Progressing inshore designations of Key Biodiversity Areas for seabirds, and their application to management of the marine environment.

Project Summary

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Project funded by:

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Supporting documents:

- Supplementary material

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Purpose of this work

This project formally identifies globally important sites (Key Biodiversity Areas) for breeding seabirds in the inshore environment of the Falkland Islands, contributing to a growing suite of available evidence for consideration in the development of a management approach for the inshore environment. The project aims to inspire implementation of good practice in marine management of the Falklands' globally significant sites for biodiversity.

Background

Marine ecosystems, particularly those in inshore waters, are projected to come under increasing pressures as human populations rise and global demands for resources increase; if pressures are poorly managed; the consequence will be social, economic and environmental costs (*1–3*). Well-formulated marine spatial planning (MSP) with by appropriate decision-making tools, can guide management decisions that will benefit people and nature. [Key Biodiversity Areas](#) (KBAs) are one such tool recently agreed upon by an international network of organisations as an overarching framework for identifying globally important areas.

The Falkland Islands are key breeding grounds for numerous globally important seabird populations (*4–6*). These birds are one of the most threatened groups of all birds, as numerous human activities are known to impact species globally (*7*). They are, however, a key taxa that can play a critical role guiding marine spatial planning efforts (*8–10*) because of the relative ease through which seabird populations can be monitored on land and at sea as opposed to other marine species; meaning they have long been considered indicators of broader biodiversity patterns (*11–13*).

All seabird species breeding at the Falkland Islands – while diverse in their requirements from the marine environment – are dependent on the surrounding and highly productive inshore waters (*4–6*) (Augé et al. 2018, Baylis et al. 2019, 2021).

Project aims

1. **KBA identification**: identify globally important areas for seabirds in the inshore environment of the Falkland Islands as these inshore areas are where several human activities are currently documented to, or will likely, occur (*4, 14*).
2. **Possible human impacts**: for each of the target species, utilise documented accounts to inform which potential human activities could impact the study species (7, 15).

3. **Proposed Marine Management Area suitability**: discuss the application and limitations of our results for informing MSP efforts in the Islands, and in the context of proposals for Marine Management Areas (16).

Context of key evidence: what are Key Biodiversity Areas?

We identify a suite of **Key Biodiversity Areas (KBAs)** for breeding seabirds in the inshore environment of the Falkland Islands.

Key Biodiversity Areas (see [here](#)) are:

- Defined as sites 'important for the global persistence of biodiversity'; applicable across multiple taxa
- Identified where sites contain a significant proportion of a species' global population or ecosystem extent
- A globally recognised tool to support decision-making, adopted by an international network of government and non-government organisations (*17, 18*)

To support decision-making and management action, the KBA guidelines recognise that sites should be considered as 'manageable units' when delineating boundaries.

The unique international collaboration underpinning these sites facilitates the identification of globally important sites under a single currency, where all accepted sites undergo consultation, expert review and are curated in a globally accessible database (*19*).

Key Biodiversity Areas come with no legal standing unless implemented by the governing body with jurisdiction for the site.

KBAs are recognised within the Sustainable Development Goals (SDG) (*20*). The draft text of the post-2020 Global Biodiversity Framework (under the convention of Biological Diversity CBD 2020) calls for recognition of these sites as a key tool for identifying globally important areas for biodiversity. The Falkland Islands are signatories to the CBD and align environment goals around the SDG.

Methods (summary)

1. KBA identification

We collated the most comprehensive dataset available of breeding and non-breeding location records for 27 species of Falkland Islands seabirds. Data from 12 breeding seabird species

were considered of sufficient quality to be assessed for possible KBA status. These species include:

- Albatrosses: Black-browed Albatross
- Cormorants: Imperial Shag, Rock Shag
- Ducks: Falkland Steamer Duck
- Gulls: Dolphin Gull
- Penguins: Gentoo Penguin, Magellanic Penguin, Southern Rockhopper Penguin
- Petrel / Prions / Shearwaters: Slender-billed Prion, Sooty Shearwater, Southern Giant Petrel.
- Skuas: Brown Skua

We identified important areas for seabirds at sea on a 1 km x 1 km grid that served to represent the species ecology alongside the conservation goals being considered (*22*). The important areas considered are those used by the birds for multiple needs and include rafting, preening, bathing, foraging or as necessary transit corridors between foraging trips, depending on the species.

2. *Possible human impacts*

We identified documented past, current and future human activities known to impact species populations at a global level through analysis of the relative IUCN Red List accounts (https://www.iucnredlist.org/) and supporting material from the recent global assessment to seabirds (*7*).

3. *MMA suitability*

Finally, to assess how the globally important areas – KBAs – would be supported by a recent Marine Management Areas (MMA) proposal, we assessed the overlap between target species KBA element layers and proposed MMAs for the inshore environment of the Falkland Islands.

High level results

1. Globally important areas (Key Biodiversity Areas) were identified for nine species of seabirds throughout the inshore waters of the Falkland Islands. (The KBA area is represented as the solid red line in Figure 2). Falkland waters are principally, though not exclusively, of global significance during the breeding season for these species.

2. The waters around the Jason Islands, New Island, Bird Island and Saunders Island merit particular attention as a KBA was triggered by up to 6 out of 9 species. This is represented as 'overlapping KBA layers' in Figure 1 and Figure 2.

3. Human activities known to impact the target species in the marine environment at the global level include climate change (particularly, increasing severe weather), aquaculture, fisheries by-catch, overfishing, disease spread and introduction, energy production, mining, hunting/trapping, and pollution (Table 1).

4. Globally important areas had appropriate overlap with some of the proposed network of Marine Management Areas (Figure 2), while other areas would need attention if they are to be adopted.

5. Data reinforces how the recognised near pristine inshore environment of the Falkland Islands is of global importance for biodiversity.

6. Given limited data availability for some species (i.e. insufficient records on species population numbers), results are likely to underestimate the number of globally important sites. This underlines the importance of a transparent process that allows the update of designations as data become available.

7. Taxonomic uncertainty meant that both Imperial and Rock Shags could not be assessed against the KBA global criteria. However the data identified areas that are important for these species in the Falklands and if taxonomy in the future shows these are an endemic species, the areas in this study would likely qualify as KBAs (Figure 1 B).
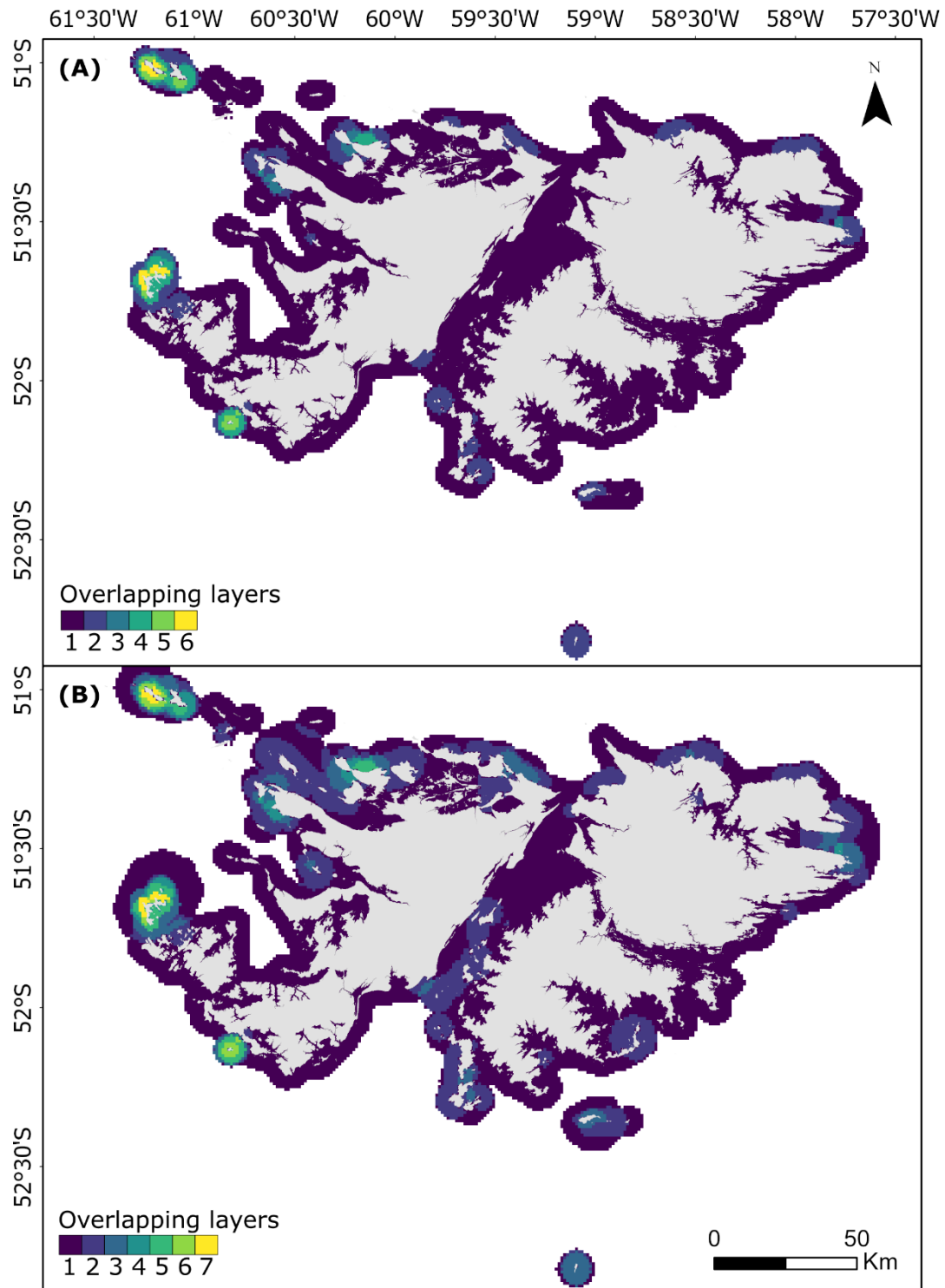
Figure 1: (A) Overlap of globally important species layers for 9 different species which met global KBA criteria, and (B) as in panel A, but with inclusion of regionally important areas for two species where data was insufficient for assessment against global KBA criteria. The 11 species include: for Panel (A), Black-browed Albatross, Slender-billed Prion, Southern Giant Petrel, Gentoo Penguin, Southern-Rockhopper Penguin, Brown Skua, Dolphin Gull, Falklands Steamer Duck, Sooty Shearwater, and included in Panel (B), Imperial Shag and Rock Shag.
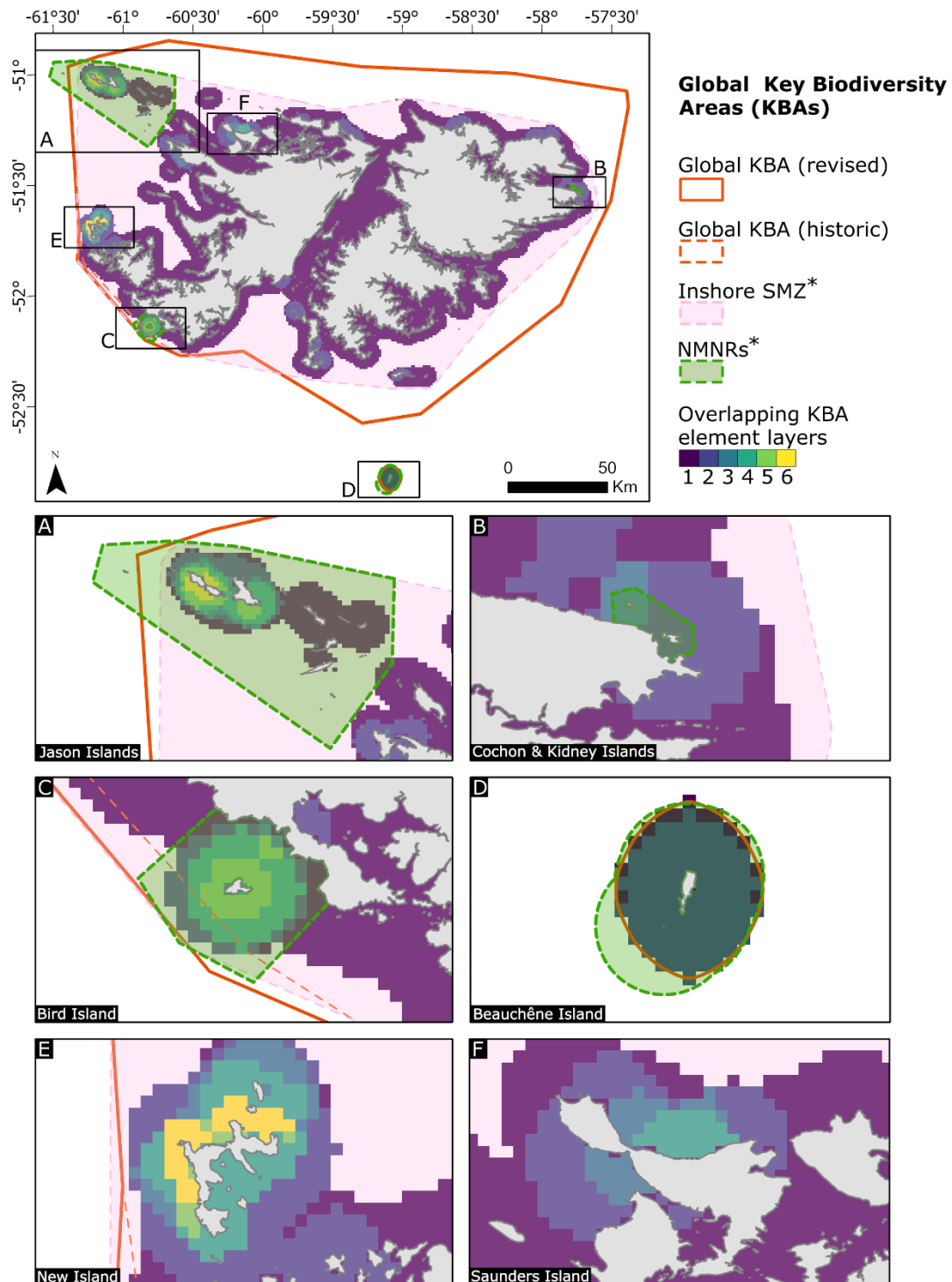
Figure 2: Globally important sites for seabirds represented by overlapping KBA element layers for seabirds in the inshore environment of the Falkland Islands. KBA element layers refer to the individual species distribution layers which had areas that met KBA criteria at the species level. Data from 9 species met global KBA criteria within in the inshore area of the Falkland Islands (associated global KBA criteria in brackets) which had distribution layers that met global KBA criteria are: Black-browed Albatross (D1a), Slender-billed Prion (D1a), Southern Giant Petrel (D1a), Gentoo Penguin (D1a), Southern-Rockhopper Penguin (A1b, A1d, D1a), Brown Skua (D1a), Dolphin Gull (D1a), Falklands Steamer Duck (B1), Sooty Shearwater (D1a). KBA criteria: globally threatened biodiversity (Crit. A), geographically restricted biodiversity (Crit. B), biological processes such as demographic aggregations (Crit. D). Also shown are the revised (nominated to KBA secretariat) and historic global KBA, and proposed *MMA zones: SMZ (Sustainable Multi-use Zone) and NMNR (National Marine Nature Reserve following the project, see here). MMA data valid as of November 2021.
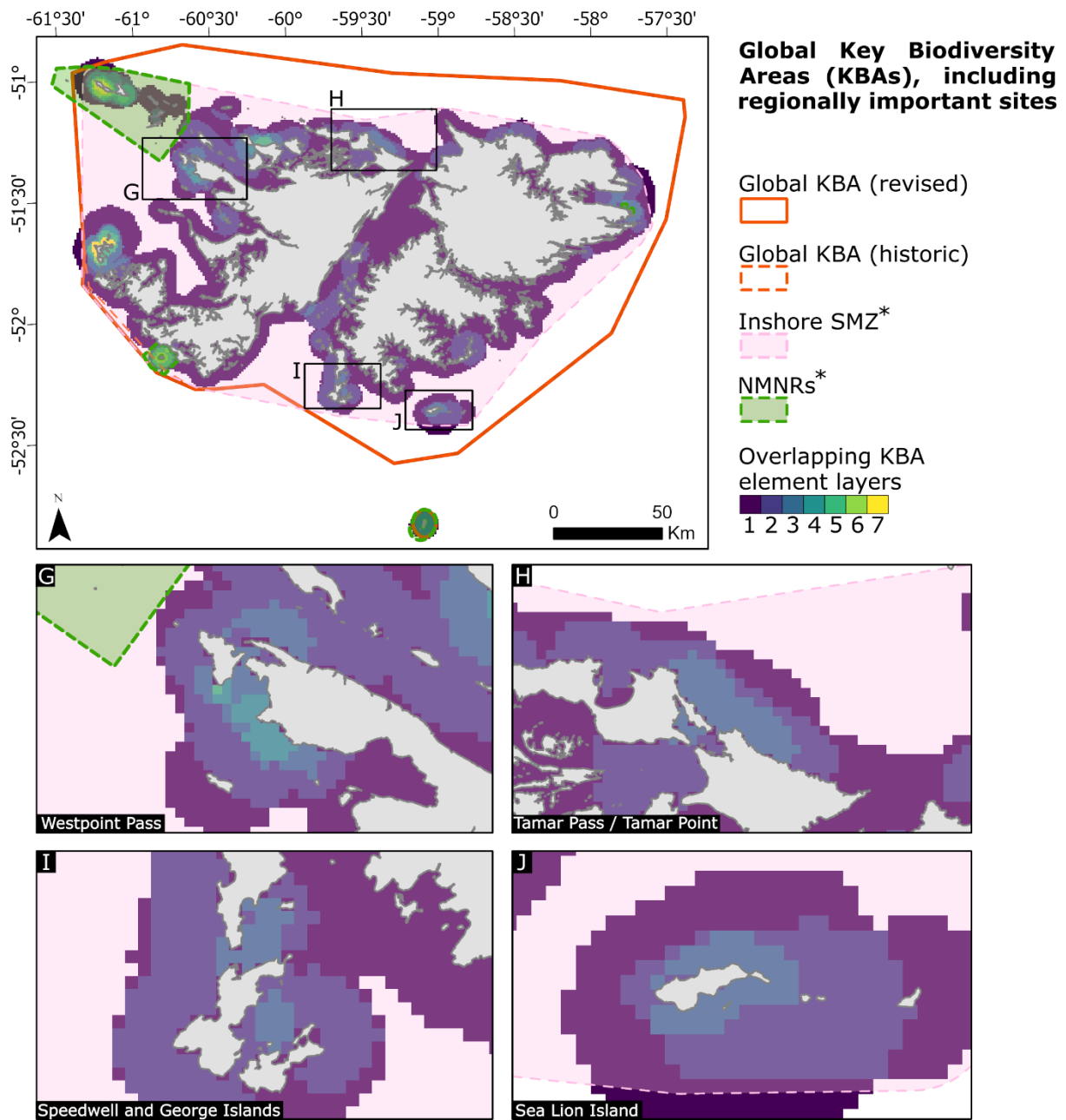
Figure 3: As in Figure 2, overlap of globally important sites for nine species of seabirds in the inshore environment of the Falkland Islands, but also including overlap with regionally important sites for the two cormorant species (Imperial Shag and Rock Shag). Regional importance was assessed for the cormorant species given insufficient data existed to assess these species against global KBA criteria. MMA data valid as of November 2021.

Table 1: Recognised human activities known to impact species at the global level in the marine environment at both the family (○) and species (●) level for the 12 species considered for KBA specific analyses, as per the IUCN Red List accounts (https://www.iucnredlist.org/) and Dias et al., (2019).

Family	Common Name	Climate change & severe weather	Human intrusions & disturbance	Aquaculture	By-catch	By-catch and Overfishing	Diseases	Energy production & mining	Hunting / trapping	Overfishing	Pollution	Transportation & service corridors
ANATIDAE	Ducks	○		○	○	○		○		○	○	○
	Falkland Steamer Duck (FLSD)										●	
DIOMEDEIDAE	Albatrosses	○			○	○					○	
	Black-browed Albatross (BBAL)	●			●							
LARIDAE	Gulls	○	○	○	○	○		○	○	○	○	
	Dolphin Gull (DOGU)											
PHALACROCORACIDAE	Cormorants	○	○		○	○		○		○	○	
	Imperial Shag (IMSH)										●	
	Rock Shag (ROSH)										●	
PROCELLARIIDAE	Petrels, Prions, Shearwaters	○		○	○	○		○	○	○	○	○
	Slender-billed Prion (SBPR)											
	Sooty Shearwater (SOSH)	●			●							
	Southern Giant Petrel (SGPE)				●							
SPHENISCIDAE	Penguins	○		○	○	○	○	○	○	○	○	○
	Gentoo Penguin (GEPE)	●				●	●				●	
	Magellanic Penguin (MAPE)	●		●	●	●		●	●		●	
	Southern Rockhopper Penguin (SRPE)	●				●	●	●			●	
STERCORARIIDAE	Skuas	○			○					○		
	Brown Skua (BRSK)	●			●							

For effective management of the Falklands' marine environment it will be important to consider where it is appropriate to undertake activities known to be threatening to biodiversity and how to make those considerations consistent and transparent.

Aquaculture, in particular proposed industrial scale open-pen salmon farming, is a key activity with associated threats and likely impacts, that would operate within the inshore waters of the Falkland Islands and overlap with the globally important sites for seabirds identified in this study (*23*, *24*). The documented environmental impacts of salmon farming to seabird populations include direct impacts such as displacement from feeding grounds due to increased boat traffic, bird strike from attraction to light and also entanglement in anti-predator nets. Pollution and altered ecosystem dynamics can also have indirect effects on seabird populations (*23*, *25*).

Under the proposed Marine Management Areas, National Marine Nature Reserves (NMNR) are proposed for around the Jason Islands and Bird Island, with the majority of the inshore proposed as mixed sustainable use (SMZ). The areas around New Island and Saunders Island have equivalent (compared to the Jason Islands NMNR) or higher (compared to the general Inshore SMZ) total numbers of overlapping globally important sites in these areas (Figure 2). Additionally, when accounting for regionally important populations, many more areas have high numbers of overlapping important sites for species (Figure 3).

Areas around New Island and Saunders arguably merit equivalent management approaches to the Jason Islands and Bird Island. The development of criteria or a transparent decision-making framework for applying appropriate management and protection approaches/categories would ensure consistency. This would also provide an opportunity to improve management approaches and increase international recognition by utilising global standards and decision-making tools such as those included in the renewed IUCN MPA Guidelines (Day et al. 2019), and other associated area-based management tools (Visconti et al. 2019, Grorud-Colvert et al. 2021).

Ultimately, it is likely that emerging evidence will further recognise broader areas of the Falklands inshore environment as globally important. Therefore, given the dynamic and connected nature of marine ecosystems, and the associated services they provide, the precautionary principle should be considered when designing long term management interventions. Critically, not only should the most biodiverse regions receive the strongest management interventions, but in areas where minimal management interventions are

applied, it should be ensured that these are still adequate enough to ensure biodiversity is maintained throughout.

Limitations and future recommendations

Assessing sites against global KBA criteria means that other sites with regionally important populations may not be captured with this approach.

The number of globally important sites identified represent a likely minimum, because for some species insufficient population data, coupled with taxonomic uncertainty, meant it was unfeasible to assess certain sites against global KBA criteria.

Future research and monitoring efforts to obtain or revise baseline population data, as well as fine scale at-sea distribution estimates (*6*), would serve as part of the necessary baseline required to monitor the impact of potential human activities in future, and would significantly strengthen opportunities to guide efforts which could support lasting ecosystem functioning of the region.

Key species from the study for which further basic taxonomic, abundance and distribution, and population trend data would enhance decision making include: Brown Skuas, Dolphin Gulls, Imperial and Rock Shags, Magellanic Penguins, Slender-billed Prions and Sooty Shearwaters (Figure 4).

Beyond the species specific KBA criteria that we assessed identified sites against, several KBA criteria exist which serve to recognise the importance of sites at an ecosystem level, or for areas which are still representative of natural and intact places. Establishing a KBA National Coordination Group could facilitate assessment of all available biodiversity data against these criteria. Assessing sites against these criteria will further enhance the understanding of the value of the Falkland Islands biodiversity in a global context.
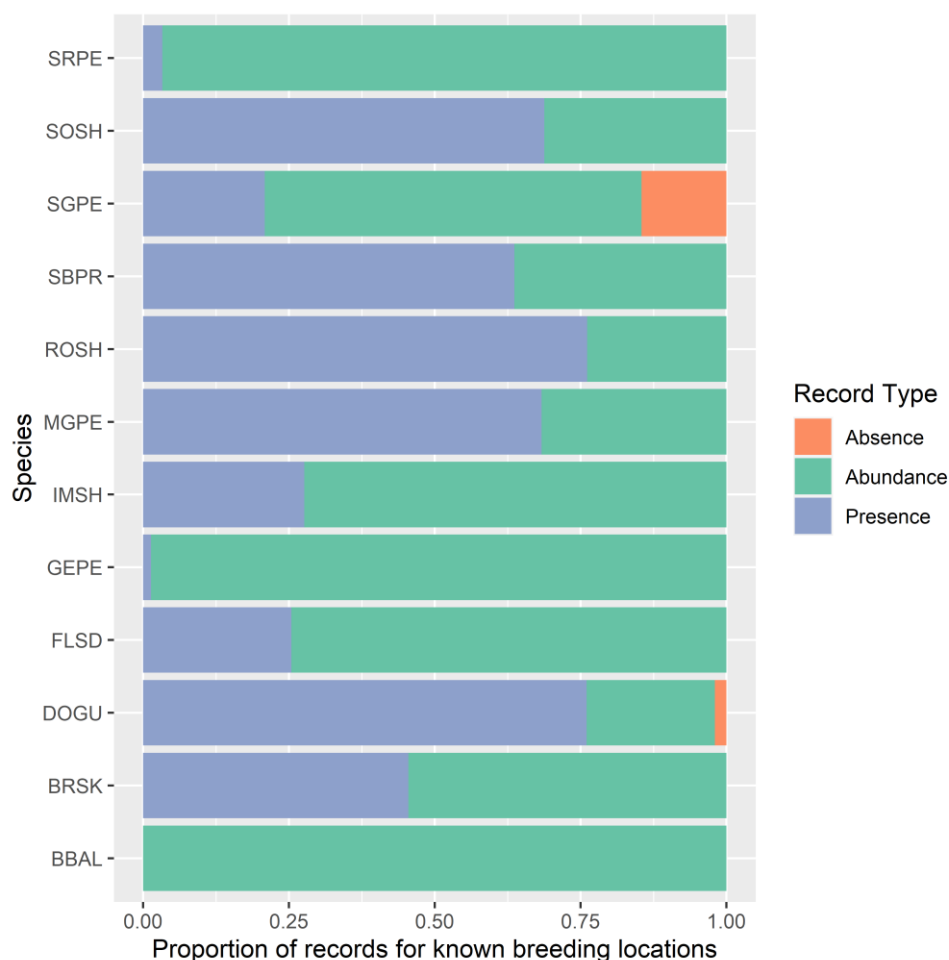
Figure 4: Proportion of the type of available records (used toward the global KBA analysis) for all known breeding locations for a given species. Records reflect the most recent estimate available for a given location. Record types include; Absence (a species was previously recorded breeding at the site but as of the most recent count, the species was not recorded as breeding at the site), Abundance (the species was recorded as breeding at the site and a record indicating the number of birds is available), Presence (the species was recorded as breeding at the site but a record indicating the number of birds is not available). Only abundance records were used for the global KBA Analysis. For those species which have a majority of presence only records, further research and monitoring efforts to obtain abundance estimates for these species would enhance marine spatial planning efforts across the Falkland Islands. Species codes: SRPE – Southern Rockhopper Penguin, SOSH – Sooty Shearwater, SGPE – Southern Giant Petrel, SBPR – Slender-billed Prion, ROSH – Rock Shag, MGPE – Magellanic Penguin, IMSH – Imperial Shag, GEPE – Gentoo Penguin, FLSD – Falkland Steamer Duck, DOGU – Dolphin Gull, BRSK – Brown Skua and BBAL – Black-browed Albatross.

Further reading

- Supplementary material (Technical Report)

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Acknowledgements

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