ORNITOLOGÍA NEOTROPICAL
(2025) 36: 28–32
DOI: 10.58843/ornneo.v36i1.1327
SHORT NOTE

Sociedad de Ornitología Neotropical

LONGEVITY RECORD FOR A BROWN-CRESTED FLYCATCHER *MYIARCHUS TYRANNULUS* (TYRANNIDAE) FROM OMETEPE ISLAND, NICARAGUA

Norlan Zambrana Morales[1] · Salvadora Morales[2] · Keyla Mena[1] · Osmar Sandino[1] · Steven Albert[3]*

[1] Biometepe, G8Q2+FPF, Moyogalpa, Nicaragua
[2] P.O. Box 1770, Manomet, Massachusetts, 02345, USA
[3] The Institute for Bird Populations, P.O. Box 518, Petaluma, California, 94953, USA.
Email: Steven Albert · salbert@birdpop.org

Abstract · Recapture analysis of banded birds helps researchers evaluate parameters such as longevity and survival, which provide insight into the life history, demography and general ecology of species and communities. However, long-term recapture data on Neotropical species are relatively scarce. As part of the Monitoring Overwinter Survival (MoSI) program, we have been banding and monitoring birds on Ometepe island in Lake Nicaragua, Nicaragua, intermittently since 2006. Here, we report the longevity of a Brown-crested Flycatcher *Myiarchus tyrannulus* which was banded in 2007 and recaptured in good health in 2023, making the bird at least 17 years 8.5 months old. After searching the extant literature for longevity records for all species in Tyrannidae, and finding published data on 41 of these, we believe our data provides a new published record for the family.

Un Récord De Longevidad Para *Myarchus tyrannulus* (Tyrannidae) en Isla de Ometepe, Nicaragua

Resumen · El análisis de recaptura de aves anilladas ayuda a los investigadores a evaluar parámetros como la longevidad y la supervivencia, que brindan información sobre la historia de vida, la demografía y la ecología general de las especies y las comunidades. Sin embargo, los datos de recaptura a largo plazo de las especies neotropicales son relativamente escasos. Como parte del programa de Monitoreo de la Supervivencia Invernal (MoSI), hemos estado anillando y monitoreando aves en la isla de Ometepe en el Lago de Nicaragua, Nicaragua, de manera intermitente desde 2006. Aquí, informamos sobre la longevidad de un *Myiarchus tyrannulus* que fue anillado en 2007 y recapturado en buen estado de salud en 2023, lo que hace que el ave tenga al menos 17 años y 8,5 meses de edad. Después de buscar en la literatura existente registros de longevidad para todas las especies de Tyrannidae, y encontrar datos publicados sobre 41 de ellas, creemos que nuestros datos proporcionan un nuevo registro publicado para la familia.

Keywords: *Biometepe · Bird Banding · Bird Monitoring · MoSI Program · Neotropical Migrants*

INTRODUCTION

Analysis of the recaptures of banded birds helps scientists evaluate parameters such as demography, population structure, longevity and survival (Baillie et al. 1986, DeSante 1992). In addition, ecologists often use longevity data to evaluate habitat quality, determine the effectiveness of habitat restoration, understand potential threats to a species' survival, and inform conservation strategies (Pyle et al. 2020). Longevity data are also used to investigate evolutionary patterns by comparing lifespan across different bird species (Holmes and Austad 1995), often relating it to factors such as body size (Parrish 1997), habitat (Pyle et al. 2020), and diet (Poulin et al. 1994). However, there is much that is still poorly understood about longevity and ageing in birds, including questions such as why many birds live so long relative to their metabolism and body size —on average, much longer than similar-sized mammals or mammals with similar metabolisms.

Bird banding began in the Americas around 1920 (Tautin 2005). Over the past century, hundreds of studies have documented important aspects of avian ecology and migratory connectivity through the use of bird banding data alone (U.S. Bird Banding Laboratory 2020, Fernández-Ordóñez and Albert 2022). Other technologies have surpassed banding in terms of information on species movements and other aspects of their ecology, but long-term bird banding still provides one of the few ways to accurately determine or estimate the longevity of a bird, a crucial piece of information in understanding the basic ecology, population dynamics, and conservation needs of many species.

Clapp et al. (1983), Klimkiewicz and Futcher (1989), and Klimkiewicz (2008) published longevity records for dozens of species, although many may be severe underestimates due to lack of reliable data. We believe that the reasons for this are (1) recapture of banded birds is somewhat rare, requiring sustained, long-term monitoring to gather robust data sets; (2) the source journals that report longevity are widely dispersed in a number of different languages; (3) attempts to collect and unify this information, such as Cor-

Submitted 26 Mar 2024 · First decision 11 May 2024 · Acceptance 14 Feb 2025 · Online publication 29 Sep 2025
Communicated by Ignacio Roesler

nell University's Birds of the World, is relatively new and lack data for numerous species; (4) many bird banders, who have the unanalyzed data on hand, have published only a small fraction of it; and (5) determining the age of birds in the field can be difficult. Molt patterns provide clues about the age of most birds up to two or three years, and slightly longer for others such as woodpeckers and larger birds such as raptors (Pyle 2022). However, aging by molt patterns is challenging because at later ages birds no longer retain feathers from their juvenile or formative plumages to indicate a relatively precise age.

Banding and recapture records from the Monitoring Avian Productivity and Survivorship (MAPS) and the Monitoring Overwinter Survival programs have been used to document new longevity records for many species (Rowan et al 2014, Grosselet et al. personal communication). Overall, however, a surprising lack of long-term longevity data for many species persists, especially from the Neotropics (Albert et al. 2020). The goal of this study is to provide information on the longevity of a common Neotropical migratory species, and to encourage other banders to share this very important and easy to acquire information on the birds they band.

METHODS

Study site. Since 2005, we have operated a bird banding and monitoring station on the island of Ometepe, in Lake Nicaragua (or Lago Cocibolca, as it is known locally), Nicaragua (11°30'46.5"S, 85°34'6.8"W). Major ecosystem types at the study site include wetlands and tropical rainforests often dominated by Spanish cedar *Cedrela odorata* and evergreens such as *Guarea grandifolia* (UNESCO 2025). A wide range of elevations on the island's two volcanic peaks provide a diversity of habitats and distinctive animal and plant species, including several rare and endangered species such as Yellow-naped Parrot *Amazona auropalliata*. Ometepe has a tropical climate for the region, with average daytime high temperatures generally ranging from 31°C in October to 34°C in April, and nighttime lows ranging from 20°C in January to 22°C in May through October (Morales et al. 2008). The driest month is March, which may have no precipitation, and the rainiest period is September and October, during which time it may rain up to 300 mm per month (Meteoblue.com 2024).

Sampling: Bird banding and monitoring was accomplished under the auspices of the MoSI program, a network of standardized constant-effort bird banding stations, run independently by non-profits, public agencies, and individuals, and administered by The Institute for Bird Populations (DeSante et al. 2021). Bird banding under the MoSI program began at the station in November 2006 using the standardized MoSI protocol (DeSante et al. 2021) for marking birds and monitoring recaptures. We have operated the Ometepe MoSI station from November through March each year since it was established, except from 2015–2021 when operations were halted due to lack of funding. Station operation involved erecting up to twelve consistently located, 12 m long x 2.5 m high mist-nets, with a 30 mm mesh size (Ralph et al. 1996). Mist-nets were opened at local sunrise and closed before dusk (17:00 h) for two consecutive days. Each captured bird was marked with a unique numbered aluminum band, and information was recorded on its age (as outlined in Pyle 2022), sex, reproductive status, molt, wing chord, weight, and physical condition, as described in the protocols of the MoSI program (DeSante et al. 2021).

Literature searches: As longevity estimates for most Tyrannidae have not been widely studied or reported, we reviewed longevity records for all 440 species of Tyrannidae (Winkler et al. 2020). We consulted species accounts in Birds of the World (2022), and AnAge, the Animal Ageing and Longevity Database (De Magalhães and Costa 2009), and other sources particular to one or a few species, as listed in Table 1.

Table 1. Longevity records for 41 species of the family Tyrannidae obtained from a literature search. Species are listed alphabetically by genus.

Common Name	Scientific Name	Reported Age	Source
Tufted Tit-Tyrant	*Anairetes parulus*	1 year, 3 months	Rozzi and Jiménez 2013
Northern Beardless Tyrannulet	*Camptostoma imberbe*	5 years, 9 months	Tenney 2020
Fuscous Flycatcher	*Cnemotriccus fuscatus*	7 years, 10 months	Verea et al. 2007
Olive-sided Flycatcher	*Contopus cooperi*	11 years, 1 month	De Magalhães and Costa 2009
Lesser Antillean Pewee	*Contopus latirostris*	10 years	Cole 2020
Greater Pewee	*Contopus pertinax*	6-7 years	Clapp et al. 1983
Western Wood-Pewee	*Contopus sordidulus*	6 years, 1 month	Bemis and Rising 2020
Eastern Wood-Pewee	*Contopus virens*	8 years, 2 months	Watt et al. 2020
White-crested Elaenia	*Elaenia albiceps*	7 years, 0 months	Brown et al. 2007
Alder Flycatcher	*Empidonax alnorum*	9 years, 1 months	De Magalhães and Costa 2009
Western Flycatcher	*Empidonax difficilis*	6 years, 11 months	Lowther et al. 2023
Yellow-bellied Flycatcher	*Empidonax flaviventris*	3 years, 11 months	Clapp et al. 1983
Buff-breasted Flycatcher	*Empidonax fulvifrons*	2 years	Bowers and Dunning 2020
Hammond's Flycatcher	*Empidonax hammondii*	7 years	De Magalhães and Costa 2009
Least Flycatcher	*Empidonax minimus*	8 years	Clapp et al. 1983
Dusky Flycatcher	*Empidonax oberholseri*	9 years	De Magalhães and Costa 2009
Willow Flycatcher	*Empidonx traillii*	11 years	De Magalhães and Costa 2009
Acadian Flycatcher	*Empidonax virescens*	12 years, 1 month	Tweidt 2008
Euler's Flycatcher	*Lathrotriccus euleri*	5 years, 9 months	de Souza Lopes et al. 1980
Slaty-capped Flycatcher	*Leptopogon superciliaris*	7 years, 4 months	Scholer et al. 2018
Olive-striped Flycatcher	*Mionectes galbinus*	9 years	Lentino et al. 2003
Gray-hooded Flycatcher	*Mionectes rufiventris*	3 years, 3 months	de Souza Lopes et al. 1980
Apical Flycatcher	*Mionectes striaticollis*	7 years, 6 months	Scholer et al. 2018
Dark-faced Ground-Tyrant	*Muscisaxicola macloviana*	0 Years, 3 months	Rozzi and Jiménez 2013
Puerto Rican Flycatcher	*Myiarchus antillarum*	13 years, 7 months	De Magalhães and Costa 2009
Apical Flycatcher	*Myiarchus apicalis*	6 years	De Magalhães and Costa 2009
Ash-throated Flycatcher	*Myiarchus cinerascens*	11 years, 9 months	De Magalhães and Costa 2009
Great Crested Flycatcher	*Myiarchus crinitus*	14 years, 0 months	Miller and Lanyon 2020
Dusky-capped Flycatcher	*Myiarchus tuberculifer*	13 years, 11 months	Clapp et al. 1983
Brown-crested Flycatcher	*Myiarchus tyrannulus*	17 years, 8.5 months	This study
Venezuelan Flycatcher	*Myiarchus venezuelensis*	9 years	Sainz-Borgo 2023
Bran-colored Flycatcher	*Myiophobus fasciatus*	5 years, 1 month	de Souza Lopes et al. 1980
Planalto Tyrannulet	*Phyllomyias fasciatus*	4 years, 4 months	de Souza Lopes et al. 1980
Vermilion Flycatcher	*Pyrocephalus rubinus*	5 years, 6 months	Ellison et al. 2021
Black Phoebe	*Sayornis nigricans*	10 years	Schroeder 1985
Eastern Phoebe	*Sayornis phoebe*	10 years, 3 months	Weeks 2020
Say's Phoebe	*Sayornis saya*	5 years	Weathers 1983
Thick-billed Kingbird	*Tyrannus crassirostris*	10 years	Small 1994
Eastern Kingbird	*Tyrannus tyrannus*	10 years	Murphy 2014
Western Kingbird	*Tyrannus verticalis*	6 years, 11 months	Kennard 1975
Fire-eyed Diucon	*Xolmis pyrope*	0 years 7 months	Rozzi Jiménez 2013

Figure 1. The Brown-crested Flycatcher *Myiarchus tyrannulus* captured on 19 February 2024 at Ometepe Island, Nicaragua, still in apparently good health at 17 years 8.5 months of age. Photograph by Norlan Zambrana).

RESULTS

On 17 January 2007, we captured and banded a Brown-crested Flycatcher *Myiarchus tyrannulus*. Based on retained juvenile primary coverts present on this date, we determined the age as a second calendar year (SY) or formative-plumaged (FCF) bird. Like most suboscine passerine birds, members of the family Tyrannidae undergo a partial to complete pre-formative molt, meaning that in their first year of life, they drop some juvenile (primarily body) feathers, and replace them with fresh adult-like formative feathers, retaining some of their juvenile (primarily wing and tail) feathers into their second year (Pyle 2022). Differentiating the retained juvenile feathers from the freshly-replaced formative feathers is one very important clue to ageing a bird. In the case of *Myiarchus tyrannulus*, their pre-formative molt takes place during August to February (Pyle 2022), meaning that birds captured during this period that have both juvenile and formative feathers—as this individual did—would be a formative-plumaged (or Second Year) bird after January 1. The most typical formative plumage pattern in this species is to have retained juvenile primary coverts while all other feathers are replaced (Pyle 2022), which matches the pattern seen on this *Myiarchus tyrannulus*.

This bird was almost certainly born during the spring season, though it is not possible to fix an exact date without more evidence. In such cases, and with a reasonable certainty that the bird is migratory and was born in temperate North America, we assigned an estimated hatching date for this bird of 1 June 2006.

The bird was recaptured five additional times, on 23 February 2007; 8 January 2009; 16 February 2010; 17 March 2010; 19 February 2023; and most recently on 27 March 2023 at the approximate age of 17 years 8.5 months (Figure 1). During all captures, the bird had relatively low fat scores (0 or 1 on a scale of 0 to 7), which is not unusual for a mid-non-breeding season capture, i.e., before Nearctic Neotropical migrants began packing on weight and fat for northward migration in the ensuing months. The bird was always captured in basic plumage. Pyle (2022) states that the pre-basic plumage for this species usually commences on the breeding grounds, and completes at stopover locations or on the winter grounds, where most flight feathers are replaced. The fact that the bird was observed in basic plumage and not in molt indicates that the pre-basic molt had been completed before capture.

Our literature search revealed longevity records for 41 species of Tyrannidae (Table 1). This covered species from only 16 (15.1%) of 106 genera in the family: *Anairetes, Camptostoma, Cnemotriccus, Contopus, Elaenia, Empidonax, Lathrotriccus, Leptopogon, Mionectes, Muscisaxicola, Myiarchus, Myiophobus, Phyllomyias, Pyrocephalus, Sayornis, Tyrannus, and Xolmis* (Table 1). The average longevity of Tyrannidae species was 7.79 ± 3.7 years (N = 41 species), with a range of 2 to 14 years (Table 1). In addition, many of these records are obvious underestimates of the true longevity for the species (ages of 2 years, or even less, etc.). For *Myiarchus tyrannulus*, AnAge lists the current known longevity for this species at 11 years (De Magalhães and Costa 2009), and the Birds of the World (2022) online resource lists the current known longevity for this species at 9 years, 11 months (Klimkiewicz and Futcher 1989). After this review, we believe that our record of 17 years, 8.5 months for this species is an unprecedented record for Tyrannidae (Table 1).

DISCUSSION

The longevity of 17 years, 8.5 months we estimated for *Myiarchus tyrannulus* far surpasses the previous documented age for this species (Klimkiewicz and Futcher 1989, De Magalhães and Costa 2009) and is higher than the recorded longevity for any of the 440 species of Tyrannidae documented to date. Furthermore, we found longevity records for only 41 (9.3%) of the 440 species in the family. Tyrannidae is an example of a

large and diverse family of North and South American species for which little data on longevity are available.

The lack of basic longevity information for nearly 90% of the species in this family (and no doubt, other families as well) points to the great need for continued long-term monitoring. Basic biological data such as longevity, philopatry, sex ratios, and vital rates can help conservation professionals make informed decisions. Community and citizen science programs such as the Monitoring Avian Productivity and Survivorship and Monitoring Overwinter Survival programs can aid by providing a large, standardized database from which researchers from all over the hemisphere can glean data for a variety of research interests.

ACKNOWLEDGEMENTS

We thank the many banders and assistants that helped in the collection of these data, including Sandra Hernández, Luis Valerio, Horacio Galán Arle Morales, Lesly Hernández, Adonis Antonio López, Levis Antonio Hernández, Emerson Urtecho, Deglyn del Socorro Barrios Cruz, Fauto Jose Gonzáles, and Pamela Arebalo. The work was conducted under the auspices of Fauna and Flora International and the Nicaragua non-profit organization Biometepe, both of which we thank for their support. We thank Peter Pyle and Rodney Siegel for their comments on early drafts of this paper.

REFERENCES

Albert, S, JD Wolfe, J Kellerman, T Sherry, BJM Stutchbury, NJ Bayly, A Ruiz-Sanchez (2020) Habitat ecology of Nearctic-Neotropical migratory landbirds on the nonbreeding grounds. *The Condor: Ornithological Applications* 122: 1–18. https://doi.org/10.1093/condor/duaa055

Baillie, SR, RE Green, M Boddy, ST Buckland (1986) *An Evaluation of the Constant Effort Sites Scheme.* British Trust for Ornithology, Thetford, UK.

Bemis, C, JD Rising (2020) Western Wood-Pewee (*Contopus sordidulus*), version 1.0. *In* Poole AF and FB Gill (eds). *Birds of the World*. Cornell Lab of Ornithology, Ithaca, New York, USA. Available at https://doi.org/10.2173/bow.wewpew.01 [Accessed 1 December 2023]

Bowers Jr, RK, JB Dunning (2020) Buff-breasted Flycatcher (*Empidonax fulvifrons*), version 1.0. *In* Poole AF and FB Gill (eds). *Birds of the World*. Cornell Lab of Ornithology, Ithaca, New York, USA. Available at https://doi.org/10.2173/bow.bubfly.01 [Accessed 1 December 2023]

Brown, CE, CB Anderson, S Ippi, MF Sherriffs, R Charlin, S McGehee, R Rozzi (2007) Autoecología del Fío-Fío (*Elaenia albiceps* LaFresnaye & D'Orbigny) en los bosques subantárcticos de la reserva de biosfera Cabo de Hornos, Chile. *Anales del Instituto de la Patagonia* 35: 29–40.

Clapp, RB, MK Klimkiewicz, AG Futcher (1983) Longevity records of North American birds: Columbidae through Paridae. *Journal of Field Ornithology* 54: 123–137.

Cole, KK (2020) Lesser Antillean Pewee (*Contopus latirostris*), version 1.0. *In* Schulenberg TS (ed). *Birds of the World*. Cornell Lab of Ornithology, Ithaca, New York, USA. Available at https://doi.org/10.2173/bow.leapew1.01 [Accessed 1 December 2023]

De Magalhães, JP, J Costa (2009) A database of vertebrate longevity records and their relation to other life-history traits. *Journal of Evolutionary Biology* 22: 1770–1774. https://doi.org/10.1111/j.1420-9101.2009.01783.x

de Souza Lopes, OS, LH Sacchetta, E Dente (1980) Longevity of wild birds obtained during a banding program in Sao Paulo, Brazil. *Journal of Field Ornithology* 51: 144–148.

DeSante, DF (1992) Monitoring Avian Productivity and Survivorship (MAPS): a sharp, rather than blunt, tool for monitoring and assessing landbird populations. Pp. 511–521 *in* McCullough DC and RH Barrett (eds). *Wildlife 2001: Populations*. Elsevier Applied Science, London, UK.

DeSante, DF, JF Saracco, P Pyle, Claudia Romo de Vivar Álvarez, Salvadora Morales, L Helton, R Taylor, et al. (2021) *MoSI (Monitoreo de Sobrevivencia Invernal) manual: instructions for establishing and operating bird banding stations as part of the MoSI Program*. The Institute for Bird Populations, Point Reyes Station, California, USA.

Ellison, K, BO Wolf, SL Jones (2021) Vermilion Flycatcher (*Pyrocephalus rubinus*), version 1.1. *In* Poole AF (ed). *Birds of the World*. Cornell Lab of Ornithology, Ithaca, New York, USA. Available at https://doi.org/10.2173/bow.verfly.01.1 [Accessed 1 December 2023]

Fernández-Ordóñez, JC, SK Albert (2023) A century of bird band recoveries in Venezuela yield insights into migratory ecology. *Southwestern Naturalist* 67: 39–51. https://doi.org/10.1894/0038-4909-67.1.39

Holmes, DJ, SN Austad (1995) Birds as animal models for the comparative biology of aging: a prospectus. *Journal of Gerontology: Biological Sciences* 50A: B59–66. https://doi.org/10.1093/gerona/50A.2.B59

Kennard, JH (1975) Longevity records of North American birds. *Bird-Banding* 46: 55–73. https://doi.org/10.2307/4512096

Klimkiewicz, MK (2008) *Longevity records of North American birds.* Version 2008.1. Patuxent Wildlife Research Center, Bird Banding Laboratory, Laurel, MD, USA. Available at https://h-mar.org/author/jon-gelmanhi-mma-org/ [Accessed 1 December 2023]

Klimkiewicz, KM, AG Futcher (1989) Longevity records of North American birds, Supplement 1. *Journal of Field Ornithology* 60: 469–494.

Lentino, M, E Bonaccorso, MA García, EA Fernández, R Rivero, C Portas (2003) Longevity records of wild birds in the Henri Pittier National Park, Venezuela. *Ornitología Neotropical* 14: 545–548.

Lowther, PE, DA McCallum, P Pyle, WA Hopping (2023) Western Flycatcher (*Empidonax difficilis*), version 1.0. *In* Keeney BK and SM Billerman (eds). *Birds of the World*. Cornell Lab of Ornithology, Ithaca, New York, USA. Available at https://doi.org/10.2173/bow.wesfly.01 [Accessed 1 December 2023]

Meteoblue.com (2024) Weather statistics for Isla de Ometepe. Available at https://www.meteoblue.com/en/weather/week/isla-de-ometepe_nicaragua_3617424 [Accessed 13 February 2025]

Miller, KE, WE Lanyon (2020) Great Crested Flycatcher (*Myiarchus crinitus*), version 1.0. *In* Poole AF (ed). *Birds of the World*. Cornell Lab of Ornithology, Ithaca, New York, USA. Available at https://doi.org/10.2173/bow.grcfly.01 [Accessed 1 December 2023]

Morales, S, D Osorno, WJ Arendt, and S Hernández. 2008. *Bird checklist of Ometepe Island, Nicaragua.* US Forest Service. Available at https://research.fs.usda.gov/treesearch/61462 [Accessed 15 Sep 2015]

Murphy, MT (2014) Survival, longevity, and breeding dispersal by Eastern Kingbirds in central New York. *Kingbird* 64: 290–300.

Parrish, JD (1997) Patterns of frugivory and energetic condition in Nearctic landbirds during autumn migration. *The Condor* 99: 681–197. https://doi.org/10.2307/1370480

Poulin, B, G Leefebvre, R McNeil (1994) Diets of land birds from Northeastern Venezuela. *The Condor* 96: 354–367. https://doi.org/10.2307/1369320

Pyle, P (2022) *Identification guide to North American birds, part I, second edition.* Slate Creek Press, Bolinas, California, USA.

Pyle, P, KR Foster, CM Godwin, DR Kaschube, JF Saracco (2020) Yearling proportion correlates with habitat structure in a boreal forest landbird community. *PeerJ* 8: e8898. https://doi.org/10.7717/peerj.8898

Rowan, E, RB Siegel, DR Kaschube, S Stock (2014) North American longevity records for nine landbird species monitored at Yosemite National Park's MAPS stations. *North American Bird Bander* 39: 153–159.

Rozzi R, JE Jiménez (2013) *Magellanic Sub-Antarctic ornithology: first decade of long-term bird studies at the Omara Ethnobotanical Park, Cape Horn Biosphere Reserve, Chile.* University of North Texas Press and Ediciones Universidad de Magallanes, Santiago, Chile.

Sainz-Borgo, C (2023) Venezuelan Flycatcher (*Myiarchus venezuelensis*), version 2.0. *In* Billerman SM (ed). *Birds of the World*. Cornell Lab of Ornithology, Ithaca, New York, USA. Available at https://doi.org/10.2173/bow.venfly1.02 [Accessed 1 December 2023]

Scholer, MN, CL Merkord, GA Londoño, JE Jankowski (2018). Minimum longevity estimates for some Neotropical landbirds of southeastern Peru. *The Wilson Journal of Ornithology* 130: 818–823. https://doi.

org/10.1676/17-095.1

Schroeder, DA (1985) Breeding biology and population limitation in the Black Phoebe (*Sayornis nigricans*) in southern coastal California. Ph.D. Thesis, University of California, Santa Barbara, California, USA.

Small, A (1994) *California birds: their status and distribution.* Ibis Publishing Company, Vista, CA, USA.

Tautin, J (2005) One hundred years of bird banding in North America. Pp. 815–816 *in* Ralph CJ and TD Rich (eds). USDA Forest Service General Technical Report PSW-GTR-191. *Bird Conservation Implementation and Integration in the Americas: Proceedings of the Third International Partners in Flight Conference*. Asilomar, California,USA.

Tenney, CR (2020) Northern Beardless-Tyrannulet (*Camptostoma imberbe*), version 1.0. *In* Poole AF and FB Gill (eds). *Birds of the World*. Cornell Lab of Ornithology, Ithaca, New York, USA. Available at https://doi.org/10.2173/bow.nobtyr.01 [Accessed 1 December 2023]

UNESCO (2025) *Ometepe Island. Man and The Biosphere Program*. Available at https://www.unesco.org/en/mab/ometepe-island [Accessed 6 February 2025]

US Bird Banding Laboratory (2020) *Why do we band birds?*. Available at https://www.usgs.gov/labs/bird-banding-laboratory/science/why-do-we-band-birds#overview [Accessed 8 December 2023]

Verea C, M Díaz, A Solorzano (2007) Longevidad de dos especies de aves del norte de Venezuela. Ornitología Neotropical 18:459–461.

Watt, DJ, JP McCarty, SW Kendrick, FL Newell, P Pyle (2020). Eastern Wood-Pewee (*Contopus virens*), version 1.0. *In* Rodewald PG (ed). *Birds of the World*. Cornell Lab of Ornithology, Ithaca, New York, USA. Available at https://doi.org/10.2173/bow.eawpew.01 [Accessed 1 December 2023]

Weathers, WW (1983) *Birds of southern California's Deep Canyon*. University of California Press, Berkeley, California, USA. https://doi.org/10.1525/9780520317543

Weeks Jr, HP (2020) Eastern Phoebe (*Sayornis phoebe*), version 1.0. *In* Poole AF (ed). *Birds of the World.* Cornell Lab of Ornithology, Ithaca, New York, USA. Available at https://doi.org/10.2173/bow.easpho.01 [Accessed 1 December 2023]

Winkler DW, SM Billerman, IJ Lovette (2020) Tyrannidae, Tyrant Flycatchers, version 1.0. *In* Billerman, SM, BK Keeney, PG Rodewald and TS Schulenberg (eds). *Birds of the World.* Available at https://doi.org/10.2173/bow.tyrann2.01 [Accessed 1 December 2023]