
("Common eider" OR "Somateria mollissima") AND (harvest OR hunt* OR captur* OR harass* OR kill* OR poach* OR troph* OR cultur* OR conflict OR medicine OR trade OR sale OR traffic* OR OR poison* OR consum*) NOT bycatch NOT bycaught	Searching in Web of Science "Core Collection", under the option of "Topic"	320
("Common eider" OR "Somateria mollissima") AND (harvest OR hunt* OR harass* OR kill* OR poach* OR troph* OR cultur* OR conflict OR medicine OR trade OR sale OR traffic* OR poison* OR consum*) NOT bycatch NOT bycaught	Searching in Web of Science "Core Collection", under the option of "Topic"	280

("Common eider" OR "Somateria mollissima") AND (Collect OR catch OR caught OR harvest OR hunt OR capture OR harass OR kill) -bycatch -bycaught	Google Scholar	8840 results
("Common eider" OR "Somateria mollissima") AND (Collect OR harvest OR hunt OR capture OR harass OR kill) -bycatch -bycaught	Google Scholar	7670
("Common eider" OR "Somateria mollissima") AND (harvest OR hunt OR capture OR harass OR kill) -bycatch -bycaught	Google Scholar	6770
("Common eider" OR "Somateria mollissima") AND (harvest OR hunt OR harass OR kill OR poach OR trophy OR culture OR conflict OR medicine OR trade OR sale OR traffic OR poison OR consume) -bycatch -bycaught	Google Scholar	9360

"Emperor penguin" OR " Aptenodytes forsteri " example

Search terms	**Search Source**	**Number of hits**
("Emperor penguin" OR " Aptenodytes forsteri ") AND (Collect* OR catch* OR caught OR harvest OR hunt* OR captur* OR harass* OR kill*) NOT bycatch NOT bycaught	Searching in Web of Science "Core Collection", under the option of "All Fields"	103
("Emperor penguin" OR " Aptenodytes forsteri ") AND (Collect* OR catch* OR caught OR harvest OR hunt* OR captur* OR harass* OR kill*) NOT bycatch NOT bycaught	Searching in Web of Science "Core Collection", under the option of "All Fields"	99
("Emperor penguin" OR " Aptenodytes forsteri ") AND (Collect* OR catch* OR caught OR harvest OR hunt* OR captur* OR harass* OR kill*) NOT bycatch NOT bycaught	Searching in Web of Science "Core Collection", under the option of "Topic"	82

("Emperor penguin" OR " Aptenodytes forsteri ") AND (Collect* OR catch* OR caught OR harvest OR hunt* OR captur* OR harass* OR kill*) NOT bycatch NOT bycaught	Searching in Web of Science "Core Collection", under the option of "Topic"	78
("Emperor penguin" OR " Aptenodytes forsteri ") AND (Collect OR catch OR caught OR harvest OR hunt OR capture OR harass OR kill) -bycatch -bycaught	Google Scholar	6380
("Emperor penguin" OR " Aptenodytes forsteri ") AND (Collect OR harvest OR hunt OR capture OR harass OR kill) -bycatch -bycaught	Google Scholar	5630

Appendix 2: Species for analysis

BirdLife International recognised 365 seabird species at time of our analysis (Dec 2024).

318 of these species are recognised as migratory, according to CMS definition.

259 species had ≥1 records in the Web of Science search, across a total of 4949 records

241 species had records from 2010 onwards, across 2667 records

72 unique species were considered under seabird take initially from Web of Science review

60 species identified from Web of Science review where seabird take explicitly related to "delivery for human consumption".

139 of 357 species listed under Hunting/trapping from Dias et al., 2019

123 of 357 species listed under Hunting/trapping from Dias et al., 2019 AND are migratory according to CMS definition.

- 39 of these species also from Web of Science, and all where the timing of threat was recorded as current “Ongoing” in the Red List assessment / Dias et al. 2019
- 56 species only in Dias et al. 2019 under Hunting/trapping and where the Timing of the threat is considered “Ongoing” (n=55) or “Past, Likely to Return” (n=1)
- 29 species only in Dias et al. 2019 under Hunting/trapping and where Timing is “Past, Unlikely to Return”. Note, one species (Spheniscus magellanicus) had Hunting/trapping listed under both “Ongoing” and “Past, Unlikely to Return”.

21 additional species with records of take relating to "delivery for human consumption" compared to Dias et al. 2019 (i.e. 21 of the 60 species noted above).

144 Migratory species in total are, or have been, recognised to be threatened by “Hunting/trapping” and Seabird take related to "delivery for human consumption".

The Dias et al. (2019) review focussed on “Hunting/trapping” in the broader sense. So, where relevant, I updated the summary data for our contemporary analysis to focus on “Hunting/trapping” records that are “Ongoing” OR “Past, Likely to Return” and only where records related to "delivery for human consumption", and for Migratory seabird species according to CMS definition. I did this by manually reading through the Dias et al. “Notes” and “References” columns. Where evidence showed the records clearly did NOT RELATE to "delivery for human consumption", these records were discarded. Where records were not clear (i.e. absence of information in Notes, References, columns), these records were kept.

105 final species currently recognised to be subject to Seabird Take, or where the threat was considered current or on-going.

- 21 new species from Web of Science
- 39 species from Web of Science and Dias et al. 2019
- 45 species from Dias et al.2019 only (associated timing of “Ongoing” and “Past, Likely to return”)
- NOTE: Although, 56 species only in Dias et al. 2019 under Hunting/trapping and where Timing is “Ongoing” or “Past, Likely to Return”, 11 of these records related to “Hunting/trapping” which did not align with "delivery for human consumption".

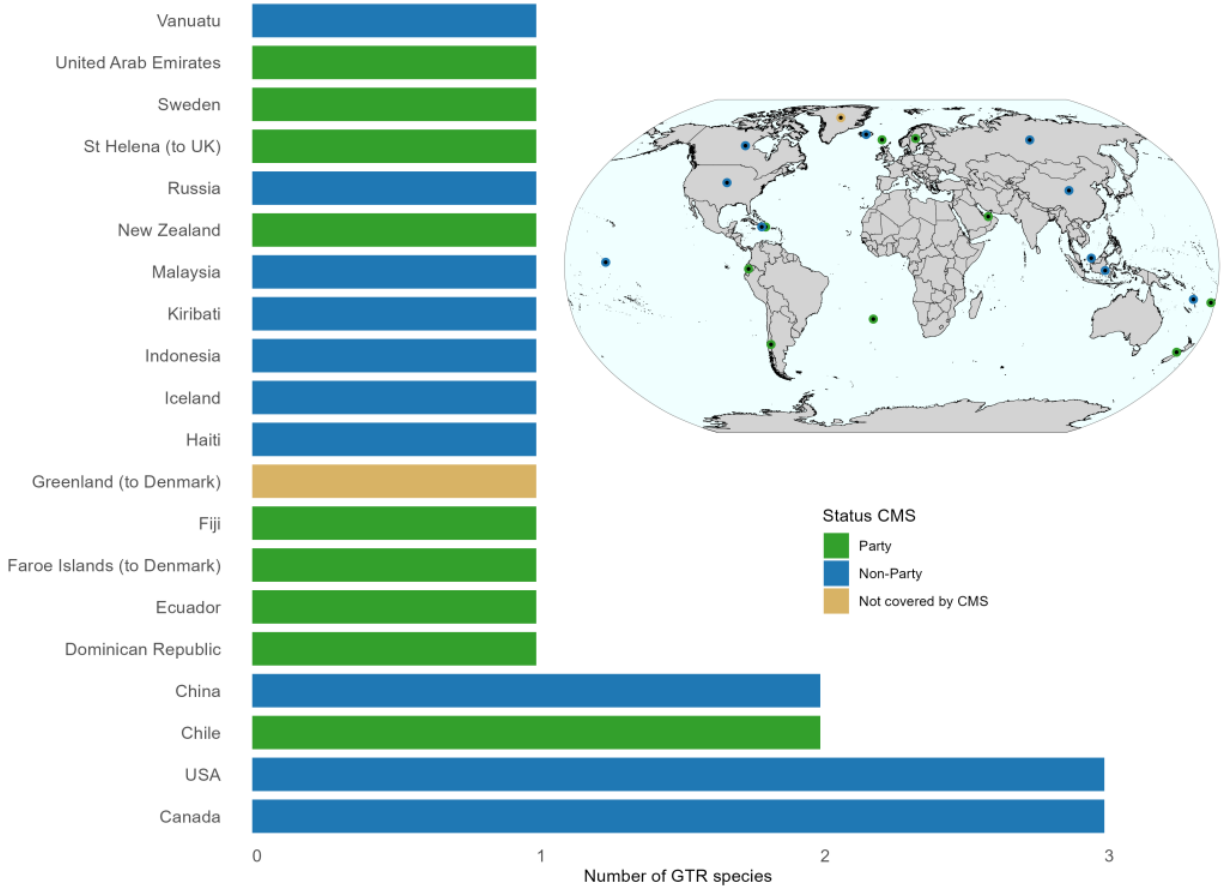
Appendix 3: Coding of key terms for analysis

Topic	Literature terms	Analysis terms
Take Life-stage	Nest	Nest
	Egg	Egg
	Chick	Chick
	Fledgling	Juvenile
	Juvenile	Juvenile
	Adult	Adult
	Unknown	NR
Season	breeding	Breeding
	non-breeding	Non-breeding
	autumn	Non-breeding
	winter	Non-breeding
	all-year	Year-round
	not reported	NR
Demographic of taker	cultural harvest	IPLC
	fisherman	Fisherman
	fisherman (local)	Fisherman
	fishing and hunting	Hunt (other)
	harvest	IPLC
	harvester	IPLC
	hunt	Hunt (other)
	hunter	Hunt (other)
	hunters	Hunt (other)
	indigenous people's	IPLC
	Indigenous people's	IPLC
	indigenous peoples	IPLC
	local communities	IPLC
	local fisherman	Fisherman
	local hunter	Hunt (other)
	locals	IPLC
	mixed (indigenous	IPLC
	native groups	IPLC
	nr	nr
	poach	Poacher
	poacher	Poacher
	poachers	Poacher
	professional hunter	Hunt (sports)
	recreational hunter	Hunt (other)
	seasonal workers	Seasonal workers
	subsistence	IPLC
	subsistence harvest	IPLC
	subsistence hunters	IPLC
	traditional	IPLC

	u	nr
	western hunters)	Hunt (sports)
Seabird take use	professional hunter	Commercial
	sold to eat	Commercial
	sold to market	Commercial
	cultural	Subsistence
	cultural	Subsistence
	customary harvest	Subsistence
	harvest	Subsistence
	Feather used in fishing lures	Functional
	fish bait	Functional
	hunt	Hunting
	hunt)	Hunting
	hunter	Hunting
	hunters	Hunting
	kill	Hunting
	nr	NR
	poach	Poaching
	poaching	Poaching
	recreational	Recreational
	recreational hunter	Recreational
	sport	Recreational
	incidental killing during harvest of other seabirds	Incidental
	human consumption	Subsistence
	local fisherman	Subsistence
	mixed (subsistence	Subsistence
	subsistence	Subsistence
Method of seabird take	Captured at sea	Active take
	catch	Active take
	collect	Passive take
	cultural harvest	Passive take
	direct harvesting	Passive take
	down harvest	Passive take
	fisherman	Active take
	fishing and hunting	Active take
	harvest	Passive take
	harvested	Passive take
	hunt	Active take
	hunt at sea	Active take
	kill	Active take
	killed	Active take
	none	nr
	nr	nr
	poach	Active take

	shoot	Active take
	shot	Active take
Management mechanism for take	2 year moratorium	Temporal ban
	adaptive management	Analytical Framework
	aim to have rangers patrolling	Monitoring body
	bag-limit	Quota
	harvest reduction	Quota
	indigenous peoples monitoring	Monitoring body
	length of hunting season	Temporal ban
	long-term field studies to monitor numbers	Monitoring body
	management organisation	Monitoring body
	model estimates	Analytical Framework
	nr	NR
	Professional hunter	Quota
	quota	Quota
	scientists and locals	Monitoring body
	units assigned to families (manu)	IPLC management
Reporting mechanism for take	"The number of thick-billed murres and common eiders hunted per 2013 and the number of hunters per 2013 was obtained from the Piniarneq/LULI database (extracted June 2017)"	Database
	bag-limits	Database
	bag statistics	Database
	indigenous peoples	IPLC knowledge
	local residents	IPLC knowledge
	locals	IPLC knowledge
	nr	NR
	p	NR
	scientists and locals	IPLC knowledge
	units per area	Database
Impact to population at site	decline	decline
	decrease	decline
	potential decline	decline
	potential extirpation	potential extirpation
	possible extirpation	potential extirpation
	unknown	NR
	not reported	NR
	stable	stable
	increase	increase

Appendix 4: Supporting figure 1. Globally threatened seabird species per country/territory:



Number of globally threatened (GTR) seabird species per country/territory for which records of take were recorded in the review of English scientific literature (2010 onwards) and from Dias et al. (2019)

Supplementary data 1: Seabird species and those subject to take (intentional use)

The table below shows extant seabird species meeting the definition of migratory against the CMS criteria (n=318). 105 species with records of seabird take in the context of 'intentional use' for human consumption / use were identified in the literature review (using Web of Science). The table is ordered by the 21 species that were unique to the Web of Science review (New: Web of Science only), then the 39 species that were common across both data sources (Web of Science AND Dias et al. 2019), followed by the 45 species that were unique to the Dias et al. (2019) assessment which also included expert solicitation and references prior to 2010 (Dias et al. 2019). A further 28 migratory species had previously been documented to be impacted by "Hunting/trapping", but this threat was recorded as past and unlikely to return (Dias et al PAST). Records for these 28 species were not included in the analysis. The table also includes the 47 seabird species that are considered non-migratory and were not considered in the review (Not considered (non-migratory).

Family	Scientific name	Common	Red List (2024)	CMS Migratory	Source for human consumption / use
Alcidae (Auks)	*Brachyramphus perdix*	Long-billed Murrelet	NT	Yes	New: Web of Science only
Alcidae (Auks)	*Cepphus grylle*	Black Guillemot	LC	Yes	New: Web of Science only
Fregatidae (Frigatebirds)	*Fregata ariel*	Lesser Frigatebird	LC	Yes	New: Web of Science only
Fregatidae (Frigatebirds)	*Fregata minor*	Great Frigatebird	LC	Yes	New: Web of Science only
Gaviidae (Loons/Divers)	*Gavia pacifica*	Pacific Loon	LC	Yes	New: Web of Science only
Laridae (Gulls, Terns, Skimmers)	*Larus glaucescens*	Glaucous-winged Gull	LC	Yes	New: Web of Science only
Laridae (Gulls, Terns, Skimmers)	*Larus hyperboreus*	Glaucous Gull	LC	Yes	New: Web of Science only
Laridae (Gulls, Terns, Skimmers)	*Larus marinus*	Great Black-backed Gull	LC	Yes	New: Web of Science only
Laridae (Gulls, Terns, Skimmers)	*Larus ridibundus*	Black-headed Gull	LC	Yes	New: Web of Science only
Laridae (Gulls, Terns, Skimmers)	*Onychoprion anaethetus*	Bridled Tern	LC	Yes	New: Web of Science only
Laridae (Gulls, Terns, Skimmers)	*Onychoprion fuscatus*	Sooty Tern	LC	Yes	New: Web of Science only
Laridae (Gulls, Terns, Skimmers)	*Rissa tridactyla*	Black-legged Kittiwake	VU	Yes	New: Web of Science only
Laridae (Gulls, Terns, Skimmers)	*Sternula antillarum*	Least Tern	LC	Yes	New: Web of Science only
Laridae (Gulls, Terns, Skimmers)	*Thalasseus bengalensis*	Lesser Crested Tern	LC	Yes	New: Web of Science only
Phaethontidae (Tropicbirds)	*Phaethon lepturus*	White-tailed Tropicbird	LC	Yes	New: Web of Science only
Phalacrocoracidae (Cormorants)	*Nannopterum auritum*	Double-crested Cormorant	LC	Yes	New: Web of Science only
Phalacrocoracidae (Cormorants)	*Phalacrocorax carbo*	Great Cormorant	LC	Yes	New: Web of Science only
Procellariidae (Petrels, Shearwaters)	*Ardenna pacifica*	Wedge-tailed Shearwater	LC	Yes	New: Web of Science only

Procellariidae (Petrels, Shearwaters)	*Ardenna tenuirostris*	Short-tailed Shearwater	LC	Yes	New: Web of Science only
Procellariidae (Petrels, Shearwaters)	*Fulmarus glacialis*	Northern Fulmar	LC	Yes	New: Web of Science only
Procellariidae (Petrels, Shearwaters)	*Puffinus bailloni*	Tropical Shearwater	LC	Yes	New: Web of Science only
Alcidae (Auks)	*Alca torda*	Razorbill	LC	Yes	Web of Science AND Dias et al. 2019
Alcidae (Auks)	*Alle alle*	Little Auk	LC	Yes	Web of Science AND Dias et al. 2019
Alcidae (Auks)	*Fratercula arctica*	Atlantic Puffin	VU	Yes	Web of Science AND Dias et al. 2019
Alcidae (Auks)	*Uria aalge*	Common Murre	LC	Yes	Web of Science AND Dias et al. 2019
Alcidae (Auks)	*Uria lomvia*	Thick-billed Murre	LC	Yes	Web of Science AND Dias et al. 2019
Anatidae (Ducks, Geese, Swans)	*Aythya marila*	Greater Scaup	LC	Yes	Web of Science AND Dias et al. 2019
Anatidae (Ducks, Geese, Swans)	*Bucephala clangula*	Common Goldeneye	LC	Yes	Web of Science AND Dias et al. 2019
Anatidae (Ducks, Geese, Swans)	*Bucephala islandica*	Barrow's Goldeneye	LC	Yes	Web of Science AND Dias et al. 2019
Anatidae (Ducks, Geese, Swans)	*Clangula hyemalis*	Long-tailed Duck	VU	Yes	Web of Science AND Dias et al. 2019
Anatidae (Ducks, Geese, Swans)	*Melanitta americana*	Black Scoter	NT	Yes	Web of Science AND Dias et al. 2019
Anatidae (Ducks, Geese, Swans)	*Melanitta deglandi*	White-winged Scoter	LC	Yes	Web of Science AND Dias et al. 2019
Anatidae (Ducks, Geese, Swans)	*Melanitta fusca*	Velvet Scoter	VU	Yes	Web of Science AND Dias et al. 2019
Anatidae (Ducks, Geese, Swans)	*Melanitta nigra*	Common Scoter	LC	Yes	Web of Science AND Dias et al. 2019
Anatidae (Ducks, Geese, Swans)	*Melanitta perspicillata*	Surf Scoter	LC	Yes	Web of Science AND Dias et al. 2019
Anatidae (Ducks, Geese, Swans)	*Mergus serrator*	Red-breasted Merganser	LC	Yes	Web of Science AND Dias et al. 2019
Anatidae (Ducks, Geese, Swans)	*Somateria mollissima*	Common Eider	NT	Yes	Web of Science AND Dias et al. 2019
Anatidae (Ducks, Geese, Swans)	*Somateria spectabilis*	King Eider	LC	Yes	Web of Science AND Dias et al. 2019
Gaviidae (Loons/Divers)	*Gavia adamsii*	Yellow-billed Loon	NT	Yes	Web of Science AND Dias et al. 2019
Laridae (Gulls, Terns, Skimmers)	*Anous minutus*	Black Noddy	LC	Yes	Web of Science AND Dias et al. 2019
Laridae (Gulls, Terns, Skimmers)	*Anous stolidus*	Brown Noddy	LC	Yes	Web of Science AND Dias et al. 2019
Laridae (Gulls, Terns, Skimmers)	*Hydroprogne caspia*	Caspian Tern	LC	Yes	Web of Science AND Dias et al. 2019
Laridae (Gulls, Terns, Skimmers)	*Larus argentatus*	European Herring Gull	LC	Yes	Web of Science AND Dias et al. 2019
Laridae (Gulls, Terns, Skimmers)	*Pagophila eburnea*	Ivory Gull	NT	Yes	Web of Science AND Dias et al. 2019
Laridae (Gulls, Terns, Skimmers)	*Sterna dougallii*	Roseate Tern	LC	Yes	Web of Science AND Dias et al. 2019
Laridae (Gulls, Terns, Skimmers)	*Sterna hirundo*	Common Tern	LC	Yes	Web of Science AND Dias et al. 2019
Laridae (Gulls, Terns, Skimmers)	*Sterna paradisaea*	Arctic Tern	LC	Yes	Web of Science AND Dias et al. 2019
Laridae (Gulls, Terns, Skimmers)	*Thalasseus bergii*	Greater Crested Tern	LC	Yes	Web of Science AND Dias et al. 2019

Laridae (Gulls, Terns, Skimmers)	*Thalasseus bernsteini*	Chinese Crested Tern	CR	Yes	Web of Science AND Dias et al. 2019
Pelecanidae (Pelicans)	*Pelecanus onocrotalus*	Great White Pelican	LC	Yes	Web of Science AND Dias et al. 2019
Phalacrocoracidae (Cormorants)	*Nannopterum brasilianum*	Neotropical Cormorant	LC	Yes	Web of Science AND Dias et al. 2019
Procellariidae (Petrels, Shearwaters)	*Ardenna grisea*	Sooty Shearwater	NT	Yes	Web of Science AND Dias et al. 2019
Procellariidae (Petrels, Shearwaters)	*Calonectris borealis*	Cory's Shearwater	LC	Yes	Web of Science AND Dias et al. 2019
Procellariidae (Petrels, Shearwaters)	*Pterodroma feae*	Cape Verde Petrel	NT	Yes	Web of Science AND Dias et al. 2019
Procellariidae (Petrels, Shearwaters)	*Pterodroma gouldi*	Grey-faced Petrel	LC	Yes	Web of Science AND Dias et al. 2019
Procellariidae (Petrels, Shearwaters)	*Pterodroma hasitata*	Black-capped Petrel	EN	Yes	Web of Science AND Dias et al. 2019
Spheniscidae (Penguins)	*Eudyptes moseleyi*	Northern Rockhopper Penguin	EN	Yes	Web of Science AND Dias et al. 2019
Sulidae (Gannets, Boobies)	*Sula dactylatra*	Masked Booby	LC	Yes	Web of Science AND Dias et al. 2019
Sulidae (Gannets, Boobies)	*Sula leucogaster*	Brown Booby	LC	Yes	Web of Science AND Dias et al. 2019
Sulidae (Gannets, Boobies)	*Sula sula*	Red-footed Booby	LC	Yes	Web of Science AND Dias et al. 2019
Alcidae (Auks)	*Aethia cristatella*	Crested Auklet	LC	Yes	Dias et al. 2019
Anatidae (Ducks, Geese, Swans)	*Histrionicus histrionicus*	Harlequin Duck	LC	Yes	Dias et al. 2019
Anatidae (Ducks, Geese, Swans)	*Polysticta stelleri*	Steller's Eider	VU	Yes	Dias et al. 2019
Anatidae (Ducks, Geese, Swans)	*Somateria fischeri*	Spectacled Eider	NT	Yes	Dias et al. 2019
Diomedeidae (Albatrosses)	*Phoebastria irrorata*	Waved Albatross	CR	Yes	Dias et al. 2019
Fregatidae (Frigatebirds)	*Fregata andrewsi*	Christmas Island Frigatebird	VU	Yes	Dias et al. 2019
Fregatidae (Frigatebirds)	*Fregata magnificens*	Magnificent Frigatebird	LC	Yes	Dias et al. 2019
Laridae (Gulls, Terns, Skimmers)	*Gygis alba*	Atlantic White Tern	LC	Yes	Dias et al. 2019
Laridae (Gulls, Terns, Skimmers)	*Larus cachinnans*	Caspian Gull	LC	Yes	Dias et al. 2019
Laridae (Gulls, Terns, Skimmers)	*Larus cirrocephalus*	Grey-headed Gull	LC	Yes	Dias et al. 2019
Laridae (Gulls, Terns, Skimmers)	*Larus hemprichii*	Sooty Gull	LC	Yes	Dias et al. 2019
Laridae (Gulls, Terns, Skimmers)	*Larus leucophthalmus*	White-eyed Gull	LC	Yes	Dias et al. 2019
Laridae (Gulls, Terns, Skimmers)	*Larus melanocephalus*	Mediterranean Gull	LC	Yes	Dias et al. 2019
Laridae (Gulls, Terns, Skimmers)	*Larus michahellis*	Yellow-legged Gull	LC	Yes	Dias et al. 2019
Laridae (Gulls, Terns, Skimmers)	*Larus modestus*	Grey Gull	LC	Yes	Dias et al. 2019
Laridae (Gulls, Terns, Skimmers)	*Larus smithsonianus*	Arctic Herring Gull	LC	Yes	Dias et al. 2019
Laridae (Gulls, Terns, Skimmers)	*Rissa brevirostris*	Red-legged Kittiwake	VU	Yes	Dias et al. 2019
Laridae (Gulls, Terns, Skimmers)	*Saundersilarus saundersi*	Saunders's Gull	VU	Yes	Dias et al. 2019

Laridae (Gulls, Terns, Skimmers)	*Sterna repressa*	White-cheeked Tern	LC	Yes	Dias et al. 2019
Laridae (Gulls, Terns, Skimmers)	*Sternula balaenarum*	Damara Tern	LC	Yes	Dias et al. 2019
Laridae (Gulls, Terns, Skimmers)	*Sternula saundersi*	Saunders's Tern	LC	Yes	Dias et al. 2019
Laridae (Gulls, Terns, Skimmers)	*Thalasseus maximus*	Royal Tern	LC	Yes	Dias et al. 2019
Laridae (Gulls, Terns, Skimmers)	*Thalasseus sandvicensis*	Sandwich Tern	LC	Yes	Dias et al. 2019
Phalacrocoracidae (Cormorants)	*Leucocarbo atriceps*	Imperial Shag	LC	Yes	Dias et al. 2019
Phalacrocoracidae (Cormorants)	*Phalacrocorax nigrogularis*	Socotra Cormorant	VU	Yes	Dias et al. 2019
Procellariidae (Petrels, Shearwaters)	*Ardenna creatopus*	Pink-footed Shearwater	VU	Yes	Dias et al. 2019
Procellariidae (Petrels, Shearwaters)	*Bulweria bulwerii*	Bulwer's Petrel	LC	Yes	Dias et al. 2019
Procellariidae (Petrels, Shearwaters)	*Calonectris leucomelas*	Streaked Shearwater	NT	Yes	Dias et al. 2019
Procellariidae (Petrels, Shearwaters)	*Pelecanoides garnotii*	Peruvian Diving-petrel	NT	Yes	Dias et al. 2019
Procellariidae (Petrels, Shearwaters)	*Procellaria westlandica*	Westland Petrel	EN	Yes	Dias et al. 2019
Procellariidae (Petrels, Shearwaters)	*Pseudobulweria rostrata*	Tahiti Petrel	NT	Yes	Dias et al. 2019
Procellariidae (Petrels, Shearwaters)	*Pterodroma alba*	Phoenix Petrel	VU	Yes	Dias et al. 2019
Procellariidae (Petrels, Shearwaters)	*Pterodroma brevipes*	Collared Petrel	VU	Yes	Dias et al. 2019
Procellariidae (Petrels, Shearwaters)	*Pterodroma inexpectata*	Mottled Petrel	NT	Yes	Dias et al. 2019
Procellariidae (Petrels, Shearwaters)	*Puffinus assimilis*	Little Shearwater	LC	Yes	Dias et al. 2019
Procellariidae (Petrels, Shearwaters)	*Puffinus elegans*	Subantarctic Shearwater	LC	Yes	Dias et al. 2019
Procellariidae (Petrels, Shearwaters)	*Puffinus persicus*	Persian Shearwater	LC	Yes	Dias et al. 2019
Procellariidae (Petrels, Shearwaters)	*Puffinus puffinus*	Manx Shearwater	LC	Yes	Dias et al. 2019
Spheniscidae (Penguins)	*Pygoscelis papua*	Gentoo Penguin	LC	Yes	Dias et al. 2019
Spheniscidae (Penguins)	*Spheniscus demersus*	African Penguin	CR	Yes	Dias et al. 2019
Spheniscidae (Penguins)	*Spheniscus humboldti*	Humboldt Penguin	VU	Yes	Dias et al. 2019
Spheniscidae (Penguins)	*Spheniscus magellanicus*	Magellanic Penguin	LC	Yes	Dias et al. 2019
Stercorariidae (Skuas)	*Catharacta chilensis*	Chilean Skua	LC	Yes	Dias et al. 2019
Sulidae (Gannets, Boobies)	*Papasula abbotti*	Abbott's Booby	EN	Yes	Dias et al. 2019
Laridae (Gulls, Terns, Skimmers)	*Larus atlanticus*	Olrog's Gull	NT	Yes	Dias et al 2019 (Likely return)
Alcidae (Auks)	*Synthliboramphus wumizusume*	Japanese Murrelet	VU	Yes	Dias et al PAST
Diomedeidae (Albatrosses)	*Diomedea dabbenena*	Tristan Albatross	CR	Yes	Dias et al PAST

Diomedeidae (Albatrosses)	*Diomedea exulans*	Snowy Albatross	VU	Yes	Dias et al PAST
Diomedeidae (Albatrosses)	*Diomedea sanfordi*	Northern Royal Albatross	EN	Yes	Dias et al PAST
Diomedeidae (Albatrosses)	*Phoebastria albatrus*	Short-tailed Albatross	VU	Yes	Dias et al PAST
Diomedeidae (Albatrosses)	*Phoebastria nigripes*	Black-footed Albatross	NT	Yes	Dias et al PAST
Diomedeidae (Albatrosses)	*Thalassarche chlororhynchos*	Atlantic Yellow-nosed Albatross	EN	Yes	Dias et al PAST
Diomedeidae (Albatrosses)	*Thalassarche eremita*	Chatham Albatross	VU	Yes	Dias et al PAST
Hydrobatidae (Northern Storm-petrels)	*Hydrobates castro*	Band-rumped Storm-petrel	LC	Yes	Dias et al PAST
Laridae (Gulls, Terns, Skimmers)	*Thalasseus elegans*	Elegant Tern	NT	Yes	Dias et al PAST
Oceanitidae (Southern Storm-petrels)	*Nesofregetta fuliginosa*	Polynesian Storm-petrel	EN	Yes	Dias et al PAST
Phalacrocoracidae (Cormorants)	*Phalacrocorax capillatus*	Japanese Cormorant	LC	Yes	Dias et al PAST
Procellariidae (Petrels, Shearwaters)	*Bulweria fallax*	Jouanin's Petrel	NT	Yes	Dias et al PAST
Procellariidae (Petrels, Shearwaters)	*Calonectris edwardsii*	Cape Verde Shearwater	NT	Yes	Dias et al PAST
Procellariidae (Petrels, Shearwaters)	*Procellaria aequinoctialis*	White-chinned Petrel	VU	Yes	Dias et al PAST
Procellariidae (Petrels, Shearwaters)	*Pterodroma axillaris*	Chatham Islands Petrel	VU	Yes	Dias et al PAST
Procellariidae (Petrels, Shearwaters)	*Pterodroma baraui*	Barau's Petrel	EN	Yes	Dias et al PAST
Procellariidae (Petrels, Shearwaters)	*Pterodroma cahow*	Bermuda Petrel	EN	Yes	Dias et al PAST
Procellariidae (Petrels, Shearwaters)	*Pterodroma caribbaea*	Jamaican Petrel	CR	Yes	Dias et al PAST
Procellariidae (Petrels, Shearwaters)	*Pterodroma cervicalis*	White-necked Petrel	VU	Yes	Dias et al PAST
Procellariidae (Petrels, Shearwaters)	*Pterodroma deserta*	Desertas Petrel	VU	Yes	Dias et al PAST
Procellariidae (Petrels, Shearwaters)	*Pterodroma incerta*	Atlantic Petrel	EN	Yes	Dias et al PAST
Procellariidae (Petrels, Shearwaters)	*Pterodroma madeira*	Zino's Petrel	EN	Yes	Dias et al PAST
Procellariidae (Petrels, Shearwaters)	*Pterodroma magentae*	Magenta Petrel	CR	Yes	Dias et al PAST
Procellariidae (Petrels, Shearwaters)	*Pterodroma sandwichensis*	Hawaiian Petrel	EN	Yes	Dias et al PAST
Procellariidae (Petrels, Shearwaters)	*Pterodroma solandri*	Providence Petrel	LC	Yes	Dias et al PAST
Procellariidae (Petrels, Shearwaters)	*Puffinus mauretanicus*	Balearic Shearwater	CR	Yes	Dias et al PAST
Sulidae (Gannets, Boobies)	*Morus capensis*	Cape Gannet	EN	Yes	Dias et al PAST
Alcidae (Auks)	*Aethia psittacula*	Parakeet Auklet	LC	Yes	Evidence not found in this review
Alcidae (Auks)	*Aethia pusilla*	Least Auklet	LC	Yes	Evidence not found in this review
Alcidae (Auks)	*Aethia pygmaea*	Whiskered Auklet	LC	Yes	Evidence not found in this review

Alcidae (Auks)	*Brachyramphus brevirostris*	Kittlitz's Murrelet	NT	Yes	Evidence not found in this review
Alcidae (Auks)	*Brachyramphus marmoratus*	Marbled Murrelet	EN	Yes	Evidence not found in this review
Alcidae (Auks)	*Cepphus carbo*	Spectacled Guillemot	LC	Yes	Evidence not found in this review
Alcidae (Auks)	*Cepphus columba*	Pigeon Guillemot	LC	Yes	Evidence not found in this review
Alcidae (Auks)	*Cerorhinca monocerata*	Rhinoceros Auklet	LC	Yes	Evidence not found in this review
Alcidae (Auks)	*Fratercula cirrhata*	Tufted Puffin	LC	Yes	Evidence not found in this review
Alcidae (Auks)	*Fratercula corniculata*	Horned Puffin	LC	Yes	Evidence not found in this review
Alcidae (Auks)	*Ptychoramphus aleuticus*	Cassin's Auklet	NT	Yes	Evidence not found in this review
Alcidae (Auks)	*Synthliboramphus antiquus*	Ancient Murrelet	LC	Yes	Evidence not found in this review
Alcidae (Auks)	*Synthliboramphus craveri*	Craveri's Murrelet	VU	Yes	Evidence not found in this review
Alcidae (Auks)	*Synthliboramphus hypoleucus*	Guadalupe Murrelet	EN	Yes	Evidence not found in this review
Alcidae (Auks)	*Synthliboramphus scrippsi*	Scripps's Murrelet	VU	Yes	Evidence not found in this review
Anatidae (Ducks, Geese, Swans)	*Melanitta stejnegeri*	Siberian Scoter	LC	Yes	Evidence not found in this review
Anatidae (Ducks, Geese, Swans)	*Mergus merganser*	Goosander	LC	Yes	Evidence not found in this review
Diomedeidae (Albatrosses)	*Diomedea amsterdamensis*	Amsterdam Albatross	EN	Yes	Evidence not found in this review
Diomedeidae (Albatrosses)	*Diomedea antipodensis*	Antipodean Albatross	EN	Yes	Evidence not found in this review
Diomedeidae (Albatrosses)	*Diomedea epomophora*	Southern Royal Albatross	VU	Yes	Evidence not found in this review
Diomedeidae (Albatrosses)	*Phoebastria immutabilis*	Laysan Albatross	NT	Yes	Evidence not found in this review
Diomedeidae (Albatrosses)	*Phoebetria fusca*	Sooty Albatross	EN	Yes	Evidence not found in this review
Diomedeidae (Albatrosses)	*Phoebetria palpebrata*	Light-mantled Albatross	NT	Yes	Evidence not found in this review
Diomedeidae (Albatrosses)	*Thalassarche bulleri*	Buller's Albatross	NT	Yes	Evidence not found in this review
Diomedeidae (Albatrosses)	*Thalassarche carteri*	Indian Yellow-nosed Albatross	EN	Yes	Evidence not found in this review
Diomedeidae (Albatrosses)	*Thalassarche cauta*	Shy Albatross	NT	Yes	Evidence not found in this review
Diomedeidae (Albatrosses)	*Thalassarche chrysostoma*	Grey-headed Albatross	EN	Yes	Evidence not found in this review
Diomedeidae (Albatrosses)	*Thalassarche impavida*	Campbell Albatross	VU	Yes	Evidence not found in this review
Diomedeidae (Albatrosses)	*Thalassarche melanophris*	Black-browed Albatross	LC	Yes	Evidence not found in this review
Diomedeidae (Albatrosses)	*Thalassarche salvini*	Salvin's Albatross	VU	Yes	Evidence not found in this review
Diomedeidae (Albatrosses)	*Thalassarche steadi*	White-capped Albatross	NT	Yes	Evidence not found in this review
Gaviidae (Loons/Divers)	*Gavia arctica*	Arctic Loon	LC	Yes	Evidence not found in this review
Gaviidae (Loons/Divers)	*Gavia immer*	Common Loon	LC	Yes	Evidence not found in this review

Gaviidae (Loons/Divers)	*Gavia stellata*	Red-throated Loon	LC	Yes	Evidence not found in this review
Hydrobatidae (Northern Storm-petrels)	*Hydrobates cheimomnestes*	Ainley's Storm-petrel	VU	Yes	Evidence not found in this review
Hydrobatidae (Northern Storm-petrels)	*Hydrobates furcatus*	Fork-tailed Storm-petrel	LC	Yes	Evidence not found in this review
Hydrobatidae (Northern Storm-petrels)	*Hydrobates hornbyi*	Ringed Storm-petrel	NT	Yes	Evidence not found in this review
Hydrobatidae (Northern Storm-petrels)	*Hydrobates jabejabe*	Cape Verde Storm-petrel	LC	Yes	Evidence not found in this review
Hydrobatidae (Northern Storm-petrels)	*Hydrobates leucorhous*	Leach's Storm-petrel	VU	Yes	Evidence not found in this review
Hydrobatidae (Northern Storm-petrels)	*Hydrobates macrodactylus*	Guadalupe Storm-petrel	CR	Yes	Evidence not found in this review
Hydrobatidae (Northern Storm-petrels)	*Hydrobates markhami*	Markham's Storm-petrel	NT	Yes	Evidence not found in this review
Hydrobatidae (Northern Storm-petrels)	*Hydrobates matsudairae*	Matsudaira's Storm-petrel	VU	Yes	Evidence not found in this review
Hydrobatidae (Northern Storm-petrels)	*Hydrobates melania*	Black Storm-petrel	LC	Yes	Evidence not found in this review
Hydrobatidae (Northern Storm-petrels)	*Hydrobates microsoma*	Least Storm-petrel	LC	Yes	Evidence not found in this review
Hydrobatidae (Northern Storm-petrels)	*Hydrobates monorhis*	Swinhoe's Storm-petrel	NT	Yes	Evidence not found in this review
Hydrobatidae (Northern Storm-petrels)	*Hydrobates pelagicus*	European Storm-petrel	LC	Yes	Evidence not found in this review
Hydrobatidae (Northern Storm-petrels)	*Hydrobates socorroensis*	Townsend's Storm-petrel	EN	Yes	Evidence not found in this review
Hydrobatidae (Northern Storm-petrels)	*Hydrobates tethys*	Wedge-rumped Storm-petrel	LC	Yes	Evidence not found in this review
Hydrobatidae (Northern Storm-petrels)	*Hydrobates tristrami*	Tristram's Storm-petrel	LC	Yes	Evidence not found in this review
Laridae (Gulls, Terns, Skimmers)	*Anous albivittus*	Grey Noddy	LC	Yes	Evidence not found in this review
Laridae (Gulls, Terns, Skimmers)	*Anous tenuirostris*	Lesser Noddy	LC	Yes	Evidence not found in this review
Laridae (Gulls, Terns, Skimmers)	*Chlidonias niger*	Black Tern	LC	Yes	Evidence not found in this review
Laridae (Gulls, Terns, Skimmers)	*Creagrus furcatus*	Swallow-tailed Gull	LC	Yes	Evidence not found in this review
Laridae (Gulls, Terns, Skimmers)	*Gelochelidon macrotarsa*	Australian Gull-billed Tern	LC	Yes	Evidence not found in this review
Laridae (Gulls, Terns, Skimmers)	*Gelochelidon nilotica*	Common Gull-billed Tern	LC	Yes	Evidence not found in this review
Laridae (Gulls, Terns, Skimmers)	*Gygis candida*	Common White Tern	LC	Yes	Evidence not found in this review
Laridae (Gulls, Terns, Skimmers)	*Hydrocoloeus minutus*	Little Gull	LC	Yes	Evidence not found in this review
Laridae (Gulls, Terns, Skimmers)	*Larus atricilla*	Laughing Gull	LC	Yes	Evidence not found in this review
Laridae (Gulls, Terns, Skimmers)	*Larus audouinii*	Audouin's Gull	VU	Yes	Evidence not found in this review
Laridae (Gulls, Terns, Skimmers)	*Larus belcheri*	Belcher's Gull	LC	Yes	Evidence not found in this review
Laridae (Gulls, Terns, Skimmers)	*Larus brunnicephalus*	Brown-headed Gull	LC	Yes	Evidence not found in this review
Laridae (Gulls, Terns, Skimmers)	*Larus californicus*	California Gull	LC	Yes	Evidence not found in this review
Laridae (Gulls, Terns, Skimmers)	*Larus canus*	Mew Gull	LC	Yes	Evidence not found in this review

Laridae (Gulls, Terns, Skimmers)	*Larus crassirostris*	Black-tailed Gull	LC	Yes	Evidence not found in this review
Laridae (Gulls, Terns, Skimmers)	*Larus delawarensis*	Ring-billed Gull	LC	Yes	Evidence not found in this review
Laridae (Gulls, Terns, Skimmers)	*Larus fuscus*	Lesser Black-backed Gull	LC	Yes	Evidence not found in this review
Laridae (Gulls, Terns, Skimmers)	*Larus genei*	Slender-billed Gull	LC	Yes	Evidence not found in this review
Laridae (Gulls, Terns, Skimmers)	*Larus glaucoides*	Iceland Gull	LC	Yes	Evidence not found in this review
Laridae (Gulls, Terns, Skimmers)	*Larus heermanni*	Heermann's Gull	NT	Yes	Evidence not found in this review
Laridae (Gulls, Terns, Skimmers)	*Larus ichthyaetus*	Pallas's Gull	LC	Yes	Evidence not found in this review
Laridae (Gulls, Terns, Skimmers)	*Larus livens*	Yellow-footed Gull	LC	Yes	Evidence not found in this review
Laridae (Gulls, Terns, Skimmers)	*Larus maculipennis*	Brown-hooded Gull	LC	Yes	Evidence not found in this review
Laridae (Gulls, Terns, Skimmers)	*Larus occidentalis*	Western Gull	LC	Yes	Evidence not found in this review
Laridae (Gulls, Terns, Skimmers)	*Larus philadelphia*	Bonaparte's Gull	LC	Yes	Evidence not found in this review
Laridae (Gulls, Terns, Skimmers)	*Larus pipixcan*	Franklin's Gull	LC	Yes	Evidence not found in this review
Laridae (Gulls, Terns, Skimmers)	*Larus schistisagus*	Slaty-backed Gull	LC	Yes	Evidence not found in this review
Laridae (Gulls, Terns, Skimmers)	*Larus scoresbii*	Dolphin Gull	LC	Yes	Evidence not found in this review
Laridae (Gulls, Terns, Skimmers)	*Onychoprion aleuticus*	Aleutian Tern	VU	Yes	Evidence not found in this review
Laridae (Gulls, Terns, Skimmers)	*Onychoprion lunatus*	Grey-backed Tern	LC	Yes	Evidence not found in this review
Laridae (Gulls, Terns, Skimmers)	*Rhodostethia rosea*	Ross's Gull	LC	Yes	Evidence not found in this review
Laridae (Gulls, Terns, Skimmers)	*Sterna forsteri*	Forster's Tern	LC	Yes	Evidence not found in this review
Laridae (Gulls, Terns, Skimmers)	*Sterna hirundinacea*	South American Tern	LC	Yes	Evidence not found in this review
Laridae (Gulls, Terns, Skimmers)	*Sterna striata*	White-fronted Tern	NT	Yes	Evidence not found in this review
Laridae (Gulls, Terns, Skimmers)	*Sterna trudeaui*	Snowy-crowned Tern	LC	Yes	Evidence not found in this review
Laridae (Gulls, Terns, Skimmers)	*Sterna vittata*	Antarctic Tern	LC	Yes	Evidence not found in this review
Laridae (Gulls, Terns, Skimmers)	*Sternula albifrons*	Little Tern	LC	Yes	Evidence not found in this review
Laridae (Gulls, Terns, Skimmers)	*Sternula lorata*	Peruvian Tern	EN	Yes	Evidence not found in this review
Laridae (Gulls, Terns, Skimmers)	*Xema sabini*	Sabine's Gull	LC	Yes	Evidence not found in this review
Oceanitidae (Southern Storm-petrels)	*Fregetta grallaria*	White-bellied Storm-petrel	LC	Yes	Evidence not found in this review
Oceanitidae (Southern Storm-petrels)	*Fregetta lineata*	New Caledonian Storm-petrel	DD	Yes	Evidence not found in this review
Oceanitidae (Southern Storm-petrels)	*Fregetta maoriana*	New Zealand Storm-petrel	CR	Yes	Evidence not found in this review
Oceanitidae (Southern Storm-petrels)	*Fregetta tropica*	Black-bellied Storm-petrel	LC	Yes	Evidence not found in this review
Oceanitidae (Southern Storm-petrels)	*Garrodia nereis*	Grey-backed Storm-petrel	LC	Yes	Evidence not found in this review

Oceanitidae (Southern Storm-petrels)	*Oceanites gracilis*	White-vented Storm-petrel	DD	Yes	Evidence not found in this review
Oceanitidae (Southern Storm-petrels)	*Oceanites oceanicus*	Wilson's Storm-petrel	LC	Yes	Evidence not found in this review
Oceanitidae (Southern Storm-petrels)	*Pelagodroma marina*	White-faced Storm-petrel	LC	Yes	Evidence not found in this review
Pelecanidae (Pelicans)	*Pelecanus occidentalis*	Brown Pelican	LC	Yes	Evidence not found in this review
Phaethontidae (Tropicbirds)	*Phaethon aethereus*	Red-billed Tropicbird	LC	Yes	Evidence not found in this review
Phaethontidae (Tropicbirds)	*Phaethon rubricauda*	Red-tailed Tropicbird	LC	Yes	Evidence not found in this review
Phalacrocoracidae (Cormorants)	*Gulosus aristotelis*	European Shag	LC	Yes	Evidence not found in this review
Phalacrocoracidae (Cormorants)	*Leucocarbo bougainvilliorum*	Guanay Cormorant	NT	Yes	Evidence not found in this review
Phalacrocoracidae (Cormorants)	*Leucocarbo magellanicus*	Rock Shag	LC	Yes	Evidence not found in this review
Phalacrocoracidae (Cormorants)	*Microcarbo coronatus*	Crowned Cormorant	LC	Yes	Evidence not found in this review
Phalacrocoracidae (Cormorants)	*Phalacrocorax capensis*	Cape Cormorant	EN	Yes	Evidence not found in this review
Phalacrocoracidae (Cormorants)	*Phalacrocorax neglectus*	Bank Cormorant	EN	Yes	Evidence not found in this review
Phalacrocoracidae (Cormorants)	*Urile pelagicus*	Pelagic Cormorant	LC	Yes	Evidence not found in this review
Phalacrocoracidae (Cormorants)	*Urile penicillatus*	Brandt's Cormorant	LC	Yes	Evidence not found in this review
Podicipedidae (Grebes)	*Podiceps auritus*	Horned Grebe	VU	Yes	Evidence not found in this review
Podicipedidae (Grebes)	*Podiceps cristatus*	Great Crested Grebe	LC	Yes	Evidence not found in this review
Podicipedidae (Grebes)	*Podiceps grisegena*	Red-necked Grebe	LC	Yes	Evidence not found in this review
Podicipedidae (Grebes)	*Podiceps nigricollis*	Black-necked Grebe	LC	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Aphrodroma brevirostris*	Kerguelen Petrel	LC	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Ardenna bulleri*	Buller's Shearwater	VU	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Ardenna carneipes*	Flesh-footed Shearwater	NT	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Ardenna gravis*	Great Shearwater	LC	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Calonectris diomedea*	Scopoli's Shearwater	LC	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Daption capense*	Cape Petrel	LC	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Fulmarus glacialoides*	Southern Fulmar	LC	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Halobaena caerulea*	Blue Petrel	LC	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Macronectes giganteus*	Southern Giant Petrel	LC	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Macronectes halli*	Northern Giant Petrel	LC	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Pachyptila belcheri*	Slender-billed Prion	LC	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Pachyptila desolata*	Antarctic Prion	LC	Yes	Evidence not found in this review

Procellariidae (Petrels, Shearwaters)	*Pachyptila macgillivrayi*	MacGillivray's Prion	CR	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Pachyptila salvini*	Salvin's Prion	LC	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Pachyptila turtur*	Fairy Prion	LC	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Pachyptila vittata*	Broad-billed Prion	LC	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Pagodroma nivea*	Snow Petrel	LC	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Pelecanoides urinatrix*	Common Diving-petrel	LC	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Pelecanoides whenuahouensis*	Whenua Hou Diving-petrel	CR	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Procellaria cinerea*	Grey Petrel	NT	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Procellaria conspicillata*	Spectacled Petrel	VU	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Procellaria parkinsoni*	Black Petrel	VU	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Pseudobulweria becki*	Beck's Petrel	CR	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Pseudobulweria macgillivrayi*	Fiji Petrel	CR	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Pterodroma arminjoniana*	Trindade Petrel	VU	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Pterodroma atrata*	Henderson Petrel	EN	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Pterodroma cookii*	Cook's Petrel	VU	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Pterodroma defilippiana*	Masatierra Petrel	VU	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Pterodroma externa*	Juan Fernandez Petrel	VU	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Pterodroma heraldica*	Herald Petrel	LC	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Pterodroma hypoleuca*	Bonin Petrel	LC	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Pterodroma lessonii*	White-headed Petrel	LC	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Pterodroma leucoptera*	White-winged Petrel	VU	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Pterodroma longirostris*	Stejneger's Petrel	VU	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Pterodroma macroptera*	Great-winged Petrel	LC	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Pterodroma mollis*	Soft-plumaged Petrel	LC	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Pterodroma neglecta*	Kermadec Petrel	LC	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Pterodroma nigripennis*	Black-winged Petrel	LC	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Pterodroma phaeopygia*	Galapagos Petrel	CR	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Pterodroma pycrofti*	Pycroft's Petrel	VU	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Pterodroma ultima*	Murphy's Petrel	LC	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Puffinus auricularis*	Townsend's Shearwater	CR	Yes	Evidence not found in this review

Procellariidae (Petrels, Shearwaters)	*Puffinus bannermani*	Bannerman's Shearwater	EN	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Puffinus bryani*	Bryan's Shearwater	CR	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Puffinus gavia*	Fluttering Shearwater	LC	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Puffinus heinrothi*	Heinroth's Shearwater	VU	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Puffinus huttoni*	Hutton's Shearwater	EN	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Puffinus lherminieri*	Audubon's Shearwater	LC	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Puffinus myrtae*	Rapa Shearwater	CR	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Puffinus nativitatis*	Christmas Shearwater	LC	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Puffinus newelli*	Newell's Shearwater	CR	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Puffinus opisthomelas*	Black-vented Shearwater	NT	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Puffinus subalaris*	Galapagos Shearwater	LC	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Puffinus yelkouan*	Yelkouan Shearwater	VU	Yes	Evidence not found in this review
Procellariidae (Petrels, Shearwaters)	*Thalassoica antarctica*	Antarctic Petrel	LC	Yes	Evidence not found in this review
Scolopacidae (Sandpipers, Snipes, Phalaropes)	*Phalaropus fulicarius*	Red Phalarope	LC	Yes	Evidence not found in this review
Scolopacidae (Sandpipers, Snipes, Phalaropes)	*Phalaropus lobatus*	Red-necked Phalarope	LC	Yes	Evidence not found in this review
Spheniscidae (Penguins)	*Aptenodytes forsteri*	Emperor Penguin	NT	Yes	Evidence not found in this review
Spheniscidae (Penguins)	*Aptenodytes patagonicus*	King Penguin	LC	Yes	Evidence not found in this review
Spheniscidae (Penguins)	*Eudyptes chrysocome*	Southern Rockhopper Penguin	VU	Yes	Evidence not found in this review
Spheniscidae (Penguins)	*Eudyptes chrysolophus*	Macaroni Penguin	VU	Yes	Evidence not found in this review
Spheniscidae (Penguins)	*Pygoscelis adeliae*	Adelie Penguin	LC	Yes	Evidence not found in this review
Spheniscidae (Penguins)	*Pygoscelis antarcticus*	Chinstrap Penguin	LC	Yes	Evidence not found in this review
Stercorariidae (Skuas)	*Catharacta antarctica*	Brown Skua	LC	Yes	Evidence not found in this review
Stercorariidae (Skuas)	*Catharacta maccormicki*	South Polar Skua	LC	Yes	Evidence not found in this review
Stercorariidae (Skuas)	*Catharacta skua*	Great Skua	LC	Yes	Evidence not found in this review
Stercorariidae (Skuas)	*Stercorarius longicaudus*	Long-tailed Jaeger	LC	Yes	Evidence not found in this review
Stercorariidae (Skuas)	*Stercorarius parasiticus*	Arctic Jaeger	LC	Yes	Evidence not found in this review
Stercorariidae (Skuas)	*Stercorarius pomarinus*	Pomarine Jaeger	LC	Yes	Evidence not found in this review
Sulidae (Gannets, Boobies)	*Morus bassanus*	Northern Gannet	LC	Yes	Evidence not found in this review

Sulidae (Gannets, Boobies)	*Morus serrator*	Australasian Gannet	LC	Yes	Evidence not found in this review
Sulidae (Gannets, Boobies)	*Sula granti*	Nazca Booby	LC	Yes	Evidence not found in this review
Sulidae (Gannets, Boobies)	*Sula nebouxii*	Blue-footed Booby	LC	Yes	Evidence not found in this review
Sulidae (Gannets, Boobies)	*Sula variegata*	Peruvian Booby	LC	Yes	Evidence not found in this review
Anatidae (Ducks, Geese, Swans)	*Tachyeres brachypterus*	Falkland Steamerduck	LC	No	Not considered (non-migratory)
Anatidae (Ducks, Geese, Swans)	*Tachyeres leucocephalus*	White-headed Steamerduck	VU	No	Not considered (non-migratory)
Anatidae (Ducks, Geese, Swans)	*Tachyeres patachonicus*	Flying Steamerduck	LC	No	Not considered (non-migratory)
Anatidae (Ducks, Geese, Swans)	*Tachyeres pteneres*	Magellanic Steamerduck	LC	No	Not considered (non-migratory)
Fregatidae (Frigatebirds)	*Fregata aquila*	Ascension Frigatebird	VU	No	Not considered (non-migratory)
Hydrobatidae (Northern Storm-petrels)	*Hydrobates homochroa*	Ashy Storm-petrel	EN	No	Not considered (non-migratory)
Hydrobatidae (Northern Storm-petrels)	*Hydrobates monteiroi*	Monteiro's Storm-petrel	VU	No	Not considered (non-migratory)
Laridae (Gulls, Terns, Skimmers)	*Anous ceruleus*	Blue Noddy	LC	No	Not considered (non-migratory)
Laridae (Gulls, Terns, Skimmers)	*Chlidonias albostriatus*	Black-fronted Tern	EN	No	Not considered (non-migratory)
Laridae (Gulls, Terns, Skimmers)	*Gygis microrhyncha*	Little White Tern	LC	No	Not considered (non-migratory)
Laridae (Gulls, Terns, Skimmers)	*Larosterna inca*	Inca Tern	NT	No	Not considered (non-migratory)
Laridae (Gulls, Terns, Skimmers)	*Larus dominicanus*	Kelp Gull	LC	No	Not considered (non-migratory)
Laridae (Gulls, Terns, Skimmers)	*Larus fuliginosus*	Lava Gull	VU	No	Not considered (non-migratory)
Laridae (Gulls, Terns, Skimmers)	*Larus hartlaubii*	Hartlaub's Gull	LC	No	Not considered (non-migratory)
Laridae (Gulls, Terns, Skimmers)	*Larus novaehollandiae*	Silver Gull	LC	No	Not considered (non-migratory)
Laridae (Gulls, Terns, Skimmers)	*Larus pacificus*	Pacific Gull	LC	No	Not considered (non-migratory)
Laridae (Gulls, Terns, Skimmers)	*Sterna sumatrana*	Black-naped Tern	LC	No	Not considered (non-migratory)
Laridae (Gulls, Terns, Skimmers)	*Sterna virgata*	Kerguelen Tern	NT	No	Not considered (non-migratory)
Laridae (Gulls, Terns, Skimmers)	*Sternula nereis*	Fairy Tern	VU	No	Not considered (non-migratory)
Oceanitidae (Southern Storm-petrels)	*Oceanites pincoyae*	Pincoya Storm-petrel	DD	No	Not considered (non-migratory)
Pelecanidae (Pelicans)	*Pelecanus thagus*	Peruvian Pelican	NT	No	Not considered (non-migratory)
Phalacrocoracidae (Cormorants)	*Leucocarbo campbelli*	Campbell Island Shag	VU	No	Not considered (non-migratory)
Phalacrocoracidae (Cormorants)	*Leucocarbo carunculatus*	Rough-faced Shag	VU	No	Not considered (non-migratory)
Phalacrocoracidae (Cormorants)	*Leucocarbo chalconotus*	Stewart Island Shag	VU	No	Not considered (non-migratory)
Phalacrocoracidae (Cormorants)	*Leucocarbo colensoi*	Auckland Islands Shag	VU	No	Not considered (non-migratory)
Phalacrocoracidae (Cormorants)	*Leucocarbo onslowi*	Chatham Islands Shag	CR	No	Not considered (non-migratory)

Phalacrocoracidae (Cormorants)	*Leucocarbo ranfurlyi*	Bounty Islands Shag	VU	No	Not considered (non-migratory)
Phalacrocoracidae (Cormorants)	*Leucocarbo verrucosus*	Kerguelen Islands Shag	LC	No	Not considered (non-migratory)
Phalacrocoracidae (Cormorants)	*Microcarbo melanoleucos*	Little Pied Cormorant	LC	No	Not considered (non-migratory)
Phalacrocoracidae (Cormorants)	*Nannopterum harrisi*	Flightless Cormorant	VU	No	Not considered (non-migratory)
Phalacrocoracidae (Cormorants)	*Phalacrocorax featherstoni*	Pitt Island Shag	EN	No	Not considered (non-migratory)
Phalacrocoracidae (Cormorants)	*Phalacrocorax fuscescens*	Black-faced Cormorant	LC	No	Not considered (non-migratory)
Phalacrocoracidae (Cormorants)	*Phalacrocorax punctatus*	Spotted Shag	LC	No	Not considered (non-migratory)
Phalacrocoracidae (Cormorants)	*Phalacrocorax varius*	Great Pied Cormorant	LC	No	Not considered (non-migratory)
Phalacrocoracidae (Cormorants)	*Poikilocarbo gaimardi*	Red-legged Cormorant	NT	No	Not considered (non-migratory)
Phalacrocoracidae (Cormorants)	*Urile urile*	Red-faced Cormorant	LC	No	Not considered (non-migratory)
Procellariidae (Petrels, Shearwaters)	*Pachyptila crassirostris*	Fulmar Prion	LC	No	Not considered (non-migratory)
Procellariidae (Petrels, Shearwaters)	*Pelecanoides georgicus*	South Georgia Diving-petrel	LC	No	Not considered (non-migratory)
Procellariidae (Petrels, Shearwaters)	*Pelecanoides magellani*	Magellanic Diving-petrel	LC	No	Not considered (non-migratory)
Procellariidae (Petrels, Shearwaters)	*Pseudobulweria aterrima*	Mascarene Petrel	CR	No	Not considered (non-migratory)
Spheniscidae (Penguins)	*Eudyptes pachyrhynchus*	Fiordland Penguin	NT	No	Not considered (non-migratory)
Spheniscidae (Penguins)	*Eudyptes robustus*	Snares Penguin	VU	No	Not considered (non-migratory)
Spheniscidae (Penguins)	*Eudyptes schlegeli*	Royal Penguin	LC	No	Not considered (non-migratory)
Spheniscidae (Penguins)	*Eudyptes sclateri*	Erect-crested Penguin	EN	No	Not considered (non-migratory)
Spheniscidae (Penguins)	*Eudyptula minor*	Little Penguin	LC	No	Not considered (non-migratory)
Spheniscidae (Penguins)	*Megadyptes antipodes*	Yellow-eyed Penguin	EN	No	Not considered (non-migratory)
Spheniscidae (Penguins)	*Spheniscus mendiculus*	Galapagos Penguin	EN	No	Not considered (non-migratory)

Supplementary data 2: Seabird species subject to take and CMS Appendices listing

The 105 species with records of take for delivery for human consumption / use. Eight (including sub-population) are listed in CMS Appendix I (migratory species that have been assessed as being in danger of extinction throughout all or a significant portion of their range), 23 are listed in CMS Appendix II (migratory species that have an unfavourable conservation status and that require international agreements for their conservation and management), 2 species are listed on both Appendix I and II, and 15 species were noted as likely meeting the criteria for listing in the Appendices of the Convention (Res.14.20). Also shown are the number of countries/territories and country names (where noted) where unique records for species take were identified. The Common Eider (*Somateria mollissima*) has the highest number of country/territory records (n = 9).

Family	Species	Common name	Red List (2024)	CMS Appendices	Other CMS Agreement	n countries	Countries/territories
Alcidae (Auks)	*Aethia cristatella*	Crested Auklet	LC			1	USA
Alcidae (Auks)	*Alca torda*	Razorbill	LC		AEWA	1	Canada
Alcidae (Auks)	*Alle alle*	Little Auk	LC		AEWA	1	Greenland (to Denmark)
Alcidae (Auks)	*Brachyramphus perdix*	Long-billed Murrelet	NT	Res 14.20		2	Canada, USA
Alcidae (Auks)	*Cepphus grylle*	Black Guillemot	LC		AEWA	1	Canada
Alcidae (Auks)	*Fratercula arctica*	Atlantic Puffin	VU	Res 14.20	AEWA	3	Canada, Faroe Islands (to Denmark), Iceland
Alcidae (Auks)	*Uria aalge*	Common Murre	LC		AEWA	2	Canada, Greenland (to Denmark)
Alcidae (Auks)	*Uria lomvia*	Thick-billed Murre	LC		AEWA	2	Canada, Greenland (to Denmark)
Anatidae (Ducks, Geese, Swans)	*Aythya marila*	Greater Scaup	LC	Appendix II	AEWA	1	USA
Anatidae (Ducks, Geese, Swans)	*Bucephala clangula*	Common Goldeneye	LC	Appendix II	AEWA	5	Denmark, Finland, Norway, Species range, USA
Anatidae (Ducks, Geese, Swans)	*Bucephala islandica*	Barrow's Goldeneye	LC	Appendix II		2	Canada, USA
Anatidae (Ducks, Geese, Swans)	*Clangula hyemalis*	Long-tailed Duck	VU	Appendix II	AEWA	2	Canada, USA
Anatidae (Ducks, Geese, Swans)	*Histrionicus histrionicus*	Harlequin Duck	LC	Appendix II		1	USA
Anatidae (Ducks, Geese, Swans)	*Melanitta americana*	Black Scoter	NT	Appendix II		2	Canada, USA
Anatidae (Ducks, Geese, Swans)	*Melanitta deglandi*	White-winged Scoter	LC	Appendix II		2	Canada, USA
Anatidae (Ducks, Geese, Swans)	*Melanitta fusca*	Velvet Scoter	VU	Appendix II	AEWA	1	Sweden
Anatidae (Ducks, Geese, Swans)	*Melanitta nigra*	Common Scoter	LC	Appendix II	AEWA	1	Norway
Anatidae (Ducks, Geese, Swans)	*Melanitta perspicillata*	Surf Scoter	LC	Appendix II		2	Canada, USA
Anatidae (Ducks, Geese, Swans)	*Mergus serrator*	Red-breasted Merganser	LC	Appendix II	AEWA	2	Norway, Sweden
Anatidae (Ducks, Geese, Swans)	*Polysticta stelleri*	Steller's Eider	VU	Appendix I&II	AEWA	2	Russia, USA

Anatidae (Ducks, Geese, Swans)	*Somateria fischeri*	Spectacled Eider	NT	Appendix II		2	Russia, USA
Anatidae (Ducks, Geese, Swans)	*Somateria mollissima*	Common Eider	NT	Appendix II	AEWA	9	Canada, Denmark, Finland, Greenland (to Denmark), Netherlands, Norway, Species range, Sweden, USA
Anatidae (Ducks, Geese, Swans)	*Somateria spectabilis*	King Eider	LC	Appendix II	AEWA	1	USA
Diomedeidae (Albatrosses)	*Phoebastria irrorata*	Waved Albatross	CR	Appendix II	ACAP	1	Ecuador
Fregatidae (Frigatebirds)	*Fregata andrewsi*	Christmas Island Frigatebird	VU	Appendix I		2	Indonesia, Malaysia
Fregatidae (Frigatebirds)	*Fregata ariel*	Lesser Frigatebird	LC		AEWA	1	New Caledonia (to France)
Fregatidae (Frigatebirds)	*Fregata magnificens*	Magnificent Frigatebird	LC			1	Species range
Fregatidae (Frigatebirds)	*Fregata minor*	Great Frigatebird	LC		AEWA	1	New Caledonia (to France)
Gaviidae (Loons/Divers)	*Gavia adamsii*	Yellow-billed Loon	NT		AEWA	1	USA
Gaviidae (Loons/Divers)	*Gavia pacifica*	Pacific Loon	LC			1	USA
Laridae (Gulls, Terns, Skimmers)	*Anous minutus*	Black Noddy	LC			2	New Caledonia (to France), São Tomé e Príncipe
Laridae (Gulls, Terns, Skimmers)	*Anous stolidus*	Brown Noddy	LC		AEWA	3	India, New Caledonia (to France), São Tomé e Príncipe
Laridae (Gulls, Terns, Skimmers)	*Gygis alba*	Atlantic White Tern	LC			1	Species range
Laridae (Gulls, Terns, Skimmers)	*Hydroprogne caspia*	Caspian Tern	LC		AEWA	1	USA
Laridae (Gulls, Terns, Skimmers)	*Larus argentatus*	European Herring Gull	LC		AEWA	1	USA
Laridae (Gulls, Terns, Skimmers)	*Larus atlanticus*	Olrog's Gull	NT	Appendix I		1	Argentina
Laridae (Gulls, Terns, Skimmers)	*Larus cachinnans*	Caspian Gull	LC		AEWA	2	Species range, Ukraine
Laridae (Gulls, Terns, Skimmers)	*Larus cirrocephalus*	Grey-headed Gull	LC		AEWA	1	Species range
Laridae (Gulls, Terns, Skimmers)	*Larus glaucescens*	Glaucous-winged Gull	LC			2	Canada, USA
Laridae (Gulls, Terns, Skimmers)	*Larus hemprichii*	Sooty Gull	LC	Appendix II	AEWA	2	Pakistan, Seychelles
Laridae (Gulls, Terns, Skimmers)	*Larus hyperboreus*	Glaucous Gull	LC		AEWA	7	Canada, Greenland (to Denmark), Iceland, Norway, Russia, Species range, USA
Laridae (Gulls, Terns, Skimmers)	*Larus leucophthalmus*	White-eyed Gull	LC	Appendix I&II	AEWA	2	Egypt, Saudi Arabia
Laridae (Gulls, Terns, Skimmers)	*Larus marinus*	Great Black-backed Gull	LC		AEWA	2	Norway, USA
Laridae (Gulls, Terns, Skimmers)	*Larus melanocephalus*	Mediterranean Gull	LC	Appendix II	AEWA	1	Species range
Laridae (Gulls, Terns, Skimmers)	*Larus michahellis*	Yellow-legged Gull	LC		AEWA	1	Species range
Laridae (Gulls, Terns, Skimmers)	*Larus modestus*	Grey Gull	LC			1	Chile
Laridae (Gulls, Terns, Skimmers)	*Larus ridibundus*	Black-headed Gull	LC		AEWA	1	Norway
Laridae (Gulls, Terns, Skimmers)	*Larus smithsonianus*	Arctic Herring Gull	LC			1	Canada

Laridae (Gulls, Terns, Skimmers)	*Onychoprion anaethetus*	Bridled Tern	LC		AEWA	1	Malaysia
Laridae (Gulls, Terns, Skimmers)	*Onychoprion fuscatus*	Sooty Tern	LC		AEWA	4	India, New Caledonia (to France), Seychelles, São Tomé e Príncipe
Laridae (Gulls, Terns, Skimmers)	*Pagophila eburnea*	Ivory Gull	NT	Res 14.20		1	Canada
Laridae (Gulls, Terns, Skimmers)	*Rissa brevirostris*	Red-legged Kittiwake	VU	Res 14.20		1	USA
Laridae (Gulls, Terns, Skimmers)	*Rissa tridactyla*	Black-legged Kittiwake	VU	Res 14.20	AEWA	2	Canada, Greenland (to Denmark)
Laridae (Gulls, Terns, Skimmers)	*Saundersilarus saundersi*	Saunders's Gull	VU	Appendix I		1	China
Laridae (Gulls, Terns, Skimmers)	*Sterna dougallii*	Roseate Tern	LC		AEWA	1	Malaysia
Laridae (Gulls, Terns, Skimmers)	*Sterna hirundo*	Common Tern	LC		AEWA	2	Russia, USA
Laridae (Gulls, Terns, Skimmers)	*Sterna paradisaea*	Arctic Tern	LC		AEWA	2	Canada, Russia
Laridae (Gulls, Terns, Skimmers)	*Sterna repressa*	White-cheeked Tern	LC	Appendix II	AEWA	1	Iran, Islamic Republic of
Laridae (Gulls, Terns, Skimmers)	*Sternula antillarum*	Least Tern	LC			6	Brazil, Cuba, Guadeloupe (to France), Guyana, Haiti, Trinidad and Tobago
Laridae (Gulls, Terns, Skimmers)	*Sternula balaenarum*	Damara Tern	LC	Appendix II	AEWA	1	Angola
Laridae (Gulls, Terns, Skimmers)	*Sternula saundersi*	Saunders's Tern	LC	Appendix II	AEWA	1	Species range
Laridae (Gulls, Terns, Skimmers)	*Thalasseus bengalensis*	Lesser Crested Tern	LC		AEWA	1	Malaysia
Laridae (Gulls, Terns, Skimmers)	*Thalasseus bergii*	Greater Crested Tern	LC		AEWA	2	India, Malaysia
Laridae (Gulls, Terns, Skimmers)	*Thalasseus bernsteini*	Chinese Crested Tern	CR	Appendix I		1	China
Laridae (Gulls, Terns, Skimmers)	*Thalasseus maximus*	Royal Tern	LC		AEWA	1	Species range
Laridae (Gulls, Terns, Skimmers)	*Thalasseus sandvicensis*	Sandwich Tern	LC		AEWA	1	Species range
Pelecanidae (Pelicans)	*Pelecanus onocrotalus*	Great White Pelican	LC	Appendix I * Palearctic sub-population	AEWA	8	Bulgaria, Greece, Iran, Islamic Republic of, Israel, Kenya, Namibia, South Africa, Turkey
Phaethontidae (Tropicbirds)	*Phaethon lepturus*	White-tailed Tropicbird	LC		AEWA	1	São Tomé e Príncipe
Phalacrocoracidae (Cormorants)	*Leucocarbo atriceps*	Imperial Shag	LC			1	Chile
Phalacrocoracidae (Cormorants)	*Nannopterum auritum*	Double-crested Cormorant	LC			1	Species range
Phalacrocoracidae (Cormorants)	*Nannopterum brasilianum*	Neotropical Cormorant	LC			1	Brazil
Phalacrocoracidae (Cormorants)	*Phalacrocorax carbo*	Great Cormorant	LC		AEWA	4	Austria, Iran, Islamic Republic of, Lithuania, Poland
Phalacrocoracidae (Cormorants)	*Phalacrocorax nigrogularis*	Socotra Cormorant	VU	Appendix II	AEWA	1	United Arab Emirates
Procellariidae (Petrels, Shearwaters)	*Ardenna creatopus*	Pink-footed Shearwater	VU	Appendix I	ACAP	1	Chile

Procellariidae (Petrels, Shearwaters)	*Ardenna grisea*	Sooty Shearwater	NT	Res 14.20		2	Australia, New Zealand
Procellariidae (Petrels, Shearwaters)	*Ardenna pacifica*	Wedge-tailed Shearwater	LC			1	New Caledonia (to France)
Procellariidae (Petrels, Shearwaters)	*Ardenna tenuirostris*	Short-tailed Shearwater	LC			1	Australia
Procellariidae (Petrels, Shearwaters)	*Bulweria bulwerii*	Bulwer's Petrel	LC			1	Spain
Procellariidae (Petrels, Shearwaters)	*Calonectris borealis*	Cory's Shearwater	LC			1	Spain
Procellariidae (Petrels, Shearwaters)	*Calonectris leucomelas*	Streaked Shearwater	NT	Res 14.20		1	Species range
Procellariidae (Petrels, Shearwaters)	*Fulmarus glacialis*	Northern Fulmar	LC			3	Canada, Faroe Islands (to Denmark), Greenland (to Denmark)
Procellariidae (Petrels, Shearwaters)	*Pelecanoides garnotii*	Peruvian Diving-petrel	NT	Appendix I		1	Species range
Procellariidae (Petrels, Shearwaters)	*Procellaria westlandica*	Westland Petrel	EN	Appendix II	ACAP	1	New Zealand
Procellariidae (Petrels, Shearwaters)	*Pseudobulweria rostrata*	Tahiti Petrel	NT	Res 14.20		1	Species range
Procellariidae (Petrels, Shearwaters)	*Pterodroma alba*	Phoenix Petrel	VU	Res 14.20		1	Kiribati
Procellariidae (Petrels, Shearwaters)	*Pterodroma brevipes*	Collared Petrel	VU	Res 14.20		2	Fiji, Vanuatu
Procellariidae (Petrels, Shearwaters)	*Pterodroma feae*	Cape Verde Petrel	NT	Res 14.20		1	Cape Verde
Procellariidae (Petrels, Shearwaters)	*Pterodroma gouldi*	Grey-faced Petrel	LC			1	New Zealand
Procellariidae (Petrels, Shearwaters)	*Pterodroma hasitata*	Black-capped Petrel	EN	Res 14.20		2	Dominican Republic, Haiti
Procellariidae (Petrels, Shearwaters)	*Pterodroma inexpectata*	Mottled Petrel	NT	Res 14.20		1	New Zealand
Procellariidae (Petrels, Shearwaters)	*Puffinus assimilis*	Little Shearwater	LC			1	Species range
Procellariidae (Petrels, Shearwaters)	*Puffinus bailloni*	Tropical Shearwater	LC			1	Wallis and Futuna Islands (to France)
Procellariidae (Petrels, Shearwaters)	*Puffinus elegans*	Subantarctic Shearwater	LC			1	Species range
Procellariidae (Petrels, Shearwaters)	*Puffinus persicus*	Persian Shearwater	LC			1	Species range
Procellariidae (Petrels, Shearwaters)	*Puffinus puffinus*	Manx Shearwater	LC			2	Faroe Islands (to Denmark), Portugal
Spheniscidae (Penguins)	*Eudyptes moseleyi*	Northern Rockhopper Penguin	EN	Res 14.20		1	St Helena (to UK)
Spheniscidae (Penguins)	*Pygoscelis papua*	Gentoo Penguin	LC			1	Falkland Islands (Malvinas)
Spheniscidae (Penguins)	*Spheniscus demersus*	African Penguin	CR	Appendix II	AEWA	1	Species range
Spheniscidae (Penguins)	*Spheniscus humboldti*	Humboldt Penguin	VU	Appendix I		1	Chile
Spheniscidae (Penguins)	*Spheniscus magellanicus*	Magellanic Penguin	LC			2	Chile, Falkland Islands (Malvinas)
Stercorariidae (Skuas)	*Catharacta chilensis*	Chilean Skua	LC			1	Chile
Sulidae (Gannets, Boobies)	*Papasula abbotti*	Abbott's Booby	EN	Res 14.20		1	Species range
Sulidae (Gannets, Boobies)	*Sula dactylatra*	Masked Booby	LC		AEWA	1	New Caledonia (to France)
Sulidae (Gannets, Boobies)	*Sula leucogaster*	Brown Booby	LC			2	New Caledonia (to France), São Tomé e Príncipe

ulidae (Gannets, Boobies)	*Sula sula*	Red-footed Booby	LC	1	New Caledonia (to France)

Supplementary data 3: Number of species per country subject to take but for which health risks were not reported

The table documents the number of species subject to take per country/territory (n = 51 countries) but for which health risks were not reported. NR = "Not reported". Recommendation: understand whether human health risks are associated with take of these species in respective countries.

Human health impacted	Country/territory	n species	Demographic	Scientific name	Common name	Country CMS status
NR	USA	16	IPLC, Hunt (other), NR	Aethia cristatella, Brachyramphus perdix, Bucephala clangula, Bucephala islandica, Gavia adamsii, Gavia pacifica, Histrionicus histrionicus, Hydroprogne caspia, Larus glaucescens, Melanitta americana, Melanitta deglandi, Melanitta perspicillata, Polysticta stelleri, Rissa brevirostris, Somateria fischeri, Somateria spectabilis	Crested Auklet, Long-billed Murrelet, Common Goldeneye, Barrow's Goldeneye, Yellow-billed Loon, Pacific Loon, Harlequin Duck, Caspian Tern, Glaucous-winged Gull, Black Scoter, White-winged Scoter, Surf Scoter, Steller's Eider, Red-legged Kittiwake, Spectacled Eider, King Eider	Non-Party
NR	New Caledonia (to France)	9	Poacher	Anous minutus, Anous stolidus, Ardenna pacifica, Fregata ariel, Fregata minor, Onychoprion fuscatus, Sula dactylatra, Sula leucogaster, Sula sula	Black Noddy, Brown Noddy, Wedge-tailed Shearwater, Lesser Frigatebird, Great Frigatebird, Sooty Tern, Masked Booby, Brown Booby, Red-footed Booby	Party

NR	Canada	7	Hunt (other), IPLC	Brachyramphus perdix, Bucephala islandica, Fratercula arctica, Larus smithsonianus, Melanitta americana, Melanitta deglandi, Melanitta perspicillata	Long-billed Murrelet, Barrow's Goldeneye, Atlantic Puffin, Arctic Herring Gull, Black Scoter, White-winged Scoter, Surf Scoter	Non-Party
NR	Chile	6	NR	Ardenna creatopus, Catharacta chilensis, Larus modestus, Leucocarbo atriceps, Spheniscus humboldti, Spheniscus magellanicus	Pink-footed Shearwater, Chilean Skua, Grey Gull, Imperial Shag, Humboldt Penguin, Magellanic Penguin	Party
NR	Malaysia	5	Fisherman	Fregata andrewsi, Onychoprion anaethetus, Sterna dougallii, Thalasseus bengalensis, Thalasseus bergii	Christmas Island Frigatebird, Bridled Tern, Roseate Tern, Lesser Crested Tern, Greater Crested Tern	Non-Party
NR	São Tomé e Príncipe	5	NR	Anous minutus, Anous stolidus, Onychoprion fuscatus, Phaethon lepturus, Sula leucogaster	Black Noddy, Brown Noddy, Sooty Tern, White-tailed Tropicbird, Brown Booby	Party
NR	Norway	4	Hunt (other)	Bucephala clangula, Larus ridibundus, Melanitta nigra, Mergus serrator	Common Goldeneye, Black-headed Gull, Common Scoter, Red-breasted Merganser	Party
NR	India	3	Fisherman	Anous stolidus, Onychoprion fuscatus, Thalasseus bergii	Brown Noddy, Sooty Tern, Greater Crested Tern	Party

NR	New Zealand	3	IPLC, NR	Ardenna grisea, Procellaria westlandica, Pterodroma inexpectata	Sooty Shearwater, Westland Petrel, Mottled Petrel	Party
NR	Brazil	2	NR, Hunt (other)	Nannopterum brasilianum, Sternula antillarum	Neotropical Cormorant, Least Tern	Party
NR	China	2	Seasonal workers, Poacher	Saundersilarus saundersi, Thalasseus bernsteini	Saunders's Gull, Chinese Crested Tern	Non-Party
NR	Falkland Islands (Malvinas)	2	IPLC, NR	Pygoscelis papua, Spheniscus magellanicus	Gentoo Penguin, Magellanic Penguin	Party
NR	Faroe Islands (to Denmark)	2	Hunt (other), NR	Fratercula arctica, Puffinus puffinus	Atlantic Puffin, Manx Shearwater	Party
NR	Haiti	2	NR, Hunt (other)	Pterodroma hasitata, Sternula antillarum	Black-capped Petrel, Least Tern	Non-Party
NR	Iran, Islamic Republic of	2	Poacher, NR	Pelecanus onocrotalus, Sterna repressa	Great White Pelican, White-cheeked Tern	Party
NR	Russia	2	Hunt (other), NR	Polysticta stelleri, Somateria fischeri	Steller's Eider, Spectacled Eider	Non-Party
NR	Seychelles	2	NR, IPLC	Larus hemprichii, Onychoprion fuscatus	Sooty Gull, Sooty Tern	Party
NR	Spain	2	NR, Poacher	Bulweria bulwerii, Calonectris borealis	Bulwer's Petrel, Cory's Shearwater	Party
NR	Sweden	2	Hunt (other)	Melanitta fusca, Mergus serrator	Velvet Scoter, Red-breasted Merganser	Party
NR	Angola	1	NR	Sternula balaenarum	Damara Tern	Party
NR	Argentina	1	NR	Larus atlanticus	Olrog's Gull	Party
NR	Australia	1	IPLC	Ardenna grisea	Sooty Shearwater	Party
NR	Bulgaria	1	Poacher	Pelecanus onocrotalus	Great White Pelican	Party
NR	Cape Verde	1	NR	Pterodroma feae	Cape Verde Petrel	Party
NR	Cuba	1	Hunt (other)	Sternula antillarum	Least Tern	Party

NR	Denmark	1	Hunt (other)	Bucephala clangula	Common Goldeneye	Party
NR	Dominican Republic	1	NR	Pterodroma hasitata	Black-capped Petrel	Party
NR	Ecuador	1	NR	Phoebastria irrorata	Waved Albatross	Party
NR	Egypt	1	NR	Larus leucophthalmus	White-eyed Gull	Party
NR	Fiji	1	IPLC	Pterodroma brevipes	Collared Petrel	Party
NR	Finland	1	Hunt (other)	Bucephala clangula	Common Goldeneye	Party
NR	Greece	1	Poacher	Pelecanus onocrotalus	Great White Pelican	Party
NR	Guadeloupe (to France)	1	Hunt (other)	Sternula antillarum	Least Tern	Party
NR	Guyana	1	Hunt (other)	Sternula antillarum	Least Tern	Non-Party
NR	Iceland	1	Hunt (other)	Fratercula arctica	Atlantic Puffin	Non-Party
NR	Indonesia	1	Fisherman	Fregata andrewsi	Christmas Island Frigatebird	Non-Party
NR	Israel	1	Poacher	Pelecanus onocrotalus	Great White Pelican	Party
NR	Kenya	1	Poacher	Pelecanus onocrotalus	Great White Pelican	Party
NR	Kiribati	1	NR	Pterodroma alba	Phoenix Petrel	Non-Party
NR	Namibia	1	Poacher	Pelecanus onocrotalus	Great White Pelican	Non-Party
NR	Pakistan	1	NR	Larus hemprichii	Sooty Gull	Party
NR	Portugal	1	NR	Puffinus puffinus	Manx Shearwater	Party
NR	Saudi Arabia	1	NR	Larus leucophthalmus	White-eyed Gull	Party
NR	South Africa	1	Poacher	Pelecanus onocrotalus	Great White Pelican	Party
NR	St Helena (to UK)	1	IPLC	Eudyptes moseleyi	Northern Rockhopper Penguin	Party
NR	Trinidad and Tobago	1	Hunt (other)	Sternula antillarum	Least Tern	Party
NR	Turkey	1	Poacher	Pelecanus onocrotalus	Great White Pelican	Non-Party
NR	Ukraine	1	Hunt (other)	Larus cachinnans	Caspian Gull	Party
NR	United Arab Emirates	1	NR	Phalacrocorax nigrogularis	Socotra Cormorant	Party

NR	Vanuatu	1	IPLC	Pterodroma brevipes	Collared Petrel	Non-Party
NR	Wallis and Futuna Islands (to France)	1	IPLC	Puffinus bailloni	Tropical Shearwater	Party
No	Canada	1	IPLC	Larus glaucescens	Glaucous-winged Gull	Non-Party
No	New Zealand	1	IPLC	Ardenna grisea	Sooty Shearwater	Party

Supporting data 1: Literature records and R code

Wide format data used for the analysis, including literature associated with each record, is available on request. R code used for the analysis is also available on request.

- Filename: “analysis-cms-seabirds-input-data_JH1”
- R code (key file): “05-WebAndDias-Analysis”