

The First Record of Red-footed Booby (*Sula sula*) in British Columbia.

By Rick Toochin. Submitted: April 15, 2019.

Introduction and Distribution

The Red-footed Booby (*Sula sula*) is a charismatic seabird species that is found in the world's tropical oceans (Harrison 1983b, Harrison 1987). There are 3 recognized subspecies of the Red-footed Booby (Clements *et al.* 2017).

The nominate subspecies of Red-footed Booby is (*Sula sula sula*) which is found breeding in the Caribbean, with the largest colonies found on Little Cayman and Los Rocas off Venezuela (Nelson 1978c, Diamond 1980, Evans 1990). This subspecies also breeds on islands off Puerto Rico, in the United States and British Virgin Islands, the Lesser Antilles (Redonda, St. Vincent, and the Grenadines), Grenada, Tobago, Half Moon Key off Belize, islands off the Yucatán Peninsula, and in the Bahamas with 1 nest reported in 1995 after being extirpated for many years (Norton 1995). In the western Atlantic Ocean, the Red-footed Booby breeds on South Trinidad, and possibly still on Fernando de Noronha (off Brazil) and Boatswain Bird Island off Ascension Island (Bent 1922, Verner 1961, Russell 1964, Watson 1965a, Peterson and Chalif 1973, Diamond 1980, Olson 1981a, American Ornithologists' Union 1983, van Halewyn and Norton 1984, Tunnell and Chapman 1988, Antas 1991, Gochfeld *et al.* 1994).

The second subspecies of Red-footed Booby is (*Sula sula rubripes*) and is found breeding in the Pacific Ocean on Kure Atoll, Midway Atoll, Pearl and Hermes Reef, Laysan Island, Lisianski Island, Gardner Pinnacles, French Frigate Shoals, Necker Island (near Hawaii), Nihoa, Kauai, Oahu, and Johnston Atoll (Bent 1922, Nelson 1978c, Mayr and Cottrell 1979, American Ornithologists' Union 1983, Harrison 1990a). This subspecies also breeds on offshore islands of China, Japan, islands in Indonesia and the Philippines, and islands off northeastern Australia (Harrison 1983b, Brazil 2009). In central and south Pacific Ocean, the Red-footed Booby breeds on Palau, Marianas Islands, Marcus, Wake Island, Caroline Island, Truk, Satawan, Lukuna, Oroluk, Marshall Islands, Gilbert Islands, Kwajalein, Bikini, Fiji, Phoenix, Samoa, Line Island, Society Island, Austral Island, Marquesas, Tuamotu, Gambier, and Pitcairn (Henderson) Island. This species may also breed on Tabitevea, Abaiang, Makin, Namu, Ujae, Ailinginae, Rongelap, Eniwetok, Majuro, Erikub, and Likiep (Bent 1922, Kirby 1925, Nelson 1978c, Mayr and Cottrell 1979, Jehl and Parkes 1982, Croxall *et al.* 1983, Hasegawa 1984, Melville 1984, Van Tets and Fullagar 1984, Harrison 1990a, Howell and Webb 1990b, Steadman *et al.* 1990, Dickinson *et al.* 1991, Everett and Anderson 1991, Reichel 1991, Mckinnon and Phillipps 1993, De Korte and Silvius 1994, Hsu and Melville 1994, Kepler *et al.* 1994, Stokes 1994, Pitman *et al.* 1995, White *et al.* 1995a) . This subspecies also breeds in the Indian Ocean on Aldabra, Cosmoledo, various islands in the Seychelles, Amirantes, Farquhar and Providence in Providence Bank, Rodriguez,

Chagos Archipelago, Cocos (Keeling), and Christmas I. (Watson *et al.* 1963, Mayr and Cottrell 1979, Croxall *et al.* 1983, De Korte 1984b, Feare 1984b, Diamond 1994, Reville and Stokes 1994).

The Red-footed Booby formerly bred in Desecheo, Puerto Rico; Gloriosa, Mauritius, and Rodriguez in the Indian Ocean (Mayr and Cottrell 1979); Assumption, Cargados Carajos, Indian Ocean (Nelson 1978c, Feare 1984b); Tikopia, Anuta, near the Solomon Islands (Steadman *et al.* 1990); Henderson, Marquesas, and Society Island (Steadman 1989). The Red-footed Booby is probably extirpated on more islands throughout its range due to the introduction of predators and human predation (Schreiber *et al.* 1996). Use of seabirds for food is commonly reported in all areas with nearby human populations (Schreiber *et al.* 1996).

The third subspecies of the Red-footed Booby is (*Sula sula websteri*) breeds on Islands in the eastern Pacific Ocean such as: Revillagigedo, Clarion, Clipperton, San Benedicto, Socorro, Cocos, Malpelo, Isla Isabella near Baja, and the Galapagos Archipelago (Howell and Webb 2010).

The Red-footed Booby breeds mainly on coral atolls or volcanic islands, and is pantropical in range (Schreiber *et al.* 1996). This species nests primarily in shrubs or trees, such as Beach Magnolia (*Scaevola sericea*), Beach Heliotrope (*Tournefortia argentea*), but will use almost any plant, and on occasion, deserted man-made structures (Nelson 1978c, Schreiber *et al.* 1996). The Red-footed Booby prefers to nest at heights of over 1 m, but readily nests on clumps of grass where no bushes are present (Schreiber *et al.* 1996). On large islands, it has been found nesting up to 5–8 km inland and in general does not nest in shade (Schreiber *et al.* 1996).

The overwintering range is poorly known because of limited at-sea and banding data and because birds may not go to land (Schreiber *et al.* 1996). Fledglings and immatures may go to different areas than adults and may be more nomadic than adults (Harrison 1990a). Adults may remain close to colonies (Palmer 1962, Harrison 1990a).

After the breeding season the Red-footed Booby disperses out to sea from its colonies, with some individuals returning to colonies at night to roost (Schreiber *et al.* 1996). Immatures may roost in and around colonies on islands other than their natal island, and none are found at some breeding islands (Schreiber and Ashmole 1970, Schreiber *et al.* 1996) suggesting they may disperse separately from adults (Schreiber *et al.* 1996). Birds that travel further afield will freely approach and land on ships, often travelling aboard for long distances (Harrison 1983b).

A serious threat to the Red-footed Booby and other seabird populations in central Pacific and Indian Oceans comes from El Niño-Southern Oscillation events that cause extensive mortality of chicks and sometimes of adults during severe events (Schreiber and Schreiber 1989, Schreiber 1994). El Niño events occur every 2–7 years and normally last 16–20 months (Schreiber *et al.* 1996). Their effects, while global in extent (Rasmusson and Wallace 1983, Glynn 1990), are most intense through equatorial Pacific Ocean region (Wyrтки *et al.* 1976). During an El Niño event, changes in air pressure systems and prevailing winds eventually push warm western Pacific Ocean waters across the ocean towards the Americas (Schreiber *et al.* 1996). Sea surface temperatures and sea levels rise in central and eastern Pacific Ocean regions (Wyrтки 1975, Cane 1983, Rasmusson and Wallace 1983). As a result, productive feeding grounds for seabirds at cool, nutrient-rich upwelling areas (such as Humboldt Current along coast of South America) disappear as they are overlaid with warm, nutrient-poor water (Barber and Chavez 1983, Halpern 1986). Fish die or go elsewhere in search of food; birds do the same (Schreiber *et al.* 1996). Each event differs in severity and length (Schreiber *et al.* 1996). Birds throughout the world are affected by such strong events (Boersma 1978b, Duffy *et al.* 1984a, Graybill and Hodder 1985, Ainley *et al.* 1988a, Schreiber and Schreiber 1989).

Along the East Coast of North America, the Red-footed Booby is a casually occurring species from April to September in southern Florida and is accidental from Texas, Louisiana, and South Carolina (Schreiber *et al.* 1996). This species is accidental off the Maritimes of Eastern Canada with an immature bird photographed from the deck of a ship well offshore of Lunenburg County, Nova Scotia on September 22, 2014 (Abbott and Gjerdrum 2014).

Along the West Coast of North America, the Red-footed Booby is a casually occurring species that has increased off the Coast of California in recent years with 32 accepted records by the California Bird Records Committee (Hamilton *et al.* 2007, Tietz and McCaskie 2018). Most records have occurred from late summer and fall and birds have reached as far north as San Francisco with no interior state records (Hamilton *et al.* 2007, Tietz and McCaskie 2018).

There are no accepted records for Oregon (OFO 2016) or from Washington State (Wahl *et al.* 2005, WBRC 2018).

The Red-footed Booby is a recent addition to the avifauna of British Columbia with a bird found and photographed at sea well off Haida Gwaii in September 2018 (Toochin *et al.* 2018).

The Red-footed Booby is an accidental migrant vagrant in Alaska. There is a well photographed record for Alaska of a bird observed aboard the ship R/V Tiglax at about 10 miles southeast of East Chugach Island off the tip of the Kenai Peninsula on September 10, 2015 (DeCicco 2015). There

is also a recent record of a well photographed dark morph bird found by the captain of a NOAA ground fish survey charter vessel off Agattu Island towards the western end of the Aleutian Island chain on July 28, 2018 (ABA Rare Bird Alert 2018). There is also an older ship-assisted record of a bird that sat on a boat that travelled from Hawaii to Alaska in August 1999, but this record is disregarded by most Alaskan authorities because it was ship assisted (DeCicco 2015).

Identification and Similar Species

The identification of the Red-footed Booby is covered in all standard North American field guides. This is the smallest occurring Booby in North America measuring 71 cm in length, with a wingspan of 152 cm, and weighing 1000 grams (Harrison 1983b, Sibley 2000). In all ages shows bright coral red feet, and a blue and pink base to the bill (Dunn and Alderfer 2011). Overall is similar looking to other booby species with a pointed head, tail, and wings; differs in looking smaller and having a proportionally longer tail. A slightly convex culmen abuts a bulging forehead and a somewhat high rounded crown and gentle looking face (Stokes 2010, Dunn and Alderfer 2011). The Red-footed Booby is polymorphic having 4 principal morphs: brown morph, white-tailed brown morph, white morph and black-tailed white morph, but can have several intermediate coloured birds (Harrison 1983b, Sibley 2000). It should be noted that there is no consistent difference in tail colour between Pacific and Atlantic Ocean populations.

White morphs have an all-white body; the tail can be white, gray or brown; the primaries and secondaries are black and the tertials are white (Harrison 1983b, Sibley 2000, Stokes 2010, Dunn and Alderfer 2011). The secondary coverts are white; the primary coverts on the upperwing are black (Harrison 1983b, Sibley 2000, Stokes 2010, Dunn and Alderfer 2011). The underside of the wing is white with a dark central patch formed by the medium coverts (Harrison 1983b, Sibley 2000, Stokes 2010, Dunn and Alderfer 2011). The white-tailed brown morph is all brown except for having a white tail and a variable white rump and rear belly (Harrison 1983b, Sibley 2000, Stokes 2010, Dunn and Alderfer 2011). Brown morphs are all dark brown except for variable paler head and underbody (Harrison 1983b, Sibley 2000, Stokes 2010, Dunn and Alderfer 2011).

Juveniles are mostly dark to a lighter brown colour overall and usually show a dark breast band in any morph (Harrison 1983b, Sibley 2000, Stokes 2010, Dunn and Alderfer 2011). The underwings are all dark; the legs and feet are dull orangish-yellow (Harrison 1983b, Sibley 2000, Stokes 2010, Dunn and Alderfer 2011). The bill is all dark and the head bill shape is distinctive as on adult birds (Harrison 1983b, Sibley 2000, Stokes 2010, Dunn and Alderfer 2011).

Immature birds are more similar to adults of their respective morphs, but some white morphs may have a brown back and wings, with a variable breast band (Harrison 1983b, Sibley 2000,

Stokes 2010, Dunn and Alderfer 2011). The bill is pink with a dark tip (Harrison 1983b, Sibley 2000, Stokes 2010, Dunn and Alderfer 2011).

The flight style of the Red-footed Booby is to fly low over the water with alternate flaps and glides (Stokes 2010).

The adult white morph Red-footed Booby is similar in flight to the larger adult Masked Booby (*Sula dactylatra*), but has pure white scapulars (Stokes 2010, Dunn and Alderfer 2011). These feathers are black on the Masked Booby (Stokes 2010, Dunn and Alderfer 2011). The primary coverts on an adult white morph Red-footed Booby are black; these feathers are all white on an adult Masked Booby (Stokes 2010, Dunn and Alderfer 2011). Immature Red-footed Booby is similar to an immature Brown Booby (*Sula leucogaster*) and is best identified by its smaller size and the presence of pinkish colour at the base of the bill (Stokes 2010, Dunn and Alderfer 2011).

Any Booby species found in British Columbia should be photographed at length for documentation purposes and in some cases to ensure proper identification.

Occurrence and Documentation

The Red-footed Booby is an accidental vagrant in British Columbia. The first record involved a well photographed adult dark morph bird found by commercial fisherman Kyle Brynjolfson when it landed on his commercial fishing vessel "La Porsche "in waters well offshore of Haida Gwaii in international waters on September 22, 2018 (K. Brynjolfson Pers. Comm.). He was fishing for Albacore Tuna (*Thunnus alalunga*) in international waters at the time. After an absence of several days the bird reappeared and landed on the fishing vessel and would not leave for long periods, other than for flying around and fishing, and would come back to sit on the ship (K. Brynjolfson Pers. Comm.). As the vessel entered Canadian and British Columbian waters over 120 miles off the west side of Cape St. James, off Haida Gwaii, so did the bird on September 27, 2018 (K. Brynjolfson Pers. Comm.). The Red-footed Booby rode the commercial fishing vessel south to well off Cape Scott, Vancouver Island, and the bird left the boat on September 28, 2018 (K. Brynjolfson Pers. Comm.). It did not return on September 29, 2018 (K. Brynjolfson Pers. Comm.). Photographs of the bird can be viewed on the BC Bird Alert Blog at <http://bcbirdalert.blogspot.com/2018/09/rba-red-footed-booby-off-haida-gwaii.html>. The occurrence of this bird fits perfectly with a large El Nino event that had pushed from the equatorial Pacific Ocean northward into vast areas of the north Pacific Ocean in the summer and fall of 2018 (M. Meredith Pers. Comm.).

The date of the British Columbia Red-footed Booby observation is timed perfectly with the post-breeding-season dispersal records of this species from coastal California (Hamilton *et al.*

2007, Tietz and McCaskie 2018). The dates of the 32 accepted California records range from April 16 – December 13, with the highest number of records coming from the months of September with 10, followed by October with 8 (Hamilton *et al.* 2007, Tietz and McCaskie 2018). Interestingly enough most of the state's records involve dark morph birds which put their area of origin in the eastern Pacific Ocean (Hamilton *et al.* 2007).

As more observers go offshore to watch pelagic birds, it is likely this species could reoccur in the waters of British Columbia in the future, especially during large El Niño events.

Acknowledgements

I wish to thank both Barbara McKee and Don Cecile for editing the original manuscript. I also wish to thank professional meteorologist Mitch Meredith for information on the El Niño-Southern Oscillation event of 2018 in the North Pacific Ocean. I also wish to thank commercial fisherman Kyle Brynjolfson for documenting the Red-footed Booby and passing the information on to birding world.

References

- ABA Rare Bird Alert. 2018. @ABA Rare Bird Alert: July 30, 2018: Red-footed Booby [Online Alert] Retrieved from <https://twitter.com/ABABirdAlert> [Accessed: February 11, 2019].
- Abbott, S. and C. Gjerdrum. 2014. Red-footed Booby (*Sula sula*): New to Nova Scotia and Canada. *North American Birds*. 68(2): 4-7.
- Ainley, D. G., H. R. Carter, D. W. Anderson, K. T. Briggs and M. C. Coulter. 1988a. Effects of the 1982-83 El Niño-southern oscillation on Pacific Ocean bird populations. *Acta XIX Congr. Intl. Ornithol.*: 1747-1758.
- American Ornithologists' Union. 1983. Check-list of North American Birds, 6th ed. American Ornithologists' Union, Washington, DC, USA.
- Antas, P. de T. Z. 1991. "Status and conservation of seabirds breeding in Brazilian waters." In *Seabird status and conservation: a supplement.*, edited by J. P. Croxall, 141-158. Cambridge, U.K: BirdLife International.
- Barber, R. T. and F. P. Chavez. 1983. Biological consequences of El Niño. *Science* 222: 1203-1210.
- Bent, A. C. 1922. Life histories of North American petrels and pelicans and their allies. *U.S. Natl. Mus. Bull.* 121.

- Boersma, P. D. 1978b. Breeding patterns of Galapagos penguins as an indicator of oceanographic conditions. *Science* 200: 1489-1493.
- Brazil, M. 2009. *Birds of East Asia: China, Taiwan, Korea, Japan, and Russia*. Princeton Field Guides. Princeton University Press, Princeton, New Jersey. 528pp.
- Cane, M. A. 1983. Oceanographic events during El Niño. *Science* 222: 1189-1195.
- Clements, J. F., T. S. Schulenberg, M. J. Iliff, D. Roberson, T. A. Fredericks, B. L. Sullivan, and C. L. Wood. 2017. The eBird/Clements checklist of birds of the world: v2016. [Online Resource] Retrieved from <http://www.birds.cornell.edu/clementschecklist/download/> [Accessed: March 15, 2017].
- Croxall, J. P., P. G. H. Evans and R. W. Schreiber. 1983. Status and conservation of the world's seabirds. Cambridge, UK: Internatl. Council Bird Preserv., Tech. Publ. no. 2.
- DeCicco, L. 2015. Facebook: Alaska Rare Bird Alert: September 13, 2015: Red-footed Booby [Online Resource] Retrieved from <https://www.facebook.com/groups/185008678318969/permalink/537567649729735/> [Accessed: February 11, 2019].
- De Korte, J. 1984b. "Status and conservation of seabird colonies in Indonesia." In *Status and conservation of the world's seabirds.*, edited by J. P. Croxall, P. G. H. Evans and R. W. Schreiber, 527-545. Cambridge, U.K: Intl. Council Bird Preserv.
- De Korte, J. and M. J. Silvius. 1994. "Pelecaniformes in Indonesia: status, recent changes and management." In *Seabirds on islands: threats, case studies and action plans.*, edited by D. N. Nettleship, J. Burger and M. Gochfeld, 77-93. Cambridge, U.K: BirdLife Intl.
- Diamond, A. W. 1980. The Red-footed Booby colony on Little Cayman: size, structure, and significance. *Atoll Res. Bull.* 241: 165-170.
- Diamond, A. W. 1994. "Seabirds of the Seychelles, Indian Ocean." In *Seabirds on islands: threats, case studies, and action plans.*, edited by D. N. Nettleship, J. Burger and M. Gochfeld, 258-267. no. 1: BirdLife Intl. Conserv. Ser.
- Dickinson, E. C., R. S. Kennedy and E. C. Parkes. 1991. *The birds of the Philippines*. Tring, U.K: BOU Checklist 12. Br. Ornithol. Union.
- Dunn, J. L. and J. Alderfer. 2011. *National Geographic Field Guide to the Birds of North America*. National Geographic Society, Washington D.C. 574pp.

- Duffy, D. C., A. Berutti, R. M. Randall and J. Cooper. 1984a. Effects of the 1982-1983 warm water event on the breeding of South African seabirds. *South African J. Sci.* 80: 65-69.
- Evans, P. G. H. (1990). *Birds of the eastern Caribbean*. Macmillan Press, Ltd., London, United Kingdom.
- Everett, W. T. and D. W. Anderson. 1991. "Status and conservation of the breeding seabirds on offshore Pacific islands of Baja California and the Gulf of California." In *Seabird status and conservation: A supplement.*, edited by J. Croxall, 115-139. ICBP Tech. Publ. 11.
- Feare, C. J. 1984b. "Seabird status and conservation in the tropical Indian Ocean." In *Status and conservation of the world's seabirds*, edited by J. P. Croxall, P. G. H. Evans and R. W. Schreiber, 457-471. Cambridge, UK: ICBP Tech. Publ. No. 2.
- Glynn, P. W. 1990. *Global ecological consequences of the 1982-1983 El Niño-Southern Oscillation*. Amsterdam: Elsevier.
- Gochfeld, M., J. Burger, A. Haynes-Sutton, R. Van Halewyn and J. E. Saliva. 1994. "Successful approaches to seabird protection in the West Indies." In *Seabirds on islands: threats, case studies and action plans.*, edited by D. N. Nettleship, J. Burger and M. Gochfeld, 186-209. Birdlife International: Birdlife Conserv. Ser. 1.
- Graybill, M. R. and J. Hodder. 1985. "Effects of the 1982-83 El Niño on reproduction of six species of seabirds in Oregon." In *El Niño North: Niño Effects in the Eastern Subarctic Pacific Ocean.*, edited by W. S. Wooster and D. L. Fluharty, 205-210. Univ. Washington, Seattle: Washington Sea Grant Program.
- Hamilton, R. A., M. A. Patten, and R. A. Erickson. 2007. *Rare Birds of California: A work of the California rare bird record committee*. Western Field Ornithologists, Camarillo, California. 605pp.
- Halpern, D. 1986. "Anomalous circulation in the equatorial Pacific during the 1982-83 El Niño." In *Further progress in equatorial oceanography.*, edited by E. J. Katz and J. M. Witte, 263-277. Fort Lauderdale: Nova Univ. Press.
- Harrison, C. S. 1990a. *Seabirds of Hawai'i: natural history and conservation*. Ithaca, NY: Cornell Univ. Press.
- Harrison, P. 1983b. *Seabirds: an identification guide*. Boston, MA: Houghton Mifflin Co.
- Harrison, P. 1987. *Seabirds of the World: A Photographic Guide*. Princeton University Press, Princeton. 317pp

- Hasegawa, H. 1984. "Status and conservation of seabirds in Japan, with special attention to the Short-tailed Albatross." In Status and conservation of the world's seabirds., edited by J . P. Croxall, P. G. H. Evans and R. W. Schreiber, 487-500. Cambridge, U.K: Intl. Council Bird Pres. Tech. Publ. No. 2.
- Howell, S. N. G. and S. Webb. 1990b. The seabirds of Las Islas Revillagigedo, Mexico. Wilson Bulletin 102: 140-146.
- Howell, S. N. G. and S. Webb. 2010 (ed). A guide to the birds of Mexico and northern Central America. Oxford University Press Inc., New York. 851pp.
- Hsu, W. and D. S. Melville. 1994. "Seabirds of China and adjacent seas: status and conservation." In BirdLife Conservation. Ser. 1., edited by D. N. Nettleship, J. Burger and M. Gochfeld, 210-218. Cambridge, U.K: BirdLife International.
- Jehl, J. R. and K. C. Parkes. 1982. The status of the avifauna of the Revillagigedo Islands, Mexico. Wilson Bulletin 94:1-104.
- Kepler, C. B., A. K. Kepler and D. H. Ellis. 1994. The natural history of Caroline Atoll, southern Line Islands. Part 2. Seabirds, other terrestrial animals, and conservation. Atoll Res. Bull. 398: 1-61.
- Kirby, Jr., H. 1925. The birds of Fanning Island, central Pacific Ocean. Condor 27: 185-197.
- Lack, D. 1967. Interrelationships in breeding adaptations as shown by marine birds. Acta XIV Congr. Intl. Ornithologici 1: 3-42.
- Mayr, E. and G. W. Cottrell. 1979. Check-list of birds of the world: revision of the work of James L. Peters. 2nd ed. Cambridge, MA: Mus. Comp. Zool.
- Mckinnon, J. and K. Phillipps. 1993. The birds of Borneo, Sumatra, Java, and Bali; the greater Sunda Islands. Oxford, U.K: Oxford Univ. Press.
- Melville, D. S. 1984. Seabirds of China and the surrounding seas. ICBP Tech Publ. 2.
- Nelson, J. B. 1978c. The Sulidae, gannets and boobies. Oxford, U.K: Oxford Univ. Press.
- Norton, R. L. 1995. West Indies Region. Am. Birds 49: 985-986.
- OFO. 2016. Oregon Field Ornithologists - Records Committee. [Online resource] <http://www.oregonbirds.org/index.html>. [Accessed: December 24, 2018].
- Olson, S. L. 1981a. Natural history of vertebrates on the Brazilian islands of the mid south Atlantic. Natl. Geograph. Res. Rep. 13: 481-492.

- Palmer, R. S. 1962. Handbook of North American Birds, Vol. 1: Loons through Flamingos. Yale University Press, New Haven, CT.
- Peterson, R. T. and E. L. Chalif. 1973. A Field Guide to Mexican birds. Boston: Houghton Mifflin Co.
- Pitman, R. L., L. B. Spear and M. P. Force. 1995. The marine birds of Malpelo Island, Colombia. Colon. Waterbirds 18: 113-119.
- Rasmusson, E. R. and J. M. Wallace. 1983. Meteorological aspects of the El Niño/Southern Oscillation. Science 222: 1195-1202.
- Reichel, J. D. 1991. "Status and conservation of seabirds in the Mariana Islands." In Seabird status and conservation: a supplement., edited by J. P. Croxall, 248-262. Cambridge, UK: Int. Counc. Bird Preserv. Tech. Publ. no. 11.
- Reville, B. J. and T. Stokes. 1994. "Conservation of sea-birds on Christmas Island, Indian Ocean." In Seabirds on islands: threats, case studies, and action plans., edited by D. N. Nettleship, J. Burger and M. Gochfeld, 244-257. no. 1. BirdLife Intl. Cambridge, U.K: BirdLife Conserv. Ser.
- Russell, S. M. 1964. A distributional study of the birds of British Honduras. Ornithol. Monogr. 1.
- Sibley, D. A. 2000. The Sibley field guide to birds. Alfred A. Knopf, New York. 545pp.
- Schreiber, E. A. 1994. El Niño-Southern Oscillation effects on provisioning and growth in Red-tailed Tropicbirds. Colon. Waterbirds 17: 105-120.
- Schreiber, R. W. and N. P. Ashmole. 1970. Sea-bird breeding seasons on Christmas Island, Pacific Ocean. Ibis 112: 363-394.
- Schreiber, E. A. and R. W. Schreiber. 1989. Insights into seabird ecology from a global "natural experiment.". Natl. Geograph. Res. 5: 64-81.
- Schreiber, E. A., R. W. Schreiber, and G. A. Schenk. 1996. *Red-footed Booby (Sula sula)*, version 2.0. In The Birds of North America (A. F. Poole and F. B. Gill, Editors). Cornell Lab of Ornithology, Ithaca, NY, USA. [Online Resource] Retrieved from <https://doi.org/10.2173/bna.241> [Accessed: February 6, 2019].
- Steadman, D. W. 1989. Extinction of birds in eastern Polynesia: a review of the record, and comparisons with other Pacific island groups. J. Archaeo. Sci. 16: 177-205.

- Steadman, D. W., D. S. Pahlavan and P. V. Kirch. 1990. Extinction, biogeography and human exploitation of birds on Tikopia and Anuta, Polynesian outliers in the Solomon Islands. *Bishop Mus. Occas. Papers* 30: 118-153.
- Stokes, T. 1994. "An update on birds of the Cocos (Keeling) Islands, no. 405." In *Ecology and geomorphology of the Cocos (Keeling) Islands*, edited by C. E. Woodroffe, 1-6. Washington, D.C: Natl. Mus. Nat. Hist.
- Stokes, D. and L. Stokes. 2010. *The Stokes Field Guide to the Birds of North America*. Little, Brown and Company, New York. 791pp.
- Tietz, J. and G. McCaskie. 2018. Update to Rare Birds of California: 1 January 2004 – 23 January 2018. [Online Resource] Retrieved from http://www.californiabirds.org/cbrc_book/update.pdf [Accessed: December 28, 2018].
- Toochin, R., J. Fenneman, P. Levesque and D. Cecile. 2018. British Columbia Rare Bird List: Casual and Accidental Records: July 15, 2018: 5th Edition [Online Resource] Retrieved from <http://ibis.geog.ubc.ca/biodiversity/efauna/documents/BC%20Rare%20Bird%20ListVersion-July-15-2018.pdf> [Accessed: January 27, 2019].
- Tunnell, J. W. and B. R. Chapman. 1988. First record of Red-footed Boobies nesting in the Gulf of Mexico. *Am. Birds* 42: 380-381.
- van Halewyn, R. and R. L. Norton. 1984. The status and conservation of seabirds in the Caribbean. *ICBP Tech. Publ.* 2: 169-222.
- Van Tets, G. F. and P. J. Fullagar. 1984. "Status of seabirds breeding in Australia." In *Status and conservation of the world's seabirds.*, edited by J. P. Croxall, P. G. H. Evans and R. W. Schreiber, 559-571. *ICBP Tech. Publ.* no. 2.
- Verner, J. 1961. Nesting activities of the Red-footed Booby in British Honduras. *Auk* 78: 573-594.
- Wahl, T. R, B. Tweit, and S. Mlodinow. 2005. *Birds of Washington: Status and Distribution*. Oregon State University Press, Corvallis, Oregon. 436pp.
- Watson, G. E. 1965a. Preliminary Smithsonian identification manual; seabirds of the tropical Atlantic Ocean. Washington, D.C: Smithson. Inst.
- Watson, G. E., R. L. Zusi and R. E. Storer. 1963. Preliminary field guide to the birds of the Indian Ocean. Washington, D.C: Smithson. Inst.

WBRC. 2018. Washington Bird Records Committee – Summary of Decisions. Washington Ornithological Society, Seattle, WA. [Online resource]
<http://www.wos.org/wbrcaccepteddec2018.pdf> [Accessed: December 16, 2018].

White, A. W., B. Hallett and M. Bainton. 1995a. Red-footed Boobies nest at White Cay, San Salvador. *El Pitirre* 8: 13.

Wyrтки, K. 1975. The dynamic response of the equatorial Pacific Ocean to atmospheric forcing. *J. Physiol. Oceanogr.* 5: 572-584.

Wyrтки, K., E. Stroup, W. Patzert, R. Williams and W. Quinn. 1976. Predicting and observing El Niño. *Science* 191: 343-346.