**Supplementary file S1**

Supplementary information for ‘atolls are globally significant hubs for tropical seabirds’

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1. *Reference list for seabird nesting censuses on atolls*

P.-A. Adam, A. Skerrett, G. Rocamora, First confirmed breeding record of Black-naped tern *Sterna sumatrana* from St. Francois Atoll and a new population estimate for Seychelles and the Afrotropical region. *ABC Bulletin* **16**, 78-82 (2009).

A. B. Amerson, Jr., Ornithology of the Marshall and Gilbert Islands. *Atoll Res. Bull.* **127**, 1-348 (1969).

A. B. Amerson, Jr., The natural history of French Frigate Shoals, Northwestern Hawaiian Islands. *Atoll Res Bull.* **150**, 1-383 (1971).

G. B. Baker, R. B. Cunningham, W. Murray, Are red-footed boobies *Sula sula* at risk from harvesting by humans on Cocos (Keeling) Islands, Indian Ocean? *Biol. Conserv.* **119**, 271-278 (2004).

N. Barré, P. Villard, N. Manceau, L. Monimeau, C. Ménard, Les oiseaux de l’archipel des Loyauté (Nouvelle-Calédonie): inventaire et éléments d’écologie et de biogéographie. *Revue d’Écologie* **61**, 175-194 (2006).

BirdLife International, Important Bird Area factsheet: Oeno Island. Available at <http://datazone.birdlife.org/site/factsheet/oeno-island-iba-pitcairn-islands-(to-uk)> (last accessed 25 Nov 2023).

BirdLife International, Important Bird Area factsheet: Ringgold Islands Marine. Available at <http://datazone.birdlife.org/site/factsheet/ringgold-islands-marine-iba-fiji> (last accessed 25 Nov 2023).

P. Borsa, Avifaune marine des îles Chesterfield (mer de Corail): richesse spécifique, tailles de population, menaces et tendances sur les trois dernières décennies. *Bull. de la Soc. Zool. France* **146**, 111-122 (2021).

P. Borsa, M. Pandolfi, S. Andréfouet, V. Bretagnolle, Breeding avifauna of the Chesterfield Islands, Coral Sea: current population sizes, trends, and threats. *Pac. Sci.* **64**, 297-314 (2010).

P. Borsa, A. Philippe, A. le Bouteiller, Oiseaux marins des atolls d’Entrecasteaux (parc naturel de la mer de Corail): bilan des observations des deux dernières décennies. *Bull. de la Soc. Zool. France* **146**, 175-188 (2021).

M. d. L. Brooke, The modern avifauna of the Pitcairn Islands. *Biol. J. Linn. Soc.* **56**, 199-212 (1995).

M. d. L. Brooke, The breeding biology of the gadfly petrels *Pterodroma* spp. of the Pitcairn Islands: characteristics, population sizes, and controls. *Biol. J. Linn. Soc.* **56**, 213-231 (1995).

D. W. Buden, Reptiles, birds, and mammals of Ant atoll, Eastern Caroline Islands. *Micronesia* **29**, 21-36 (1996).

D. W. Buden, Seabirds of Sorol atoll, Yap, Eastern States of Micronesia. *Bull. Brit. Ornithol. Club* **132**, 116-123 (2012).

J.-F. Butaud, M. Wragg, Les plantes et les oiseaux de l’atoll de Temoe. *Bull. Soc. Etud. Océaniennes* **324**, 67-108 (2012).

M. Carpenter, W. B. Jackson, M. W. Fall, Bird populations at Eniwetok atoll. *Micronesia* **4**, 295-307 (1968).

P. Carr, Exploring the benefits of a tropical, large-scale marine protected area for breeding seabirds, per mare, per terram. *Thesis, University of Exeter* (2021).

A. Cibois, J.-C. Thibault, Les oiseaux de Faaite. *Te Manu Bull. Soc. d'Ornithol. Polynésie* **65**, 11-13.

R. B. Clapp, Notes on the birds of Kwajalein atoll, Marshall islands. *Atoll. Res. Bull.* **342**, 1-94 (1990).

J. de Korte, H. Meltofte, Notes on breeding sites of Pelecaniformes in Micronesia. *Bird Conserv. Int.* **7**, 287-290 (1997).

F. C. Depkin, Trip report: Palmyra atoll NWR, 6 August 2001 to 3 September 2002. *Draft Administrative Report, U.S. Fish and Wildlife Service, Honolulu, HI* (2002).

A. W. Diamond, The ecology of the sea birds of Aldabra. *Phil. Trans. Roy. Soc. Lond. B.* **260**, 561-571 (1971).

A. W. Diamond, The red-footed booby on Aldabra atoll, Indian Ocean. *Ardea* **62**, 196-218 (1974).

A. W. Diamond, The biology of tropicbirds at Aldabra atoll, Indian Ocean. *The Auk* **92**, 16-39 (1975).K

A. Duhec, R. Jeanne, A. Skerrett, Breeding seabirds of Farquhar atoll, Seychelles including the return of two species: red-footed booby *Sula sula* and Greater-crested tern *Thalasseus bergii. Sea Swallow* **66**, 1-14 (2017).

G. Dutson, New distributional ranges for Melanesian birds. *Emu – Austral. Ornith.* **101**, 237-248 (2001).

Z. Egerton, K. A. Townsend, D. A. Potvin, A review of the status and biology of an enigmatic pelagic species, the red-tailed tropicbird *Phaethon rubricauda. Corella* **46**, 80-88 (2022).

J. P. Ehrhardt, Census of the birds of Clipperton island, 1968. *The Condor* **73**, 476-480 (1971).

J. Enbring, Avifauna of the southwest islands of Palau. *Atoll Res. Bull.* **267**, 1-24 (1983).

L. Faulquier, Inventaire ornithologique de l’atoll de Tetiaroa en vue d’un classement en aire protégée. *Te Manu Bull. Soc. d'Ornithol. Polynésie,* 1-22 (2013).

L. Faulquier, T. Ghestemme, C. Blanvillain, Situation de l’avifaune de la réserve de biosphère de Fakarava. *Te Manu Bull. Soc. d’Ornithol. Polynésie* **84**, 4-13 (2014).

K. L. Garrett, R. W. Schreiber, E. A. Schreiber, The birds of Bikini atoll, Marshall islands: May 1986. *Atoll Res. Bull.* **314**, 1-55 (1988).

A. Gupta, Important Bird Areas (IBAs) in Kiribati. *Report prepared for the BirdLife International* (2007).

D. W. Hadden, Birds of the northern atolls of the North Solomons province of Papua New Guinea. *Notornis* **51**, 91-102 (2004).

A. E. Jensen, A. M. Songco, M. R. Alaba, Field report: monitoring and inventory of the seabirds and their breeding areas in Tubbataha Reefs Natural Park & World Heritage Site (Tubbataha Management, Puerto Princesa, Palawan, Philippines, 2021).

R. J. Jones, The status of seabird colonies on the Cook Islands atoll of Suwarrow. *Bird Conserv. Int.* **11**, 309-318 (2001).

M. A. Kappes, K. Coustaut, M. le Corre, Census of Wedge-tailed shearwater *Puffinus pacificus* breeding at D’Arros Island and St Joseph Atoll, Seychelles. *Mar. Ornith.* **41**, 29-34 (2013).

C. B. Kepler, A. K. Kepler, D. H. Ellis, The natural history of Caroline atoll. Part 2: seabirds, other terrestrial animals, and conservation. *Atoll Res. Bull.* **398**, 1-61 (1994).

W. B. King, Conservation status of birds of Central Pacific islands. *Wilson Bull.* **85**, 89-103 (1973).

D. N. Kurup, V. J. Zacharias, Birds of the Lakshadweep islands. *Forktail* **10**, 49-64 (1994).

M. le Corre, S. Jaquemet, Assessment of the seabird community of the Mozambique Channel and its potential use as an indicator of tuna abundance. *Estuar. Coast. Shelf Sci.* **63**, 421-428 (2005).

M. le Corre, P. Jouventin, Ecological significance and conservation priorities of Europa Island (Western Indian Ocean), with special reference to seabirds. *Revue d’Écologie* **52**, 205-220 (1997).

O. Lorvelec, M. Pascal, Les vertébrés de Clipperton soumis à un siècle et demi de bouleversements écologiques. *Revue d’Ècologie* **61**, 135-158 (2006).

J. Nogués, A. Fernández, A. Quatre, A. Skerrett, First population estimate of breeding Greater crested tern on Cosmoledo atoll, Seychelles. *Sea Swallow* **67**, 23-27 (2020).

P. J. O’Connor, M. J. Rauzon, Inventory and monitoring of seabirds in national park of Samoa. *Pacific Cooperative Studies Unit Technical Report 136* (University of Hawai’i at Manoa, Hawai’i, 2004) pp. 1-145.

S. Pande, N. R. Sant, S. D. Ranade, S. N. Pednekar, P. G. Mestry, S. S. Kharat, V. Deshmukh, An ornithological expedition to the Lakshadweep archipelago: assessment of threats to pelagic and other birds and recommendations. *Indian Birds* **3**, 2-12 (2007).

R. Perry, Wildlife conservation in the Line islands, Republic of Kiribati (formerly Gilbert islands). *Environ. Conserv.* **7**, 311-318 (1980).

R. J. Pierce, Birds and invasive species work at Santa Cruz islands, Solomon’s. *EcoOceania Pty Report* (2017).

R. J. Pierce, C. Blanvillain, M.-H. Burle, Bird research and monitoring associated with SOP Manu pest eradications in Acteon-Gambier archipelagos, June 2015. *EcoOceania Report for SOP Manu and BirdLife Pacific* (2015).

R. J. Pierce, N. Anterea, G. Coulston, C. Gardiner, L. Shilton, K. Taabu, G. Wragg, “Atoll restoration in the Phoenix islands, Kiribati: survey results in November-December 2009” In Biodiversity Conservation Lessons Learned Technical Series, J. Atherton, L. Duffy, Eds. (Critical Ecosystem Partnership Fund and Conservation International Pacific Islands Program, 2011).

R. J. Pierce, M. Gruber, J. Atherton, A. Burne, M. Valu, A. Whistler, A conservation survey of Tokelau. *EcoOceania Pty Ltd Plan for Tokelau Administration and Critical Ecosystem Partnership Fund* (2012).

R. J. Pierce, R. Anderson, E. VanderWerf, L. Young, Surveys and capacity building in Kiritimati (Christmas island, Kiribati) June 2007, to assist in restoration of populations of Bokikokiko and seabirds. *Report for the Wildlife Conservation Unit, Kiritimati, Republic of Kiribati* (2013).

R. J. Pierce, D. Brown, A. Ioane, K. Kamatie, Malden island, Kiribati – feasibility of cat eradication for the recovery of seabirds. *EcoOceania Report for Government of Kiribati and SPREP* (2015).

R. J. Pierce, P. Raust, G. Wragg, Report on an avifauna survey of atolls in the Tuamotu and Austral archipelagos, French Polynesia. (Wildland Consultants, Whangarei, 2003). pp. 1-43.

R. J. Pierce, T. Etei, V. Kerr, E. Saul, A. Teatata, M. Thorsen, G. Wragg, Phoenix islands conservation survey and assessment of restoration feasibility: Kiribati. *Report for Conservation International Samoa and Pacific Islands Initiative* (2006).

R. L. Pitman, J. R. Jehl, Geographic variation and reassessment of species limits in ‘Masked’ boobies of the eastern Pacific. *Wilson Bull.* **110**, 155-170 (1998).

R. L. Pyle, P. Pyle, The birds of the Hawaiian Islands: occurrence, history, distribution, and status. B.P. Bishop Museum, Honolulu, HI, U.S.A. Version 2 (1 January 2017) <http://hbs.bishopmuseum.org/birds/rlp-monograph>

M. J. Rauzon, D. Boyle, W. T. Everett, J. Gilardi, The status of birds of Wake atoll. *Atoll Res. Bull.* **561**, 1-41 (2008).

G. Rocamora, A. Skerrett, Seychelles outer islands: their importance for seabirds and a strategy for survey. *Ostrich* **78**, 1-19 (2007).

G. Rocamora, C. J. Feare, A. Skerrett, M. Athanase, E. Greig, The breeding avifauna of Cosmoledo atoll (Seychelles) with special reference to seabirds: conservation status and international importance. *Bird Conserv. Int.* **13**, 151-174 (2003).

J. C. Russell, L. Faulquier Tetiaroa rat and seabird survey. Unpublished report to Tahiti Beachcomber SA, 1-11 (2009).

J. C. Russell, S. Steibl, G. Stevens, A regionally significant population of white-tailed tropicbirds (*Phaethon lepturus*) on Kurehdhoo (Lhaviyani atoll), Republic of the Maldives. *In preparation.*

E. A. Schreiber, Breeding biology and ecology of the seabirds of Johnston atoll, central Pacific ocean: results of a long-term monitoring project 1984-2003. *Report to Project Manager for Chemical Stockpile Demilitarization* (Aberdeen Proving Ground, Maryland, 2003) pp. 1-306.

C. Serra, Situation de l’avifaune sur Fangataufa et Moruroa. *Te Manu Bull. Soc. d'Ornithol. Polynésie* **59**, 12-12 (2007).

A. Skerrett, G. Rocamora, New breeding records of roseate terns *Sterna dougallii* in Seychelles. *Bull. Afr. Bird Club* **14**, 62-67 (2007).

A. Skerrett, J. Skerrett, Seabirds and shorebirds of D’Arros and St Joseph atoll during the south-east monsoon: report on a short visit 20-24 July. *Unpublished report to Island Conservation Society, Seychelles* (2005).

A. K. Smith, N. Cook, A. Songcuan, G. Sartori, D. Cassidy, M. Deane, T. Teroroko, B. Rimon, Ecological and infrastructure assessment of Kanton (Abariringa) island, Phoenix Island Protected Area, Kiribati. *Atoll Res. Bull.* **628**, 1-41 (2020).

T. Stokes, W. Sheils, K. Dunn, Birds of the Cocos (Keeling) islands, Indian Ocean. *Emu – Austral. Ornithol.* **84**, 23-28 (1984).

M. Sur, N. Bunbury, J. van de Crommenacker, Frigatebirds on Aldabra atoll: population census, recommended monitoring protocol and sustainable tourism guidelines. *Bird Conserv. Int.* **23**, 214-220 (2013).

D. Tanret, Inventaire de l’avifaune des atolls de Scilly et Mopelia, Iles Sous-le-vent, archipel de la Société, Polynésie francaise. 1-25 (2015).

J.-C. Thibault, A. Cibois, Birds of eastern Polynesia: a biogeographic atlas. (Lnyx Edicions, Barcelona, Spain, 2017), pp. 1-440.

P. E. J. Thomas, F. R. Fosberg, L. S. Hamilton, D. R. Herbst, J. O. Juvik, J. E. Maragos, J. J. Naughton, C. F. Streck, Report of the northern Marshall islands natural diversity and protected areas survey 7-24 September 1988. (South Pacific Regional Environment Programme, Noumea, New Caledonifa, 1989), pp. 1-133.

A. J. Titmus, N. Arcilla, C. A. Lepczyk, Assessment of the birds of Swains island, American Samoa. *Wilson J. Ornithol.* **128**, 163-168 (2016).

R. M. Wanless, R. W. White, Black-naped tern *Sterna sumatrana* breeding on Cosmoledo atoll, Seychelles. *Mar. Ornithol.* **29**, 113-114 (2001).

D. Watkins, K. Batoromaio, Directory of wetlands of Kiribati – 2014. *Report to the Secretariat of the Pacific Regional Environment Program* (2014).

D. Watling, Funafuti marine conservation area, Tuvalu. *Report to the South Pacific Biodiversity Conservation Programme and SPREP* (Apia, Samoa, 1998), pp. 1-39.

1. *Principal component analysis of environmental variables*

A screenshot of a computer screen

Description automatically generated

1. *Presence model, prior predictive check*

*A graph of a line

Description automatically generated with medium confidence*

1. *Presence model, posterior predictive check*

*A screenshot of a graph

Description automatically generated*

1. *Count model, prior predictive check*

*A graph of a log-count

Description automatically generated*

1. *Count model, posterior predictive check*

*A screenshot of a graph

Description automatically generated*

1. *Sensitivity of global count predictions to different prior settings*

*A graph with different colored lines

Description automatically generated*