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The ***Bulletin of the Texas Ornithological Society*** is an annual[1] journal devoted to the biology and conservation of the birds that occur in Texas and adjacent areas.

Texas Birds Annual is published each year and includes new birding areas, recent media, vagrants and noteworthy birds from the previous year, articles on bird conservation issues and species profiles..

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[1]Starting with Vol. 42 both issues were combined..

Cover Photo: Harry Church Oberholser in his office in room 414, U.S. National Museum, in January 1939 at age 68. Photo from: Aldrich, John W. 1968. In Memoriam: Harry Church Oberholser. The Auk 85(1):25-29..

INTRODUCTION TO VOLUME FIFTY

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In 1952, Charles McNeese contacted a few friends and placed an "advertisement" in *The Spoonbill* of the Ornithology Group, Houston Outdoor Nature Club. On 14 February 1953, McNeese and a group of enthusiasts met in Austin and formed the Texas Ornithological Society.

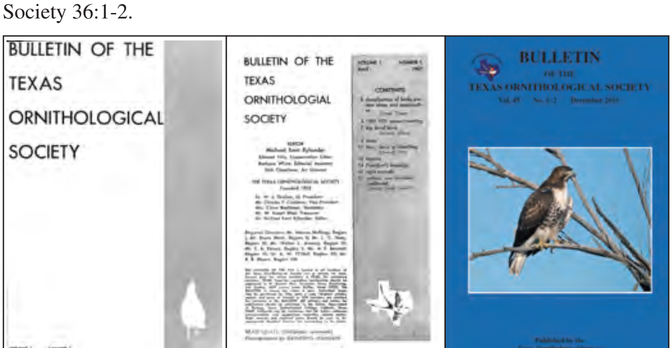
It was decided to use a monthly newsletter to keep the members posted on activities and special observations in the widely diverse regions of the state. On 9 March 1953 issue 1 of the *Newsletter of the Texas Ornithological Society* was published and distributed. For the next eight years, the "Newsletter" was the only publication. In early 1967 Kent Rylander agreed to serve as the first editor of the *Bulletin of the Texas Ornithological Society*. Celebrating the society's 50th anniversary Kent Rylander (2003) wrote the following about the history of the Bulletin.

> *"Accordingly, as the Bulletin's first editor, I urged contributors to aggressively challenge the conventional protocol for state ornithological bulletins and to experiment with unorthodox ways of describing and evaluating our everyday birding experiences. In one series of articles, I invited professional ornithologists to write candidly about why they found their work engaging, how they dealt with their profession's shortcomings, and how they evaluated their accomplishments. These intimate glimpses of their thoughts and feelings were intended to form a "bridge" between the professional ornithologist and the layman; indeed, such bridges were central to what I considered the Bulletin's mission.*
>
> *I was encouraged by the generous responses to my invitations. George M. Sutton, one of the foremost bird artists of that time, explained in sensitive detail how and why he painted birds; Alexander Skutch, perhaps the most prominent neotropical ornithologist of the day, described his personal approaches to studying tropical birds; and Roger Tory Peterson, a sort of patron saint of the TOS at the time (he designed the Scissor−tailed Flycatcher on the TOS emblem), offered to share his personal experiences about birdwatching in Texas. (Regrettably the interview had to be cancelled when I resigned as editor.) Another bridge between the professional ornithologist and amateur birder was a series of articles explaining, in non−technical terms, contemporary views about avian migration, behavior, ecology, and similar topics.*
>
> *Still another was guest editorials dealing with controversial issues, especially the social responsibilities of the TOS. After a few years, the sheer mechanics of editing the "Bulletin" became so overwhelming for a person trying to climb the academic ladder that when Keith Arnold and Douglas Slack courteously suggested that the publication be moved from Texas Tech to Texas A&M, where several persons could work on it, I readily agreed."*

The publication has changed little in the past 50 years. The overall size increased and then was reduced to its current dimensions. In 2009 (Vol. 42) both issues were combined, with a proper cover, perfect binding, and color being added.

LITERATURE CITED

RYLANDER, KENT 2003. History of the "Bulletin of the Texas Ornithological Society" Bulletin of the Texas Ornithological Society 36:1-2.



First issue of the BTOS (left) and recent issue (right).

EDITORS OF THE BULLETIN OF THE TEXAS ORNITHOLOGICAL SOCIETY

Vol 01 (1967)-08 (1975)	Kent Rylander
Vol 09 (1976)-15 (1982)	Douglas Slack
Vol 16 (1983)-17 (1984)	Terry Maxwell
Vol 18 (1985)-21 (1988)	Robert Benson
Vol 22 (1989)-29 (1996)	Karen Benson
Vol 30 (1997)-present	Jack Eitniear

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Frontispiece. The Northern Cardinal (*Cardinalis cardinalis*) longevity record is 15 years 9 months for a female in Pennsylvania. Art compliments of Lynn Delvin

BULLETIN OF THE

TEXAS ORNITHOLOGICAL SOCIETY

LONGEVITY RECORDS OF BIRDS BANDED IN NORTH TEXAS

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ABSTRACT.—Longevity records provide valuable data to develop regional and species-level lifespans for resident and migratory birds. My objective was to document regional and flyway-specific longevity from a long-term bird banding effort. Longevity data was collected from a bird banding station at the Heard Natural Science Museum and Wildlife Sanctuary in North Texas from 1978 to 2014. Forty species had recapture data ≥30 d. Longevity is reported for each species and compared to published lifespans.

Long-term bird banding efforts provide valuable data on species occurrence, diversity, abundance, population dynamics, and survival (Bailey 1974, Wood and Tucker 2010, Osenkowski et al. 2012, Ruiz-Gutierrez et al. 2012, Monroy-Ojeda et al. 2013). Longevity records are kept for bird species and by gender when possible to determine lifespan for bird species in North America (Kennard 1975, Clapp et al. 1982, Clapp et al. 1983, Klimkiewicz et al. 1983, Klimkiewicz and Futcher 1987, Klimkiewicz and Futcher 1989). Longevity records are published on the USGS Bird Banding Laboratory website (USGS Bird Banding Laboratory 2017), although records are often limited by gender. The Birds of North America Online (http://www.americanornithology.org/content/birds-north-america) species accounts have longevity records, but are often incomplete or out of date. Regional and migratory flyway longevity records are lacking in the published literature for comparison across each species' geographic range. My objective was to document longevity and extrapolate minimum lifespans for bird species captured during a long-term bird banding effort in North Texas.

METHODS

Passerines and other birds were banded at the Heard Natural Science Museum and Wildlife Sanctuary (hereafter, Heard Museum) in McKinney Texas (33° 09' N, 96° 36' W) from 1978 to 2014. The Heard Museum encompasses diverse habitats totaling 117 ha including: mid-successional prairie grassland, green ash (*Fraxinus pennsylvanica*)-black willow (*Salix nigra*) forest, intermittently-flooded mid-successional forest with sugarberry (*Celtis laevigata*), Osage orange (*Maclura pomifera*), cedar elm (*Ulmus crassifolia*), and honey locust (*Gleditsia triacanthos*). Birds were also banded in park-like habitat consisting of scattered pecan (*Carya illinoinensis*) and southern live oaks (*Quercus virginiana*) interspersed with Bermuda grass (*Cynodon dactylon*).

Banding occurred primarily during spring (21 March to 1 June) and fall (15 August to 31 October) migration; however, less intensive banding efforts occurred year-round. Birds were captured in 10-25 12-m nets; the number of nets varied depending on the number of banding personnel present. Netting and handling protocols followed Ralph et al.

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(1993) and Gustafson et al. (1997). All birds were banded with uniquely-numbered USGS bands and aging-sexing criteria followed Pyle (1997). Date of first capture and all subsequent recaptures were recorded. I defined longevity as the timespan from date of first capture to the last recapture date for an individual of each species. Longevity is reported in the same format (i.e., # yr # mon) as on the USGS Bird Banding Laboratory web page (USGS Bird Banding Laboratory 2017). Only recaptures ≥30 days were included in this analysis. I extrapolated a minimum lifespan by adding the age at initial capture to the longevity at final recapture. Descriptive data and scientific names are included in Table 1. Due to difficulty in identifying Alder Flycatcher (*Empidonax alnorum*) and Willow Flycatcher (*E. traillii*), I refer to these individuals as "Traill's Flycatchers".

RESULTS AND DISCUSSION

I analyzed capture and recapture data for 12,834 individual birds of 59 species (12 resident, 20 Nearctic-Nearctic short-distance migrants, and 27 Nearctic-Neotropical long-distance migrants) netted at the Heard Museum. Forty species had recapture histories ≥30 d. Table 1 includes initial capture date, final recapture date, and longevity for each species.

Yellow-billed Cuckoo

I documented longevity of 1 yr 2 mon for a Yellow-billed Cuckoo at the Heard Museum (Table 1). The bird was initially aged as after-third-year (ATY), thus the bird was ≥4 yr old at final recapture. The longevity record is 5 yr 0 mon for a Yellow-billed Cuckoo initially banded in Florida and recovered in South Carolina (USGS Bird Banding Laboratory 2017).

Sharp-shinned Hawk

At the Heard Museum, I documented a within season longevity of 0 yr 1 mon for a male Sharp-shinned Hawk (Table 1). This bird was aged as hatch year (HY) and recaptured as a second year (SY) bird. The longevity record for a male Sharp-shinned Hawk is 12 yr 2 mon from Minnesota (USGS Bird Banding Laboratory 2017); however, Keran (1981) reported a 13 yr 0 mon longevity record not listed on the Bird Banding Laboratory web site.

Red-bellied Woodpecker

At the Heard Museum, I documented longevity of 4 yr 1 mon for a female Red-bellied Woodpecker (Table 1). The bird was aged as after-hatch-year (AHY), thus it was ≥5 yr old at final recapture. The longevity record for a male Red-bellied Woodpecker is 12 yr 3 mon in Georgia (USGS Bird Banding Laboratory 2017).

Downy Woodpecker

I documented longevity of 6 yr 6 mon for a male Downy Woodpecker at the Heard Museum (Table 1). This bird was aged as after-second-year (ASY), thus it was ≥8 yr old at final recapture. The longevity record for a male Downy Woodpecker is 11 yr 11 mon from California (USGS Bird Banding Laboratory 2017).

Traill's Flycatcher

At the Heard Museum, I documented longevity of 0 yr 6 mon for Traill's Flycatcher, representing an initial capture during spring migration, but was recaptured during the fall migration (Table 1). The bird was aged as AHY at initial capture, thus the bird was still an AHY bird at final recapture and had completed a migration to the nesting grounds and back. Longevity records exist for an Alder Flycatcher (9 yr 1 mon) in British Columbia and a Willow Flycatcher (11 yr 0 mon) in California (USGS Bird Banding Laboratory 2017).

Eastern Phoebe

At the Heard Museum, I documented Eastern Phoebe longevity of 2 yr 0 mon (Table 1). At initial capture, the bird was aged as AHY, thus it was ≥3 yr old at final recapture. The longevity record is 10 yr 4 mon for an Eastern Phoebe initially banded in Iowa, but recovered in Alberta (USGS Bird Banding Laboratory 2017).

White-eyed Vireo

At the Heard Museum, I documented longevity of 5 yr 0 mon for White-eyed Vireo (Table 1). The bird was initially aged as AHY, thus at final recapture the bird was ≥6 yr old. The longevity record for White-eyed Vireo is 10 yr 11 mon in Louisiana (USGS Bird Banding Laboratory 2017).

Blue Jay

I documented Blue Jay longevity of 4 yr 6 mon at the Heard Museum (Table 1). The bird was aged

HY at initial capture, thus it was approximately 5 yr old at final recapture. The longevity record for Blue Jay is 26 yr 11 mon for a bird banded and recovered in Newfoundland (USGS Bird Banding Laboratory 2017).

Carolina Chickadee

At the Heard Museum, I documented longevity of 5 yr 5 mon for Carolina Chickadee (Table 1). The bird was aged as HY at initial capture, thus at final recapture the bird was approximately 6 yr old. The longevity record for Carolina Chickadee is 10 yr 11 mon in New Jersey (Clapp et al. 1983).

Tufted Titmouse

At the Heard Museum, I documented longevity of 6 yr 0 mon for Tufted Titmouse (Table 1). The bird was aged HY at initial capture, so it was approximately 6.5 yr old at final recapture. The longevity record for Tufted Titmouse is 13 yr 3 mon in Virginia (Clapp et al. 1983).

Brown Creeper

At the Heard Museum, I documented a within season longevity of 0 yr 4 mon for a Brown Creeper (Table 1). The bird was aged unknown (U), thus at final recapture, the bird was at least SY in age. The longevity record for Brown Creeper is 5 yr 5 mon in Illinois (USGS Bird Banding Laboratory 2017).

Winter Wren

At the Heard Museum, I documented a within season longevity of 0 yr 4 mon for a Winter Wren (Table 1). At initial capture, the bird was aged as HY, thus at final recapture, it was at least SY in age. The longevity record is 6 yr 6 mon for a Winter Wren in California (USGS Bird Banding Laboratory 2017).

Carolina Wren

At the Heard Museum, I documented longevity of 5 yr 0 mon for a Carolina Wren (Table 1). The bird was aged HY at initial capture, thus at final recapture the bird was approximately 5 yr old. The longevity record for Carolina Wren is 7 yr 8 mon in Florida (USGS Bird Banding Laboratory 2017).

Golden-crowned Kinglet

I documented a within season longevity of 0 yr 5 mon for a male Golden-crowned Kinglet at the Heard Museum. The bird was aged AHY at initial capture, thus it was at least an SY bird at final recapture. The longevity record for a male Golden-crowned Kinglet is 6 yr 4 mon in Minnesota (USGS Bird Banding Laboratory 2017).

Ruby-crowned Kinglet

At the Heard Museum, I documented longevity of 2 yr 8 mon for a male Ruby-crowned Kinglet (Table 1). The bird was aged ASY at initial capture, thus it was ≥5 yr old at final recapture. The longevity record for a female Ruby-crowned Kinglet is 5 yr 7 mon in California (Klimkiewicz et al. 1983).

Eastern Bluebird

At the Heard Museum, I documented longevity of 5 yr 9 mon for a male Eastern Bluebird (Table 1). The bird was aged ASY at initial capture, thus it was ≥8 yr old at final recapture. The longevity record is 10 yr 6 mon for an Eastern Bluebird, sex not reported, initially banded in New York, but recovered in South Carolina (USGS Bird Banding Laboratory 2017).

Hermit Thrush

At the Heard Museum, I documented a 5 yr 3 mon longevity for Hermit Thrush (Table 1). The bird was aged as SY at initial capture, thus the bird was ≥7 yr old at final recapture. The longevity record for Hermit Thrush is 10 yr 10 mon in Maryland (USGS Bird Banding Laboratory 2017).

Brown Thrasher

At the Heard Museum, I documented longevity of 5 yr 0 mon for Brown Thrasher (Table 1). The bird was aged as AHY at initial capture, thus the bird was ≥6 yr old at final recapture. The longevity record is 12 yr 10 mon for a Brown Thrasher initially banded and recovered in North Carolina (Klimkiewicz et al. 1983).

Northern Mockingbird

I documented 3 yr 1 mon longevity for Northern Mockingbird at the Heard Museum (Table 1). The bird was aged as HY at initial capture, thus at final recapture it was ≥4 yr old. The longevity record is 14 yr 10 mon for a Northern Mockingbird banded and recovered in Texas (USGS Bird Banding Laboratory 2017).

American Goldfinch

At the Heard Museum, I documented longevity of 3 yr 2 mon for a female American Goldfinch (Table 1). The bird was aged as HY at initial capture, thus the bird was ≥4 yr old at final recapture. The longevity record is 10 yr 9 mon for an American Goldfinch in Maryland (USGS Bird Banding Laboratory 2017).

Ovenbird

At the Heard Museum, I documented a within season longevity of 0 yr 1 mon for Ovenbird during the fall migration, which represents a lengthy stopover period for a Nearctic-Neotropical migrant (Table 1). The longevity record for Ovenbird is 11 yr 0 mon in Connecticut (USGS Bird Banding Laboratory 2017).

Louisiana Waterthrush

At the Heard Museum, I documented longevity of 1 yr 0 mon for Louisiana Waterthrush (Table 1). The bird was aged ASY at initial capture, thus it was at least ATY at final recapture. The longevity record for Louisiana Waterthrush is 11 yr 11 mon in New Jersey (USGS Bird Banding Laboratory 2017).

Prothonotary Warbler

I documented longevity of 5 yr 1 mon for a female Prothonotary Warbler at the Heard Museum (Table 1). The bird was aged as HY at initial capture, thus the bird was approximately 5 yr old at final recapture. The longevity record for a female Prothonotary Warbler is ≥8 yr old in Virginia (Blem et al. 1999).

Orange-crowned Warbler

At the Heard Museum, I documented longevity of 1 yr 1 mon for a male Orange-crowned Warbler (Table 1). The bird was aged as SY at initial capture, thus it was approximately 3 yr old at final recapture. The longevity record for a male Orange-crowned Warbler is 8 yr 7 mon in California (USGS Bird Banding Laboratory 2017).

Nashville Warbler

I documented longevity of 4 yr 6 mon for a female Nashville Warbler at the Heard Museum (Table 1). The bird was aged as AHY at initial capture, thus it was ≥5.5 yr old at final recapture. The longevity record is 7 yr 3 mon for a female Nashville Warbler banded in Maryland, but was killed by a cat and recovered in Ontario (USGS Bird Banding Laboratory 2017).

Yellow-rumped (Myrtle) Warbler

I documented a longevity of 3 yr 0 mon for a male Yellow-rumped (Myrtle) Warbler at the Heard Museum (Table 1). The bird was aged as AHY at initial capture, thus it was ≥4 yr old at final recapture. The longevity record is 8 yr 9 mon for a Yellow-rumped (Myrtle) Warbler in Florida (USGS Bird Banding Laboratory 2017).

Yellow-breasted Chat

At the Heard Museum, I documented longevity of 1 yr 7 mon for a male Yellow-breasted Chat (Table 1). The bird was aged as HY at initial capture, thus it was approximately 2 yr old at final recapture. The longevity record is 8 yr 11 mon for a male Yellow-breasted Chat in Colorado (USGS Bird Banding Laboratory 2017).

Spotted Towhee

At the Heard Museum, I documented a within season longevity of 0 yr 6 mon for a male Spotted Towhee (Table 1). The bird was aged as AHY at initial capture, thus it was ≥2 yr old at final recapture. The longevity record is 11 yr 0 mon for a male Spotted Towhee in California (USGS Bird Banding Laboratory 2017).

Field Sparrow

At the Heard Museum, I documented longevity of 3 yr 3 mon for a Field Sparrow (Table 1). The bird was aged as HY at initial capture, thus it was approximately 4 yr old at final recapture. The longevity record is 10 yr 4 mon for a Field Sparrow in Maryland (USGS Bird Banding Laboratory 2017).

Fox Sparrow

At the Heard Museum, I documented longevity of 5 yr 8 mon for a Fox Sparrow (Table 1). The bird was aged AHY at initial capture, thus it was ≥6.5 yr old at final recapture. The longevity record is 10 yr 4 mon for a Fox Sparrow in California (USGS Bird Banding Laboratory 2017).

Song Sparrow

At the Heard Museum, I documented longevity of 4 yr 4 mon for a Song Sparrow (Table 1). The bird was aged HY at initial capture, thus the bird was approximately 5 yr old at final recapture. The longevity record is 11 yr 4 mon for a Song Sparrow in Colorado (USGS Bird Banding Laboratory 2017).

Lincoln's Sparrow

At the Heard Museum, I documented longevity of 3 yr 5 mon for a Lincoln's Sparrow (Table 1). The bird was aged as HY at initial capture, thus it was approximately 4 yr old at final recapture. The longevity record is 7 yr 11 mon for a Lincoln's Sparrow in Colorado (USGS Bird Banding Laboratory 2017).

Swamp Sparrow

At the Heard Museum, I documented longevity of 3 yr 5 mon for a Swamp Sparrow (Table 1). The bird was aged as HY at initial capture, thus it was approximately 4 yr old at final recapture. The longevity record is 7 yr 10 mon for a Swamp Sparrow in Maryland (USGS Bird Banding Laboratory 2017).

White-throated Sparrow

I documented longevity of 8 yr 0 mon for a White-throated Sparrow at the Heard Museum (Table 1). The bird was aged as HY at initial capture, thus it was approximately 8.5 yr old at final recapture. The longevity record is 14 yr 11 mon for a White-throated Sparrow in Alberta (USGS Bird Banding Laboratory 2017).

Harris's Sparrow

At the Heard Museum, I documented longevity of 1 yr 4 mon for a Harris's Sparrow (Table 1). The bird was aged U at initial capture, thus it was ≥2 yr old at final recapture. The longevity record is 11 yr 8 mon for a Harris's Sparrow in Kansas (Klimkiewicz and Futcher 1987).

White-crowned Sparrow

I documented a longevity of 2 yr 0 mon for a White-crowned Sparrow at the Heard Museum (Table 1). The bird was aged as HY at initial capture, thus it was approximately 2.5 yr old at final recapture. The longevity record is 13 yr 4 mon for a White-crowned Sparrow in California (Klimkiewicz and Futcher 1987).

Dark-eyed (Slate-colored) Junco

At the Heard Museum, I documented longevity of 1 yr 0 mon for a Dark-eyed (Slate-colored) Junco (Table 1). The bird was aged as HY at initial capture, thus it was approximately 1.5 yr old at final recapture. The longevity record is 11 yr 4 mon for a Dark-eyed (Slate-colored) Junco in West Virginia (USGS Bird Banding Laboratory 2017).

Northern Cardinal

At the Heard Museum, I documented longevity of 9 yr 1 mon for a female Northern Cardinal (Table 1). The bird was aged as AHY at initial capture, thus it was ≥10 yr old at final recapture. The longevity record is 15 yr 9 mon for a female Northern Cardinal in Pennsylvania (Klimkiewicz and Futcher 1987).

Indigo Bunting

At the Heard Museum, I documented longevity of 6 yr 0 mon for a male Indigo Bunting (Table 1). The bird was aged as ASY at initial capture, thus it was ≥8 yr old at final recapture. The longevity record is 13 yr 3 mon for a male Indigo Bunting in Ohio (USGS Bird Banding Laboratory 2017).

Painted Bunting

At the Heard Museum, I documented longevity of 5 yr 1 mon for a male Painted Bunting (Table 1). The bird was aged as AHY at initial capture, thus it was ≥5 yr old at final recapture. The Bird Banding Laboratory longevity record is 11 yr 0 mon for a male Painted Bunting in Texas; however, Fisk (1974) reported a Painted Bunting ≥12 yr old.

ACKNOWLEDGMENTS

I thank Lorraine Bartlett, Linda Ergonis, Tom Heath, Betty Parker, Sandra Polcyn, Kenneth Steigman, Karen White, Judy Woods, and other volunteers from the Prairie and Timbers Audubon Society and Heard Museum for collecting banding data and logistical support. Birds were captured and banded under permit number 23655 issued to Judy Woods.

Table 1. Dates of initial capture, final recapture, and minimum longevity for species banded at the Heard Natural Science Museum and Wildlife Sanctuary in North Texas from 1978 to 2014.

Species	Scientific Name	1st Capture	Last Recapture	Longevity
Yellow-billed Cuckoo	*Coccyzus americanus*	2 May 2003	22 July 2004	1 yr 2 mon
Sharp-shinned Hawk	*Accipter striatus*	5 Nov 1996	3 Dec 1996	0 yr 1 mon
Red-bellied Woodpecker	*Melanerpes carolinus*	27 Oct 1998	19 Nov 2002	4 yr 1 mon
Downy Woodpecker	*Picoides pubescens*	5 Oct 1999	16 Mar 2006	6yr 6 mon
Traill's Flycatcher	*Empidonax alnorum/trailli*	28 May 1997	15 Sep 1997	0 yr 6 mon
Eastern Phoebe	*Sayornis phoebe*	4 May 2007	4 May 2009	2 yr 0 mon
White-eyed Vireo	*Vireo griseus*	12 Apr 1989	30 Apr 1994	5 yr 0 mon
Blue Jay	*Cyanocitta cristata*	24 Oct 2005	28 Apr 2010	4 yr 6 mon
Carolina Chickadee	*Poecile carolinensis*	27 Oct 1990	12 Mar 1996	5 yr 5 mon
Tufted Titmouse	*Baeolophus bicolor*	30 Oct 1992	27 Oct 1998	6 yr 0 mon
Brown Creeper	*Certhia americana*	10 Nov 2005	16 Mar 2006	0 yr 4 mon
Winter Wren	*Troglodytes hyemalis*	12 Nov 1996	21 Mar 1997	0 yr 4 mon
Carolina Wren	*Troglodytes ludovicianus*	25 June 2008	23 Apr 2014	5 yr 0 mon
Golden-crowned Kinglet	*Regulus satrapa*	31 Oct 2002	15 Mar 2003	0 yr 5 mon
Ruby-crowned Kinglet	*Regulus calendula*	4 Mar 2000	12 Nov 2002	2 yr 8 mon
Eastern Bluebird	*Sialia sialis*	23 Apr 2003	24 Jan 2009	5 yr 9 mon
Hermit Thrush	*Catharus guttatus*	7 Jan 1992	1 Apr 1997	5 yr 3 mon
Brown Thrasher	*Toxostoma rufum*	18 Mar 1989	4 Mar 1994	5 yr 0 mon
Northern Mockingbird	*Mimus polyglottos*	21 Dec 2007	26 Jan 2011	3 yr 1 mon
American Goldfinch	*Spinus tristis*	1 Dec 2005	21 Jan 2009	3 yr 2 mon
Ovenbird	*Seiurus aurocapilla*	3 Sep 1999	7 Oct 1999	0 yr 1 mon
Louisiana Waterthrush	*Parkesia motacilla*	16 May 2013	1 May 2014	1 yr 0 mon
Prothonotary Warbler	*Protonotaria citrea*	22 May 2003	25 June 2008	5 yr 1 mon
Orange-crowned Warbler	*Oreothlypis celata*	26 Oct 2007	12 Nov 2008	1 yr 1 mon
Nashville Warbler	*Oreothlypis ruficapilla*	10 Oct 1994	20 Apr 1999	4 yr 6 mon
Yellow-rumped Warbler	*Setophaga coronata*	5 Dec 1998	11 Dec 2001	3 yr 0 mon
Yellow-breasted Chat	*Icteria virens*	6 Sep 2001	22 Apr 2003	1 yr 7 mon
Spotted Towhee	*Pipilo maculatus*	3 Nov 2001	20 Apr 2002	0 yr 6 mon
Field Sparrow	*Spizella pusilla*	11 Dec 1990	11 Mar 1994	3 yr 3 mon
Fox Sparrow	*Passerella iliaca*	10 Mar 1990	15 Nov 1996	5 yr 8 mon
Song Sparrow	*Melospiza melodia*	17 Nov 1995	14 Mar 2000	4 yr 4 mon
Lincoln's Sparrow	*Melospiza lincolnii*	8 Nov 2006	10 Apr 2010	3 yr 5 mon
Swamp Sparrow	*Melospiza georgiana*	22 Nov 2006	10 Apr 2010	3 yr 5 mon
White-throated Sparrow	*Zonotrichia albicollis*	13 Nov 1990	27 Oct 1998	8 yr 0 mon
Harris's Sparrow	*Zonotrichia querula*	2 Dec 1992	11 Mar 1994	1 yr 4 mon
White-crowned Sparrow	*Zonotrichia leucophrys*	11 Nov 1999	6 Nov 2001	2 yr 0 mon
Dark-eyed Junco	*Junco hyemalis*	1 Dec 2005	22 Nov 2006	1 yr 0 mon
Northern Cardinal	*Cardinalis cardinalis*	25 Mar 2005	3 May 2014	9 yr 1 mon
Indigo Bunting	*Passerina cyanea*	5 May 1996	6 May 2002	6 yr 0 mon
Painted Bunting	*Passerina ciris*	9 May 1996	5 Jun 2001	5 yr 1 mon

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THE BREEDING BIRD COMMUNITY OF A REMNANT URBAN WOODLAND IN MCALLEN, TEXAS

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ABSTRACT.—We conducted a breeding bird survey of a remnant thorn-forest at McAllen Nature Center in 2015 and 2016 to assess the breeding bird community and compare it to that of a larger, exurban refuge. We recorded 37 territorial species in McAllen Nature Center, including 15 species not reported at the exurban tract. Thirteen of these predominantly used the more open, human-maintained habitats in the northern and western sides of the park. The presence of many common thorn-forest birds, including a subset of the regions "South Texas specialty" species, is encouraging. Small remnant woodlands such as McAllen Nature Center may prove vital to keep these species present as members of the urban avian community in the Lower Rio Grande Valley.

Global trends of increased urbanization can be seen in the Lower Rio Grande Valley (LRGV) of southernmost Texas. Comprised of Starr, Hidalgo, Willacy, and Cameron counties, the LRGV has undergone substantial land use changes since European-based settlers arrived in the 17th century (Brush 2005, Leslie Jr 2016). While early land conversion was primarily for agricultural expansion, in recent years, urban growth has become dominant. Between 1993 and 2003, urban area increased by 46% in Hidalgo, Cameron, and Willacy counties while irrigated land decreased by 7.6% (Huang and Fipps 2006). The human population has increased rapidly during the second half of the 1900's, rising from about 400,000 in the 1960s to about 1,350,000 as of 2015 (US Census Bureau 2015; Leslie 2016). Population growth is expected to continue, potentially reaching 3 million by 2050 (Stubbs et al. 2003; Leslie 2016). These land transformations and population shifts have and likely will continue to have positive and negative effects on bird communities.

An important aspect of these transformations is the impact on the hydrology of the region. As discussed in Brush and Cantu (1998), limited flooding along the Rio Grande has contributed to the transition from taller riparian forests to shorter thorn forests in the region, and has contributed to a shift in the associated breeding bird community. Particularly, it has resulted in the loss of uncommon, tropical species dependent on these lusher riparian woodlands and the increase of species favoring dense thickets. Species like Tropical Parula and Red-billed Pigeon, once more widespread in riparian tracts along the Rio Grande, are now greatly reduced in population or locally extirpated, while species like White-tipped Dove, Olive Sparrow, and Plain Chachalaca have shown increases in some areas (Brush and Cantu 1998; Brush 2005).

Urbanization, or the "multidimensional process that manifests itself through rapidly changing human population and changing land cover" (Seto et al. 2011), affects local biodiversity through habitat loss, biotic community changes associated with the subsequent structure of replacement habitats, and abiotic changes (McKinney 2002; Longcore and Rich 2004; Chace and Walsh 2006; Seto et al. 2011). While there is a general trend of declines in species richness going along a rural-urban gradient from rural lands to the urban core (McKinney

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2002), there can be substantial variation. In birds, intense urbanization often leads to increases in abundance of a few urban tolerant species (urban exploiters) while species richness and diversity decrease (Emlen 1974; McKinney 2002; Chace and Walsh 2006; Evans et al. 2009). However, in areas of intermediate urbanization (suburbs), habitat patchiness (heterogeneity) and increased resources in the form of bird feeders and fruiting plants can lead to a peak in species richness (Blair 1996; Marzluff 2005; Daniels and Kirkpatrick 2006; Belaire et al. 2014; Gray and van Heezik 2016). This intermediate peak (sometimes attributed to the intermediate disturbance hypothesis) is the result of colonization of urban adapter species and the retention of a subset of species generally intolerant of urbanization (urban avoiders; Marzluff 2005).

Because many of the common breeding species in riparian and thorn-forests in the LRGV are near the northern edge of their ranges in South Texas, making them of interest to the ecotourism industry, the goal of this study was to assess the potential of remnant urban woodlands as a source of avifaunal biodiversity and abundance to other urbanized areas. Specifically, are these subtropical thorn-forest species capable of breeding in an urban woodland, and how does the avian community differ from larger, exurban tracts.

METHODS

Study Area

The McAllen Nature Center (MNC) (N 26.205031°, W -98.267412°) is about 8 ha in size and is located in an area of mixed development in McAllen, TX with large shopping plazas, a convention center, a sports and park complex, and neighborhoods within 1 km. MNC has three distinct sections; an open park-like area ringed by trees and denser scrub around the entrance (~ 2 ha), a "savannah" section with scattered trees on the west side (~ 1.5 ha), and a dense thicket of native thorn-forest in the center (~ 5 ha) (fig. 1). The size roughly corresponds with an area surveyed within the 800-ha Santa Ana National Wildlife Refuge (SANWR) in the 1970s and 1990s (Gehlbach 1987; Brush and Cantu 1998).

Although the long-term history of the site is not fully documented, about half of this thicket had not been cleared since before the 1930s, and all of the thicket section has been left intact since the 1960s (Herwick and Alger 2012).

Bird Surveys

Surveys were done via the territory mapping (spot-mapping) method (Bibby et al. 1992). This method provides estimates for absolute numbers of birds in an area. This method was also used in two

Figure 1. Aerial image of McAllen Nature Center, January 2016.

earlier surveys of a 8-ha section of SANWR in the 1970s and 1990s (Gehlbach 1987, Brush and Cantu 1998). This allows for comparison between the bird community found in MNC and that representative of a large natural tract only 17.5 km SE of MNC. Ten-to-twelve bird surveys were conducted each year between late March and late July in 2015 and 2016. Surveys took 1.5-2 h to complete, and were conducted in the morning between 0800 and 1030 CST. Observations of birds and their behavior (such as singing, gathering nesting material, and territorial interactions) were mapped, with particular effort made to document simultaneous observations of birds. This allows for greater accuracy in distinguishing separate territories.

At the end of each survey season, numbers of territories were estimated using locations entered into web-based mapping software (Google Earth™, Menlo Park CA). Typically, we required at least three observations within a cluster to qualify as a territory. We gave more consideration for observations in the middle of the breeding season than those on either the early or late extremes. However, a single record of a nest with eggs or young was considered sufficient to mark down a territory. For species that do not have traditional territories, or those that only defend a small area immediate to the nest, different methods were used. For species such as White-winged Dove, half of the maximum count of individuals was used to determine number of territories (which assumes that half of the individuals were males). For those species like European Starling, which only defend an area immediately around their nests, the number of nests found was used. The Birds of North America Online species accounts (Rodewald 2015) were used as references for the spacing and territoriality of birds found during surveys, along with looking at known habitat preferences. The number of territories was averaged over the two-year survey period.

Vegetation Surveys

Survey methods were modified from those of Brush and Cantu (1998), ultimately based on the method of quantitative habitat description (James and Shugart 1970). Ten 0.05 ha circular plots (diameter = 25 m) were placed in the MNC. Six were randomly placed in the center thicket, 2 in the park-like entrance, and 2 in the savannah-like plot on the west side. Tree density, frequency, and percent canopy cover were determined along with shrub density and percent ground cover. At each of the 10 plots all trees with > 8 cm diameter at breast height (DBH) were measured for DBH and height. Tree height was measured using an extendable pole marked in 0.5 m intervals, from 0-0.5 up to 14-14.5 m above the ground (estimated at heights > 5.5 m). Percent canopy cover was measured using the Canopy App (Version 1.0.2.) from the University of New Hampshire. Percent canopy cover was the average of 5 readings, one taken from the center of each plot and then 4 at points 12 meters out in each cardinal direction. Percent ground cover was measured using the Canopeo app (Version 2.0) from Oklahoma State University. Percent herbaceous ground cover was the average of 13 readings taken every 3 meters in cardinal directions from the center of the plot (one reading at the center of the plot as well). Shrub density (plants with < 8 cm DBH) and composition were measured by counting the number of stems intercepted by arms out-stretched while walking. Two transects through each plot were done (east-west and north-south). The number of "hits" per plot reflects the density and relative abundance of woody shrub species.

RESULTS

MNC Breeding Bird Community

Thirty-seven bird species were recorded as having at least one partial territory in the McAllen Nature Center (table 1). Three of the most abundant bird species were doves, with White-winged Dove, White-tipped Dove, and Mourning Dove (averaging 12, 8, & 7.5 territories respectively), equaling 23% of all territories. Fifteen species of the total observed (40.5%) had most of their territories in the open-park section of the MNC, 11 species were more found more commonly in the thicket, and only 1 in the savannah (Table 1). The savannah section held the fewest number of total territories (9.75) when compared with the open-park (46.75) and central thicket (41.25) sections. Of the 10 remaining species, 6 averaged equal numbers of territories in at least two of the sections. Four were undetermined due to mapping methodology (for example, White-winged Dove was undetermined due to its number of territories derived from total abundance across the entirety of the MNC).

Comparisons in the Breeding Bird Communities

All told, there was an overlap of 22 species between SANWR and the MNC, with three species only found at the former and 15 additional species found at the latter. Only 3 bird species reported from the SANWR study in 1994-1996 by Brush and Cantu (1998) were not found at MNC: Carolina Wren, Black-bellied Whistling-Duck, and Red-shouldered Hawk (Table 2). These 3 species were found in low numbers at the SANWR study area. Of the 22 in-common species, 16 had greater numbers of territories at SANWR. Only Northern Cardinal, Northern Mockingbird, Common Ground Dove, Greater Roadrunner, and Buff-bellied Hummingbird had more territories at MNC, while Yellow-billed Cuckoo was equal between the two areas. An additional 15 species (equaling 25% of total territories found in the MNC) were found to have territories at the MNC but were not found during the 1994-1996 study at SANWR. Eleven of these additional species had the greatest number of territories in the open park section of the MNC: Clay-colored Thrush, Curve-billed thrasher, European Starling, Great-tailed Grackle, Green Parakeet, House Finch, House Sparrow, Lesser Goldfinch, Purple Martin, Tropical Kingbird, and Western Kingbird. Three had their greatest number of territories in the thicket: Black-chinned

Table 1. The average number of breeding bird territories at McAllen Nature Center, 2015-2016, ranked from largest to smallest. Asterisks indicate separation of territories into sections not possible.

Common Name	AVG TOTAL	Avg Park	Avg Savannah	Avg Thicket
White-winged Dove	12	*	*	*
Northern Mockingbird	9.5	4	2	3.5
White-tipped Dove	8	1.5	0	6.5
Mourning Dove	7.5	*	*	*
House Sparrow	7	7	0	0
Olive Sparrow	7	2	0	5
Purple Martin	7	7	0	0
Northern Cardinal	7	1.5	0	5.5
Golden-fronted Woodpecker	5	3.5	0.5	1
Brown-crested Flycatcher	4.5	2	0.75	1.75
Plain Chachalaca	3.5	1.75	0	1.75
Great Kiskadee	3.5	1	1	1.5
Couch’s Kingbird	3	1	1.5	0.5
Yellow-billed Cuckoo	3	0.5	1	1.5
European Starling	2.75	2.5	0.25	0
Long-billed Thrasher	2.5	0	0	2.5
Curve-billed Thrasher	2.25	1.5	0.25	0.5
Brown-headed Cowbird	2	1	0	1
Bronzed Cowbird	2	1.25	0	0.75
Ladder-backed Woodpecker	2	0.5	0.5	1
Lesser Goldfinch	2	1	1	0
White-eyed Vireo	2	0.5	0	1.5

Table 1. (*Continued*).

Common Name	AVG TOTAL	Avg Park	Avg Savannah	Avg Thicket
Groove-billed Ani	1.5	1	0.5	0
Verdin	1.5	0	0	1.5
Black-chinned Hummingbird	1.25	0.5	0	0.75
Clay-colored Thrush	1.25	1.25	0	0
Common Ground-Dove	1.25	0	0	1.25
Buff-bellied Hummingbird	1	*	*	*
Black-crested Titmouse	1	0.5	0	0.5
Green Jay	1	0	0	1
Great-tailed Grackle	1	0.5	0.5	0
Western Kingbird	1	1	0	0
Greater Roadrunner	0.5	*	*	*
Green Parakeet	0.5	0.5	0	0
Tropical Kingbird	0.5	0.5	0	0
Cactus Wren	0.25	0	0	0.25
House Finch	0.25	0	0	0.25

Table 2. Average number of territories for thorn-forest study area within Santa Ana National Wildlife Refuge (SANWR; Brush and Cantu 1998) and at McAllen Nature Center (MNC), 2015-2016. Territories are ranked by number of breeding territories at Santa Ana National Wildlife Refuge.

Species	SANWR (1994-1996)	MNC (2015-2016)
White-winged Dove	35	12
Olive Sparrow	17.7	7
Mourning Dove	13.2	7.5
White-tipped Dove	12.3	8
Plain Chachalaca	10.8	3.75
Golden-fronted Woodpecker	8.3	5
Long-billed Thrasher	7.8	2.5
White-eyed Vireo	5.5	2
Couch's Kingbird	5.3	3
Ladder-backed Woodpecker	5	2
Brown-crested Flycatcher	5	4.5
Black-crested Titmouse	4.7	1
Green Jay	4	1
Great Kiskadee	3.5	2.5
Yellow-billed Cuckoo	3	3
Bronzed Cowbird	3	2

Table 2. (*Continued*).

Species	SANWR (1994-1996)	MNC (2015-2016)
Northern Cardinal	2.8	6.5
Groove-billed Ani	2.3	1.5
Northern Mockingbird	1	9.5
Common Ground-Dove	0.3	1
Greater Roadrunner	0.3	1
Buff-bellied Hummingbird	0.3	1
Additional SANWR Species		
Black-bellied Whistling-Duck	0.3	
Red-shouldered Hawk	0.2	
Carolina Wren	1	
Additional MNC Species		
House Sparrow		7
Purple Martin		7
European Starling		2.75
Curve-billed Thrasher		2.25
Brown-headed Cowbird		2
Lesser Goldfinch		2
Verdin		1.5
Black-chinned Hummingbird		1.25
Clay-colored Thrush		1.25
Great-tailed Grackle		1
Western Kingbird		1
Green Parakeet		0.5
Tropical Kingbird		0.5
Cactus Wren		0.25
House Finch		0.25

Hummingbird, Cactus Wren, and Verdin. Only Brown-headed Cowbird had equal territories in two of the habitat types; park and thicket.

Vegetation Surveys

Vegetation in the MNC varied markedly between the three sections. Vegetation was densest in the central thicket, with greater values of percent canopy cover, tree density, and shrub density (Table 3). Tree species richness was also higher in the central thicket as compared with the open sections of the MNC. Mean tree height and percent herbaceous ground cover were lowest in the central thicket, which was predominantly covered by leaf litter.

The most common tree was mesquite (*Prosopis glandulosa*), which made up 65% of all trees.

Table 3. Vegetational characteristics of study area at McAllen Nature Center, 2015-2016.

	Section		
Vegetation Variable	**Park**	**Savannah**	**Thicket**
Percent Canopy Cover	38.1	27.9	49
Mean Canopy Height (m)	10.6	6.1	5.5
Tree Density (n/ha)	40	60	147
Mean Tree DBH (cm)	64.3	23.1	25.4
Tree Species Richness	3	2	5
Shrub Hit Density (n/ha)	0	10	6180
Percent Ground Cover	27%	11.6%	5.7%

The next three most common trees were: Texas ebony (*Ebenopsis ebano*; 8%), coma (*Sideroxylon celastrinum*; 6%) and granjeno (*Celtis pallida*; 6%). Natives made up 94% of all trees, with the only non-native trees—live oak (*Quercus virginiana*) and Washington fan palm (*Washingtonia robusta*)—found in the northern park-like section. Granjeno (*Celtis pallida*) was the most abundant shrub species with 56% of all observations belonging to this species, followed up by snake eyes (*Phaulothamnus spinescens*; 29%), lotebush (*Ziziphus obtusifolia*; 9%) and coyotillo (*Karwinskia humboldtiana*; 2%). Nearly all of the shrubs "hits" were in the thicket section.

Comparisons in Vegetation

Because the park and savannah sections of the MNC are mowed and maintained, comparisons with SANWR were only done with the central thicket. Percent canopy cover was similar between locations with 47% at SANWR and 49% at the MNC (Table 4). More and smaller trees were found at SANWR, as evidenced by greater tree density at SANWR but greater mean DBH at the MNC (Fig. 2). Tree species richness at SANWR was more than double that of MNC.

DISCUSSION

The bird community at the MNC is a mix of species commonly found in thorn-forest habitats, lower thorn-scrub, and urban settings. The central thicket, dominated by thorny plant species such as honey mesquite and granjeno, supports many of the thorn-forest birds commonly found at large, exurban reserves like SANWR. South Texas species dependent on dense habitats such as Olive Sparrow, Long-billed Thrasher, and White-tipped Dove predominantly utilized the central thicket, although the band of dense vegetation lining the open-park section also housed smaller numbers of these species.

The greatest difference between the communities was the addition of many urban/suburban tolerant

Table 4. Comparison of vegetation variables between SANWR and the MNC.

Vegetation Variable	**SANWR**	**MNC**
Canopy Cover	47%	49%
Mean Canopy Height (m)	6.1	5.5
Tree Density (n/ha)	396	147
Mean DBH (cm)	17.9	25.4
Tree Species Richness	13	5
Shrub Density n/ha	14180	6180
Percent Ground cover	No data	5.7

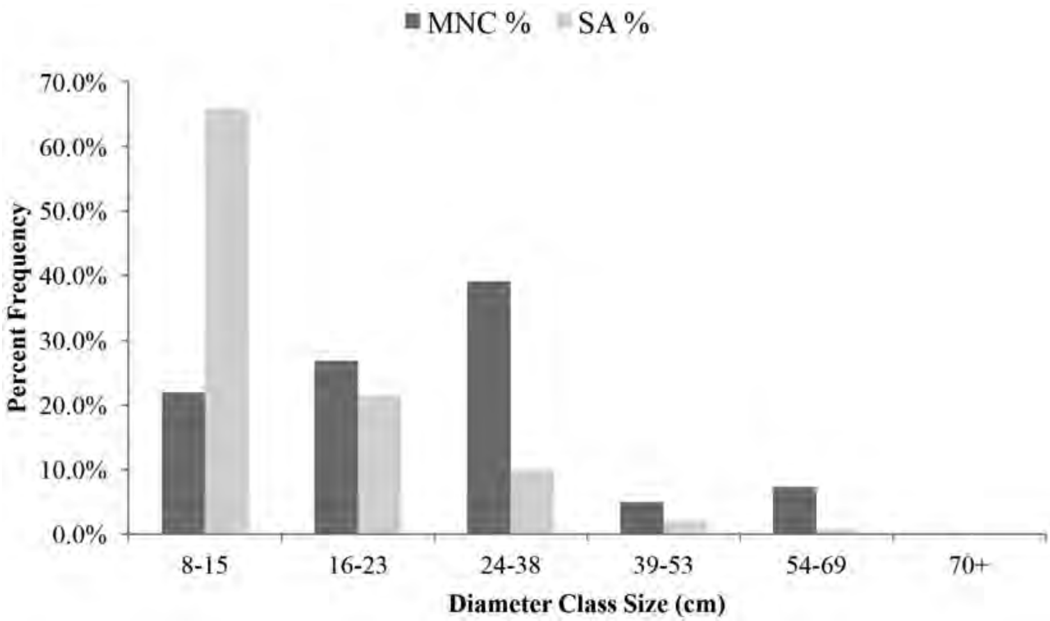

Figure 2. Percent frequencies of trees by diameter class size (SANWR n = 419, MNC n = 41).

birds at MNC. Several, such as House Sparrow, Great-tailed Grackle, and European Starling, are well known urban exploiters, common in the heterogeneous mix of development throughout the LRGV. Many of the rest are favorable of moderately-developed suburban habitats both in the LRGV and in the rest of their range; such as Brown-headed Cowbird, Curve-billed Thrasher, Lesser Goldfinch, and Western Kingbird.

Of note for the region was the presence of two species expanding their ranges; Clay-colored Thrush and House Finch. The largely tropical Clay-colored Thrush has been a regular breeding species in the LRGV since the 1990s, but in recent years has begun to fill out suburban neighborhoods in local cities (Brush 2005; eBird 2017)]. House Finch, on the other hand, is a widespread temperate species expanding more recently into the region (Brush 2005; eBird 2017). While no active nests have been documented, the House Finch at MNC met the qualifications as a breeding cluster, and it is likely they bred elsewhere on site or just off it.

The number of territories for shared bird species between SANWR and the MNC typically differed by SANWR having greater densities. This may be the result of the segmented habitat sections of the MNC, with the dense thicket only occupying 5 out of 8 ha, thus habitat availability and edge effect potentially playing a role in the assemblage. Alternatively, it could be due to observer differences, an artifact of temporal differences and overall abundance of these species, or differences in the structure and quality of the habitat. Interspecific competition also may have played a role (Faeth et al. 2011).

The presence of many common thorn-forest birds in the McAllen Nature Center is encouraging, showing that even small islands of natural habitat in the increasingly urban landscape can provide suitable habitat for some of our “South Texas specialty” birds. Conserving remnant urban woodlands may prove the best conservation strategy for keeping birds dependent on dense vegetation, such as Long-billed Thrasher and Olive Sparrow, in the urban avian community. Urban woodlands, like the MNC, may also act as stepping stones, islands, or corridors (or all three) depending on their proximity to other urban woodlands and individual species requirements (Davis and Glick 1978), particularly relevant when considering metapopulation dynamics. This, in conjunction with the urban residential “matrix”, may allow for species dispersal between remnant patches as the area continues to urbanize.

The avian community of the MNC also showed the expected increase of urban exploiter and urban adapter species in bringing up the total species richness. However, it is important to note that the thorn forest species present in the MNC are representative of abundant to common birds in native forests in the region; uncommon regional specialties such as Altamira Oriole, Northern Beardless-Tyrannulet, and Gray Hawk, were not detected in the urban woodland during this study, and have thus far not shown much indication (aside from Gray Hawk) of faring well in urban habitats. Future investigations into the population dynamics of common forest bird species in these urban woodland "islands" are needed to examine the durability of such urban populations, and the mechanisms by which they are affected.

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Appendix 1. Common and scientific names of birds mentioned in the text.

Common Name	**Scientific Name**
Altamira Oriole	*Icterus gularis*
Black-bellied Whistling−Duck	*Dendrocygna autumnalis*
Black-chinned Hummingbird	*Archilochus alexandri*
Black-crested Titmouse	*Baeolophus atricristatus*
Bronzed Cowbird	*Molothrus aeneus*
Brown-crested Flycatcher	*Myiarchus tyrannulus*
Brown-headed Cowbird	*Molothrus ater*
Buff-bellied Hummingbird	*Amazilia yucatanensis*
Cactus Wren	*Campylorhynchus brunneicapillus*
Carolina Wren	*Thryothorus ludovicianus*
Clay-colored Thrush	*Turdus grayi*
Common Ground-Dove	*Columbina passerina*
Couch's Kingbird	*Tyrannus couchii*
Curve-billed Thrasher	*Toxostoma curvirostre*
European Starling	*Sturnus vulgaris*
Golden-fronted Woodpecker	*Melanerpes aurifrons*
Gray Hawk	*Buteo plagiatus*
Great Kiskadee	*Pitangus sulphuratus*
Greater Roadrunner	*Geococcyx californianus*
Great-tailed Grackle	*Quiscalus mexicanus*
Green Jay	*Cyanocorax yncas*
Green Parakeet	*Psittacara holochlorus*
Groove-billed Ani	*Crotophaga sulcirostris*
House Finch	*Haemorhous mexicanus*
House Sparrow	*Passer domesticus*
Ladder-backed Woodpecker	*Picoides scalaris*
Lesser Goldfinch	*Spinus psaltria*
Long-billed Thrasher	*Toxostoma longirostre*
Mourning Dove	*Zenaida macroura*
Northern Beardless-Tyrannulet	*Camptostoma imberbe*
Northern Cardinal	*Cardinalis cardinalis*
Northern Mockingbird	*Mimus polyglottos*
Olive Sparrow	*Arremonops rufivirgatus*

Appendix 1. (*Continued*).

Common Name	**Scientific Name**
Plain Chachalaca	*Ortalis vetula*
Purple Martin	*Progne subis*
Red-billed Pigeon	*Patagioenas flavirostris*
Red-shouldered Hawk	*Buteo lineatus*
Tropical Kingbird	*Tyrannus melancholicus*
Tropical Parula	*Setophaga pitiayumi*
Verdin	*Auriparus flaviceps*
Western Kingbird	*Tyrannus verticalis*
White-eyed Vireo	*Vireo griseus*
White-tipped Dove	*Leptotila verreauxi*
White-winged Dove	*Zenaida asiatica*
Yellow-billed Cuckoo	*Coccyzus americanus*

POPULATION TRENDS OF HIGH CONSERVATION PRIORITY BIRD SPECIES WITHIN THE GULF COAST JOINT VENTURE REGION

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ABSTRACT.—Estimating abundance and trends of wildlife populations is an important aspect of wildlife management and conservation. Currently there are a variety of surveys used to estimate avian abundance and trends. However, before implementing a new monitoring program it is always important to evaluate current monitoring programs to see if data from the existing survey can be used to fulfill the new monitoring obligation. We used simple linear regression with a natural logarithm transformation of the Breeding Bird Survey (BBS) and Christmas Bird Count (CBC) data to analyze trends. We then conducted a power analysis using BBS and CBC data to estimate 80% power to detect trends at 3, 5, 10, and 20-year intervals (two-tailed tests at $\alpha = 0.20$) based on ±1%, ±3%, ±5%, and ±10% rate of annual population changes. Of the 27 BBS species investigated, 5 species [Hooded Merganser (*Lophodytes cucullatus*), Bald Eagle (*Haliaeetus leucocephalus*), Red-cockaded Woodpecker (*Picoides borealis*), Wood Stork (*Mycteria americana*), Swallow-tailed Kite (*Elanoides forficatus*)] were either not detected or not detected frequently enough to reliably determine population trends. Of the 37 CBC species investigated, 1 species, Black Rail (*Laterallus jamaicensis*) was not detected frequently enough to reliably determine a population trend. Our power analysis indicated that the existing BBS data can reliably estimate trends for 4 species of birds [Brown-headed Nuthatch (*Sitta pusilla*), Northern Bobwhite (*Colinus virginianus*), Swainson's Warbler (*Limnothlypis swainsonii*), and Wood Thrush (*Hylocichla mustelina*)] and the existing CBC data can reliably estimate trends for 2 species of birds [Loggerhead Shrike (*Lanius ludovicianus*), Ring-necked Duck (*Aythya collaris*)] in the Gulf Coast Joint Venture (GCJV) geography. Similar analyses at various spatial scales within the GCJV geography are also presented.

Joint Ventures were originally designed to implement the objectives of the North American Waterfowl Management Plan (USFWS 1986). Although their initial priority was waterfowl and wetland bird conservation, over ensuing decades, Joint Ventures evolved to include a spectrum of conservation activities involving many species of migratory and resident birds (Giocomo et al. 2012). Joint Ventures are organized as cooperative partnerships that involve federal and state resource agencies and non-governmental organizations (Brennan et al. 2017). The Gulf Coast Joint Venture (GCJV) is one of 22 such organizations in the United States, Canada and Mexico. It is funded by the U.S. Fish and Wildlife Service with oversight by a Management Board; habitat and monitoring programs are implemented by a team of wildlife scientists and other cooperators (http://www.gcjv.org/index.php).

The GCJV has identified 22 species of landbirds, shorebirds, and waterbirds that have high priority for the GCJV partnership, along with other avian

The findings and conclusions in this article are those of the author(s) and do not necessarily represent the views of the U.S. Fish and Wildlife Service.

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species of conservation concern that require monitoring. The GCJV was interested in evaluating the potential of using existing landscape-scale surveys such as the BBS and/or the CBC at multiple spatial scales within and at the GCJV scale as a potential alternative to implementing de novo individual monitoring programs.

Monitoring trends in vertebrate abundance is a critical component of modern wildlife science and conservation. Even with robust indices, ecologists developing monitoring programs are confronted with sampling issues, including how many plots to sample, how often to survey plots within any given year, and what interval and how many years to sample (Cyr et al. 1992). Answers to such questions are influenced strongly by variability in counts (which reflects not only variability of the counting technique, but also natural year-to-year fluctuations in populations) and by how uniform trends are across all plots. Understanding how inherent variability of abundance indices interacts with sampling structure and goals of monitoring programs permits biologists developing monitoring programs to balance labor costs with statistical power (e.g., Gerrodette 1987, Peterman and Bradford 1987, Taylor and Gerrodette 1993, Zielinski and Stauffer 1996).

METHODS

Data Collection and Analysis of Trends

We collected count data from BBS (27 species of birds from 65 routes) and CBC (37 species, 58 count circles) within the GCJV. We estimated the mean count per year for each BBS route (1966-2007) and each CBC count circle (1966-67-2007-08) within the GCJV. To analyze trends, we used simple linear regression with a natural logarithm transformation of BBS and CBC data for each species at 5 spatial scales, the entire GCJV, portions of Texas, Louisiana, Mississippi-Alabama, pooled (MS-AL) within the GCJV, and Bird Conservation Region 37 (BCR 37) within the GCJV. Additionally, we incorporated 7 BBS routes, (Columbia, Cybur, Fayette, Fort Adams, Latimer, Necaise, and Neely) in Mississippi and 3 routes in Louisiana (Bickham, Keystone, and Ramah) that were adjacent to the GCJV. In this region of the GCJV geography few BBS routes were available to perform analysis, thus we used the routes above as surrogates for GCJV routes, which allowed us to evaluate trends for species in this portion (eastern LA, western MS) of the GCJV.

We used parameter estimates and confidence intervals from our regression analysis to estimate statistical significance of trends. We did not conduct a trend analysis for species where the 95% confidence interval (CI) of mean annual population estimates overlapped 0.0, or at the state/BCR37 scale where the number of estimates (n) available were <10. A preliminary analysis of a subset of species in the CBC indicated similar trends between counts and the standardized index individuals/hour so counts were used for this analysis for ease of biological interpretation.

We used Program Monitor (Gibbs and Ene 2010) to estimate 80% power to detect trends at 3, 5, 10, and 20-year intervals (two-tailed tests at $\alpha = 0.20$) based on $\pm 1\%$, $\pm 3\%$, $\pm 5\%$, and $\pm 10\%$ rate of annual population changes. We ran 3 sets of 1,000 iterative simulations for each species and each time interval and calculated mean power $\pm$ SE to detect annual trends and rate of annual population change. We parameterized simulations using mean count and estimate of standard deviation for BBS routes and CBC circle within the GCJV and subsequent spatial scales: Texas, Louisiana, MS-AL, and BCR 37. This approach allowed us to incorporate temporal variation within each route/circle and also account for spatial variation occurring between plots (Gibbs and Ene 2010).

We recognized a priori that species detection within routes or count circles would likely be highly variable, and thus results from many species would be quite insignificant given a dataset with complete routes. For power analyses we removed the top and bottom 10% of routes by mean count for each species at each scale presented where a species was detected on ≥ 10 routes. We used the entire route dataset where species were detected on <10 routes. This approach allowed us to analyze data that would not have otherwise been useful, while only sacrificing 20% of the data. Additionally, we did not run power analysis for species with mean annual counts where the 95% confidence interval overlapped 0.0. We present power analysis results (e.g., power $\pm$ SE) for species where power to detect population changes was ≥ 0.7 on at least one of the scenarios described above, and present number of routes upon which the analysis was based. We report minimum number of years and maximum annual change necessary to reliably detect (≥0.80 probability of detection) population changes. The tables referenced show applicable power data explicitly.

RESULTS

Breeding Bird Survey

Mean (±SD) detection of species was 23.96 ± 16.19 and ranged from 0 to 59 on 65 routes (Table 1, Figure 1). Of the 27 BBS species investigated (Table 1), 5 species were either not detected or not detected frequently enough to reliably determine population trends. Hooded Mergansers (*Lophodytes cucullatus*), were not detected using the BBS survey in the GCJV. One species, Bald Eagle (*Haliaeetus leucocephalus*), was detected only twice (once on each of 2 routes) from 1966 to 2007 (Table 1). The Red-cockaded Woodpecker (*Picoides borealis*) was detected in only 3 years on 2 routes from 1966 to 2007. Wood Storks (*Mycteria americana*) were detected in an inconsistent manner (16 of 42 years) from 1966 to 2007. Swallow-tailed Kites (*Elanoides forficatus*) were detected inconsistently as well (16 of 42 years from 1966 to 2007). We provide trend (Tables 1-4) and power estimates (Tables 5-9 where appropriate) for 22 remaining BBS priority species grouped by habitat associations below.

Grassland-Shrubland Birds

Gulf Coast Joint Venture Scale

We summarized route count data evaluated trends for 7 species of grassland-shrubland associated birds at the GCJV scale (Figure 2): Northern Bobwhite (*Colinus virginianus*), Loggerhead Shrike (*Lanius ludovicianus*), Bachman's Sparrow (*Peucaea aestivalis*), Painted Bunting (*Passerina ciris*), Dickcissel (*Spiza americana*), Seaside Sparrow (*Ammodramus maritimus*), and Prairie Warbler (*Setophaga discolor*). Bachman's Sparrows (−5.82%; 95% CI:−10.42–−1.98%), Loggerhead Shrikes (−1.39%; 95% CI:−2.08–−0.60%), Northern Bobwhites (−4.50%; 95% CI:

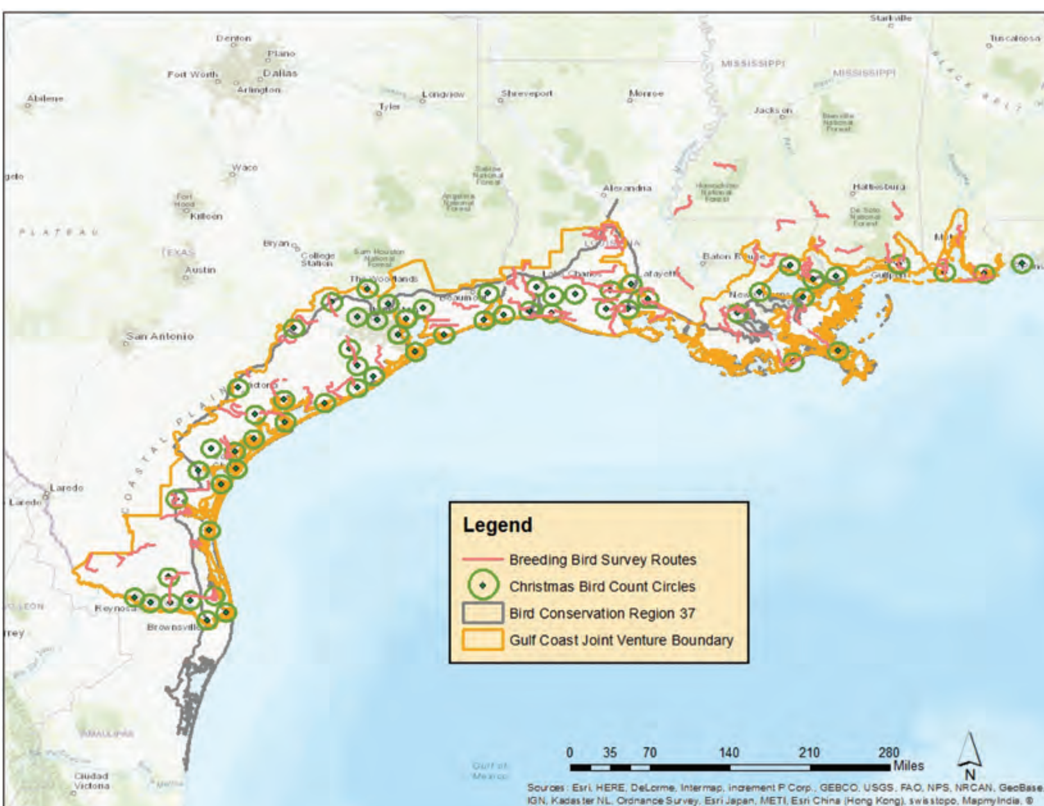


Figure 1. Breeding Bird Survey Routes and Christmas Bird Count Circles within the Gulf Coast Joint Venture region.

Table 1. Detections [number of routes detecting a species, and mean number of routes (± standard deviation) contributing count data for a species/year] and mean counts (number of individuals/route/year) of 27 breeding bird species in the Gulf Coast Joint Venture based on Breeding Bird Survey data, 1966–2007.

Species	Number of Routes with Detections	Mean number of Routes (± SD)	Mean Count (95% CI)
Bachman's Sparrow	15	5.71 ± 3.51	0.81 (0.44–1.19)
Bald Eagle	2	1.68 ± 0.48	0.04 (−0.01–0.09)
Black-bellied Whistling-Duck	26	13.68 ± 3.56	10.20 (8.26–12.14)
Black Skimmer	14	7.59 ± 2.43	1.61 (0.79–2.43)
Brown-headed Nuthatch	22	9.38 ± 4.32	1.81 (1.55–2.06)
Dickcissel	37	18.74 ± 6.05	12.18 (10.11–14.24)
Fulvous Whistling-Duck	24	12.07 ± 4.16	6.93 (5.18–8.68)
Gull-billed Tern	16	7.88 ± 3.44	2.18 (1.55–2.81)
Hooded Merganser	0	NA	NA
Kentucky Warbler	25	10.43 ± 5.56	2.21 (1.78–2.64)
King Rail	20	10.15 ± 3.51	1.26 (0.89–1.63)
Least Bittern	11	6.56 ± 1.43	0.46 (0.31–0.60)
Little Blue Heron	56	24.55 ± 10.64	7.72 (5.85–9.60)
Loggerhead Shrike	55	24.36 ± 10.55	5.53 (5.08–5.98)
Mottled Duck	31	14.44 ± 6.32	7.36 (6.26–8.47)
Northern Bobwhite	59	26.55 ± 10.79	36.68 (30.68–42.68)
Painted Bunting	46	22.21 ± 7.95	8.44 (7.46–9.43)
Prairie Warbler	18	7.36 ± 3.53	1.68 (1.23–2.12)
Prothonotary Warbler	30	12.33 ± 7.14	3.91 (3.19–4.62)
Red-cockaded Woodpecker	2	1.33 ± 0.48	0.17 (−0.05–0.38)
Red-headed Woodpecker	32	15.17 ± 5.87	1.75 (1.49–2.00)
Seaside Sparrow	6	2.58 ± 1.62	1.45 (0.75–2.16)
Swainson's Warbler	14	6.14 ± 3.38	0.49 (0.33–0.65)
Swallow-tailed Kite	12	5.36 ± 2.64	0.11 (0.05–0.16)
Wood Duck	33	16.05 ± 7.52	0.57 (0.42–0.72)
Wood Stork	13	6.66 ± 2.28	5.11 (−2.38–12.61)
Wood Thrush	28	12.45 ± 5.54	5.02 (4.20–5.84)

Table 2. Population trends [a], root mean square error (RMSE) for 22 priority bird species in the Gulf Coast Joint Venture based on Breeding Bird Survey data, 1966–2007[b].

Species	*n*	Trend Estimate[a] (95%CI)*[c]	RMSE
Bachman's Sparrow	26	−5.82% (−10.42–−1.98%)*	2.27
Black-bellied Whistling-Duck	41	3.56% (1.71–5.55%)*	2.57
Black Skimmer	33	2.74% (−0.20–5.87%)	2.64
Brown-headed Nuthatch	41	−0.50% (−1.88–0.70%)	1.38
Dickcissel	41	−0.50% (−1.88–1.01%)	2.29

Table 2. (*Continued*).

Species	*n*	Trend Estimate[a] (95%CI)*[c]	RMSE
Fulvous Whistling-Duck	40	3.67% (1.71–5.55%)*	2.28
Gull-billed Tern	35	5.23% (3.25–7.21%)*	1.66
Kentucky Warbler	39	−2.18% (−3.82–−0.50%)*	1.75
King Rail	40	−1.88% (−5.45–1.92%)	4.26
Least Bittern	31	3.46% (0.70–6.29%)*	1.97
Little Blue Heron	42	3.56% (1.61–5.55%)*	3.44
Loggerhead Shrike	42	−1.39% (−2.08–−0.60%)*	1.31
Mottled Duck	41	−3.34% (−4.21–−2.47%)*	1.26
Northern Bobwhite	42	−4.50% (−5.16–−3.92%)*	1.18
Painted Bunting	41	−1.00% (−1.78–−0.10%)*	1.42
Prairie Warbler	35	5.83% (3.73–7.98%)*	1.62
Prothonotary Warbler	42	3.87% (2.12–5.71%)*	1.98
Red-headed Woodpecker	42	−1.09% (−2.57–0.30%)	2.06
Seaside Sparrow	18	2.12% (−5.82–10.74%)	1.69
Swainson's Warbler	30	−3.44% (−5.73–−1.09%)*	1.43
Wood Duck	33	4.08% (1.71–6.72%)*	2.68
Wood Thrush	42	−1.78% (−3.05–−0.58%)*	1.56

[a] Percent change per year based estimate from natural logarithm transformed BBS counts.
[b] Not all species were detected in every year.
[c] Asterisk indicates 95% confidence interval does not overlap 0.0.

Table 3. Population trends[a] and root mean square error (RMSE) for 16 priority bird species within BCR 37 (within the GCJV) based on Breeding Bird Survey Data, 1967–2007.

Species	n	Trend	95%CI	RMSE
Black Skimmer	30	1.82%	−0.60−4.50%	1.91
Black-bellied Whistling-Duck	41	4.71%	2.63−6.82%*	2.25
Dickcissel	41	−1.00%	−2.96–0.30%	1.72
Fulvous Whistling-Duck	40	3.15%	1.01–5.13%*	2.30
Gull-billed Tern	33	5.44%	3.15–7.90%*	1.34
King Rail	40	−2.47%	−4.78–−0.50%*	2.47
Least Bittern	29	3.25%	0.40–6.18%*	1.84
Little Blue Heron	41	3.77%	1.11–6.40%*	2.93
Loggerhead Shrike	41	−0.10%	−1.00–0.80%	1.08
Mottled Duck	41	−3.34%	−4.59–−2.18%*	1.38
Northern Bobwhite	41	−4.59%	−5.26–−4.02%*	0.72
Painted Bunting	41	1.41%	0.49–2.43%*	1.15
Prothonotary Warbler	16	4.60%	−1.59–10.19%	1.11
Red-headed Woodpecker	31	−3.44%	−5.54–−1.29%*	1.46
Seaside Sparrow	15	−3.34%	−9.88–18.53%	2.27
Wood Duck	24	1.82%	−2.18–5.87%	1.86

[a] Asterisk indicates 95% confidence interval does not overlap 0.0.

Table 4. Population trends [a], for 22 bird species in at the state level within the GCJV based on Breeding Bird Survey data, 1966–2007.

	State					
	Texas		Louisiana		MS-AL	
Species	*n*	Trend (95% CI)	*n*	Trend (95% CI)	*n*	Trend (95% CI)
Bachman's Sparrow					24	−8.61 (−13.06–−4.88%)*
Black Skimmer	30	2.02%(−0.60–4.39%)				
Black-bellied Whistling-Duck	41	4.08%(2.02–6.18%)*				
Brown-headed Nuthatch			32	0.10% (−2.96–3.05%)	42	−1.00%(−2.96–.20)
Dickcissel	41	1.51%(0.90–2.12%)*	32	1.21% (−2.47–5.02%)		
Fulvous Whistling-Duck	40	2.63%(0.50–5.13%)*	21	10.52% (6.18–15.03%)*		
Gull-billed Tern	41	6.18% (4.08–7.25%)*				
Kentucky Warbler			28	−2.96%(−4.88–−0.10%)*	38	−3.92% (−5.82–−2.76%)*
King Rail	38	−4.11% (−6.76–−1.98%)*				
Least Bittern	22	3.05% (−0.20–6.18%)	22	−0.20% (−3.34–3.98%)		
Little Blue Heron	22	2.74% (−0.30–6.18%)	22	0.20% (3.44–3.87%)		
Loggerhead Shrike	41	0.30% (−0.60–1.11%)	41	−3.34% (−4.30–−1.98%)*	42	−1.98% (−2.96–−0.20%)*
Mottled Duck	41	−2.96% (−4.30–2.96%)	20	−1.98% (−7.96–4.08%)	15	8.33%(2.12–13.88%)*
Northern Bobwhite	41	−3.92% (−4.88–−2.96%)*	41	−5.80%(−4.88–−0.70%)*	42	−3.92%(−4.88–−2.96%)*
Painted Bunting	41	−3.34% (−4.30–−2.47%)*	21	−1.98% (−7.69–5.13%)	14	6.18% (−1.69–15.03%)
Prairie Warbler			22	4.08% (0.90−8.22%)*	33	5.97% (3.77–8.22%)
Prothonotary Warbler			37	4.71% (2.63–6.82%)*	42	−0.08% (−1.49–1.37%)
Red-headed Woodpecker	28	−3.92% (−5.82–−1.00%)*	38	−0.80% (−1.98–0.90%)	41	−1.98% (−3.63–−0.50%)*
Seaside Sparrow	21	−0.50% (−5.82–5.13%)			17	2.74%(−4.88–11.07%)
Swainson's Warbler			22	−3.54% (−7.32–0.30%)	21	−3.44% (−6.11–−0.80%)*
Wood Duck	28	2.74% (−1.09–6.72%)	12	0.40% (−0.30–3.77%)	24	−1.00% (−3.92–2.33%)
Wood Thrush			35	−0.20% (−1.98–2.02%)	42	−2.86% (−4.02–−1.49)

[a] Asterisk indicates 95% confidence interval does not overlap 0.0.

−5.16–−3.92%) and Painted Buntings exhibited negative annual population trends (−1.00%; 95% CI: −1.78–0.78%), Prairie Warblers (5.83%; 95% CI:3.73–7.98%) exhibited a positive population trend, and Dickcissels and Seaside Sparrows exhibited neutral population trends (Table 2). Changes in Northern Bobwhite populations could be reliably detected (≥0.80 probability) after 3 years given a ±10% annual trend and after 20 years given a ±1% annual trend (Table 5).

Bird Conservation Region 37 Scale

Within BCR 37 (Table 3), Northern Bobwhites (−4.59%; 95% CI:−5.26–−4.02%) exhibited a declining population trend, Painted Buntings (1.41%; 95% CI: 0.49–2.43%) exhibited a positive population trend, and Dickcissels, Loggerhead Shrikes, and Seaside Sparrows exhibited statistically neutral trends (Table 3). Bachman's Sparrows and Prairie Warblers were not included in trend analysis due to a lack of detections. Population changes could be reliably detected for 2 species (Table 6): Loggerhead Shrike (5 years; ± 10% annual trend) and Northern Bobwhite (3 years; ±10% annual trend).

State Scale

At the state scale Bachman's Sparrow exhibited a negative annual population trend (−8.61%; 95% CI: −13.06–−4.88%) in MS−AL (Table 4). Dickcissels exhibited a positive population trend in Texas (1.51%; 95% CI: 0.90–2.12%) and neutral

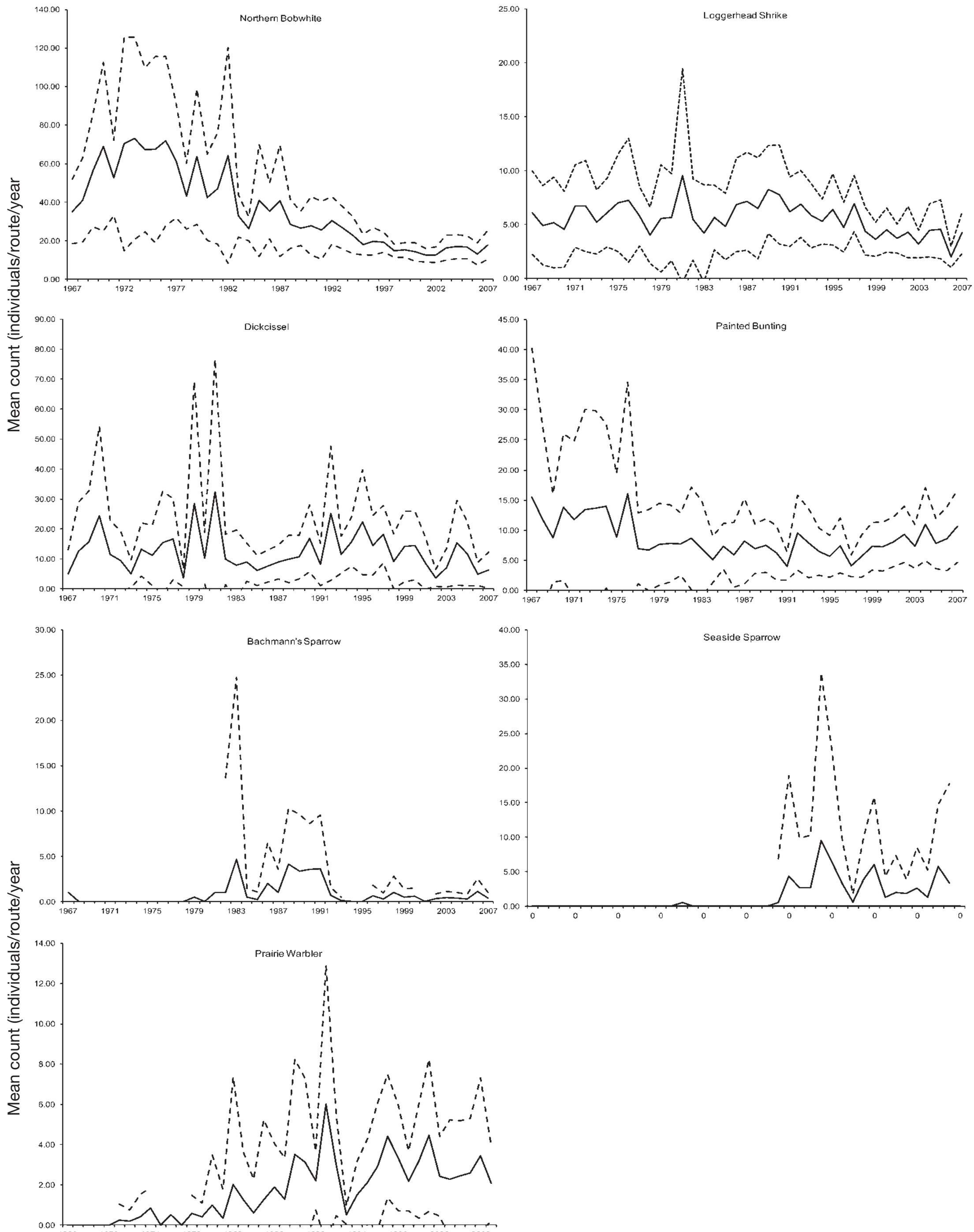


Figure 2. Population trends (based on BBS data) with 95% CI of 7 grassland/shrubland associated species based on the mean breeding bird survey (individuals/route/year) in the Gulf Coast Joint Venture region, 1967-2007.

Table 5. Power (±SE) to detect population changes at 3-, 5-, 10-, and 20-years of sampling for 4 bird species in the Gulf Coast Joint Venture using route regression Monte-Carlo simulations (1,000 iterations, n = 3 runs per species) in Program Monitor and Breeding Bird Survey (two-tailed α = 0.20). Only species with power >0.70 are reported.

		Number of Intervals							
		3 Years		5 Years		10 Years		20 Years	
Species (n[a])	Annual Trend	%Change	Power	%Change	Power	%Change	Power	%Change	Power
Brown-headed Nuthatch (17)	−10%							−86.5	0.98 ± 0.01
	−5%							−62.3	0.98 ± 0.01
	−3%							−43.4	0.98 ± 0.01
	−1%							−7.4	0.89 ± 0.07
	1%							20.8	0.97 ± 0.01
	3%							75.4	0.99 ± 0.01
	5%							152.7	0.99 ± 0.01
	10%							511.6	1.00 ± 0.01
Northern Bobwhite (49)	−10%	−19.0	0.88 ± 0.02	−34.4	0.96 ± 0.01	−61.3	0.99 ± 0.01	−86.5	0.99 ± 0.01
	−5%	−9.8	0.70 ± 0.06	−18.5	0.86 ± 0.02	−37.0	0.98 ± 0.01	−62.3	0.99 ± 0.01
	−3%	−5.9	0.00 ± 0.00	−11.5	0.79 ± 0.04	−24.0	0.96 ± 0.01	−43.4	0.99 ± 0.01
	−1%	−2.0	0.00 ± 0.00	−3.9	0.00 ± 0.00	−8.6	0.59 ± 0.08	−17.4	0.96 ± 0.01
	1%	2.0	0.00 ± 0.00	4.0	0.00 ± 0.00	9.4	0.87 ± 0.06	20.8	0.96 ± 0.01
	3%	6.1	0.32 ± 0.01	12.6	0.73 ± 0.08	30.5	0.97 ± 0.21	75.4	0.99 ± 0.01
	5%	10.3	0.66 ± 0.08	21.6	0.89 ± 0.02	55.1	0.99 ± 0.01	152.7	1.00 ± 0.01
	10%	21.0	0.87 ± 0.01	46.4	0.98 ± 0.01	135.8	0.99 ± 0.01	511.6	1.00 ± 0.00
Swainson's Warbler	−10%					−61.3	0.00 ± 0.00	−86.5	0.00 ± 0.00
	−5%					37.0	0.00 ± 0.00	−62.3	0.00 ± 0.00
	−3%					−24.0	0.00 ± 0.00	−43.4	0.00 ± 0.00
	−1%					−8.6	0.00 ± 0.00	−17.4	0.00 ± 0.00
	1%					9.4	0.00 ± 0.00	20.8	0.00 ± 0.00
	3%					30.5	0.00 ± 0.00	75.4	0.00 ± 0.00
	5%					55.1	0.08 ± 0.06	152.7	0.99 ± 0.01
	10%					135.8	0.92 ± 0.05	511.6	1.00 ± 0.00
Wood Thrush (24)	−10%			−34.4	0.59 ± 0.30	−61.3	0.36 ± 0.26	−86.5	0.01 ± 0.01
	−5%			−18.5	0.04 ± 0.04	−37.0	0.32 ± 0.11	−62.3	0.12 ± 0.12
	−3%			−11.5	0.00 ± 0.00	−24.0	0.31 ± 0.16	−43.4	0.12 ± 0.11
	−1%			−3.9	0.00 ± 0.00	−8.6	0.00 ± 0.00	−17.4	0.09 ± 0.09
	1%			4.0	0.00 ± 0.00	9.4	0.00 ± 0.00	20.8	0.03 ± 0.00
	3%			12.6	0.00 ± 0.00	30.5	0.46 ± 0.23	75.4	0.60 ± 0.20
	5%			21.6	0.27 ± 0.15	55.1	0.75 ± 0.15	152.7	0.78 ± 0.19
	10%			46.4	0.51 ± 0.20	135.8	0.80 ± 0.13	511.6	0.89 ± 0.04

[a] n = number of routes included in simulations.

Table 6. Power (±SE) to detect population changes at 3-, 5-, 10-, and 20-years of sampling for 3 priority bird species in the BCR 37 Portion of the Gulf Coast Joint Venture using route regression Monte-Carlo simulations (1,000 iterations, n = 3 runs per species) in Program Monitor and Breeding Bird Survey (two-tailed α = 0.20).

		Number of Intervals							
		3 Years		5 Years		10 Years		20 Years	
Species (n[a])	Annual Trend	%Change	Power	%Change	Power	%Change	Power	%Change	Power
Loggerhead Shrike (17)	−10%	−19.0	0.79 ± 0.04	−34.4	0.94 ± 0.02	−61.3	0.98 ± 0.01	−86.5	0.99 ± 0.01
	−5%	−9.8	0.38 ± 0.19	−18.5	0.65 ± 0.22	−37.0	0.97 ± 0.01	−62.3	0.98 ± 0.01
	−3%	−5.9	0.33 ± 0.18	−11.5	0.64 ± 0.14	−24.0	0.96 ± 0.01	−43.4	0.98 ± 0.01
	−1%	−2.0	0.00 ± 0.00	−3.9	0.00 ± 0.00	−8.6	0.61 ± 0.09	−17.4	0.86 ± 0.12
	1%	2.0	0.00 ± 0.00	4.0	0.18 ± 0.16	9.4	0.83 ± 0.08	20.8	0.95 ± 0.02
	3%	6.1	0.11 ± 0.11	12.6	0.39 ± 0.03	30.5	0.95 ± 0.01	75.4	0.99 ± 0.01
	5%	10.3	0.37 ± 0.11	21.6	0.87 ± 0.13	55.1	0.96 ± 0.01	152.7	0.99 ± 0.01
	10%	21.0	0.74 ± 0.01	46.4	0.95 ± 0.01	135.8	0.99 ± 0.01	511.6	1.00 ± 0.00
Northern Bobwhite (17)	−10%	−19.0	0.95 ± 0.02	−34.4	0.99 ± 0.01	−61.3	0.99 ± 0.01	−86.5	1.00 ± 0.00
	−5%	−9.8	0.75 ± 0.06	−18.5	0.97 ± 0.01	−37.0	0.99 ± 0.01	−62.3	0.99 ± 0.01
	−3%	−5.9	0.52 ± 0.04	−11.5	0.89 ± 0.02	−24.0	0.98 ± 0.01	−43.4	0.99 ± 0.01
	−1%	−2.0	0.00 ± 0.00	−3.9	0.50 ± 0.16	−8.6	0.92 ± 0.01	−17.4	0.98 ± 0.00
	1%	2.0	0.02 ± 0.02	4.0	0.23 ± 0.04	9.4	0.92 ± 0.02	20.8	0.98 ± 0.00
	3%	6.1	0.58 ± 0.14	12.6	0.95 ± 0.01	30.5	0.99 ± 0.01	75.4	0.99 ± 0.01
	5%	10.3	0.82 ± 0.07	21.6	0.97 ± 0.01	55.1	0.99 ± 0.01	152.7	1.00 ± 0.00
	10%	21.0	0.96 ± 0.01	46.4	0.99 ± 0.01	135.8	0.99 ± 0.01	511.6	1.00 ± 0.00
Prothonotary Warbler (2)	−10%	−19.0	0.92 ± 0.04	−34.4	0.99 ± 0.01	−61.3	0.99 ± 0.01	−86.5	0.99 ± 0.01
	−5%	−9.8	0.77 ± 0.12	−18.5	0.98 ± 0.01	−37.0	0.99 ± 0.01	−62.3	0.99 ± 0.01
	−3%	−5.9	0.47 ± 0.21	−11.5	0.95 ± 0.02	−24.0	0.98 ± 0.01	−43.4	0.99 ± 0.01
	−1%	−2.0	0.09 ± 0.02	−3.9	0.59 ± 0.15	−8.6	0.96 ± 0.01	−17.4	0.97 ± 0.01
	1%	2.0	0.52 ± 0.25	4.0	0.61 ± 0.11	9.4	0.96 ± 0.01	20.8	0.97 ± 0.01
	3%	6.1	0.89 ± 0.04	12.6	0.92 ± 0.03	30.5	0.98 ± 0.01	75.4	0.99 ± 0.01
	5%	10.3	0.80 ± 0.05	21.6	0.98 ± 0.01	55.1	0.99 ± 0.01	152.7	1.00 ± 0.00
	10%	21.0	0.98 ± 0.01	46.4	0.99 ± 0.01	135.8	1.00 ± 0.00	511.6	1.00 ± 0.00

[a] *n* = number of count circles included in simulations.

Table 7. Power (±SE) to detect population changes at 3-, 5-, 10-, and 20-years of sampling for 3 priority bird species within the Texas portion of the Gulf Coast Joint Venture using route regression Monte-Carlo simulations (1,000 iterations, *n* = 3 runs per species) in Program Monitor and Breeding Bird Survey (two-tailed α = 0.20).

		Number of Intervals							
		3 Years		5 Years		10 Years		20 Years	
Species (n[a])	Annual Trend	%Change	Power	%Change	Power	%Change	Power	%Change	Power
King Rail (9)	−10%							−86.5	0.01 ± 0.01
	−5%							−62.3	0.01 ± 0.01
	−3%							−43.4	0.01 ± 0.01
	−1%							−17.4	0.09 ± 0.04
	1%							20.8	0.19 ± 0.19
	3%							75.4	0.56 ± 0.27
	5%							152.7	0.35 ± 0.28
	10%							511.6	0.95 ± 0.03
Northern Bobwhite (21)	−10%	−19.0	0.91 ± 0.01	−34.4	0.98 ± 0.01	−61.3	0.99 ± 0.01	−86.5	1.00 ± 0.00
	−5%	−9.8	0.63 ± 0.11	−18.5	0.91 ± 0.05	−40.0	0.97 ± 0.01	−62.3	0.99 ± 0.01
	−3%	−5.9	0.36 ± 0.20	−11.5	0.85 ± 0.04	−24.0	0.94 ± 0.04	−43.4	0.99 ± 0.01
	−1%	−2.0	0.00 ± 0.00	−3.9	0.06 ± 0.06	−8.6	0.70 ± 0.13	−17.4	0.96 ± 0.01
	+1%	4.0	0.00 ± 0.00	4.1	0.00 ± 0.00	9.4	0.76 ± 0.07	20.8	0.97 ± 0.01

Table 7. (*Continued*).

Species (n^a)	Annual Trend	Number of Intervals: 3 Years %Change	3 Years Power	5 Years %Change	5 Years Power	10 Years %Change	10 Years Power	20 Years %Change	20 Years Power
	+3%	6.1	0.47 ± 0.18	12.6	0.79 ± 0.06	30.5	0.96 ± 0.02	75.4	0.99 ± 0.01
	+5%	10.3	0.71 ± 0.03	21.6	0.94 ± 0.03	55.1	0.99 ± 0.01	152.7	1.00 ± 0.00
	+10%	21.0	0.86 ± 0.06	46.6	0.98 ± 0.01	135.8	1.00 ± 0.00	511.6	1.00 ± 0.00
Wood Thrush (1)	−10%							−86.5	0.16 ± 0.01
	−5%							−62.3	0.16 ± 0.01
	−3%							−43.4	0.16 ± 0.01
	−1%							−17.4	0.16 ± 0.01
	1%							20.8	0.21 ± 0.01
	3%							75.4	0.24 ± 0.01
	5%							152.7	0.36 ± 0.01
	10%							511.6	0.92 ± 0.01

[a] n = number of routes included in simulations.

Table 8. Power (±E) to detect population changes at 3-, 5-, 10-, and 20-years of sampling for 6 priority bird species in Louisiana portion of the Gulf Coast Joint Venture using route regression Monte-Carlo simulations (1,000 iterations, n = 3 runs per species) in Program Monitor and Breeding Bird Survey (two-tailed = 0.20).

Species (n^a)	Annual Trend	Number of Intervals: 3 Years %Change	3 Years Power	5 Years %Change	5 Years Power	10 Years %Change	10 Years Power	20 Years %Change	20 Years Power
Bachman's Sparrow (5)	−10%							−86.5	0.01 ± 0.01
	−5%							−62.3	0.03 ± 0.02
	−3%							−43.9	0.04 ± 0.02
	−1%							−17.4	0.01 ± 0.03
	1%							20.8	0.01 ± 0.01
	3%							75.4	0.01 ± 0.02
	5%							152.7	0.03 ± 0.01
	10%							511.6	0.99 ± 0.00
Brown-headed Nuthatch (7)	−10%			−34.4	0.82 ± 0.04	−61.3	0.88 ± 0.05	−86.5	0.85 ± 0.12
	−5%			−18.5	0.22 ± 0.13	−37.0	0.92 ± 0.02	−62.3	0.88 ± 0.05
	−3%			−11.5	0.11 ± 0.10	−24.0	0.78 ± 0.08	−43.4	0.73 ± 0.11
	−1%			−3.9	0.08 ± 0.08	−8.6	0.45 ± 0.23	−17.4	0.76 ± 0.12
	1%			4.0	0.00 ± 0.00	9.4	0.28 ± 0.14	20.8	0.89 ± 0.03
	3%			12.6	0.27 ± 0.14	30.5	0.87 ± 0.03	75.7	0.98 ± 0.01
	5%			21.6	0.57 ± 0.28	55.1	0.93 ± 0.02	152.7	0.99 ± 0.01
	10%			46.4	0.68 ± 0.09	135.8	0.98 ± 0.01	511.6	1.00 ± 0.00
Gull-billed Tern (1)	−10%							−86.5	0.38 ± 0.00
	−5%							−62.3	0.29 ± 0.01
	−3%							−43.4	0.27 ± 0.01
	−1%							−17.4	0.22 ± 0.00
	1%							20.8	0.21 ± 0.02
	3%							75.4	0.36 ± 0.01
	5%							152.7	0.70 ± 0.01
	10%							511.6	0.99 ± 0.00
Prairie Warbler (4)	−10%			−34.4	0.76 ± 0.16	−61.3	0.97 ± 0.01	−86.5	0.87 ± 0.09
	−5%			−18.5	0.75 ± 0.19	−37.0	0.78 ± 0.11	−62.3	0.97 ± 0.01
	−3%			−11.5	0.31 ± 0.21	−24.0	0.76 ± 0.05	−43.4	0.92 ± 0.03
	−1%			−3.9	0.27 ± 0.15	−8.6	0.39 ± 0.09	−17.4	0.57 ± 0.21
	1%			4.0	0.09 ± 0.04	9.4	0.08 ± 0.06	20.8	0.84 ± 0.08
	3%			12.6	0.62 ± 0.09	30.5	0.88 ± 0.07	75.4	0.97 ± 0.01

Table 8. (*Continued*).

Species (n^a)	Annual Trend	3 Years %Change	3 Years Power	5 Years %Change	5 Years Power	10 Years %Change	10 Years Power	20 Years %Change	20 Years Power
	5%			21.6	0.44 ± 0.18	55.1	0.88 ± 0.07	152.7	0.99 ± 0.01
	10%			46.4	0.92 ± 0.02	135.8	0.97 ± 0.01	511.6	1.00 ± 0.00
Seaside Sparrow (1)	−10%							−86.5	0.11 ± 0.01
	−5%							−62.3	0.12 ± 0.01
	−3%							−43.4	0.13 ± 0.02
	−1%							−17.4	0.14 ± 0.02
	1%							20.8	0.15 ± 0.01
	3%							75.4	0.23 ± 0.01
	5%							152.7	0.31 ± 0.01
	10%							511.6	0.95 ± 0.01
Swainson's Warbler (8)	−10%					−61.3	0.83 ± 0.07	−86.5	0.95 ± 0.03
	−5%					−37.0	0.00 ± 0.00	−62.3	0.89 ± 0.07
	−3%					−24.0	0.00 ± 0.00	−43.4	0.01 ± 0.01
	−1%					−8.6	0.12 ± 0.12	−17.4	0.00 ± 0.00
	1%					9.4	0.11 ± 0.11	20.8	0.00 ± 0.00
	3%					30.5	0.00 ± 0.00	75.4	0.01 ± 0.01
	5%					55.1	0.42 ± 0.22	152.7	0.99 ± 0.01
	10%					135.8	0.99 ± 0.01	511.6	1.00 ± 0.00

[a] *n* = number of routes included in simulations.

Table 9. Power (±SE) to detect population changes at 3-, 5-, 10-, and 20-years of sampling for 9 priority bird species in the Mississippi-Alabama portion of the Gulf Coast Joint Venture using route regression Monte-Carlo simulations (1,000 iterations, $n = 3$ runs per species) in Program Monitor and Breeding Bird Survey (two-tailed $\alpha = 0.20$).

Species (n^a)	Annual Trend	3 Years %Change	3 Years Power	5 Years %Change	5 Years Power	10 Years %Change	10 Years Power	20 Years %Change	20 Years Power
Brown-headed Nuthatch (13)	−10%			−34.4	0.88 ± 0.04	−61.3	0.97 ± 0.01	−86.5	0.89 ± 0.08
	−5%			−18.5	0.62 ± 0.15	−37.0	0.87 ± 0.10	−62.3	0.90 ± 0.05
	−3%			−11.5	0.33 ± 0.18	−24.0	0.85 ± 0.03	−43.4	0.95 ± 0.04
	−1%			−3.9	0.00 ± 0.00	−8.6	0.19 ± 0.19	−17.4	0.89 ± 0.04
	1%			4.0	0.00 ± 0.00	9.4	0.41 ± 0.11	20.8	0.57 ± 0.29
	3%			12.6	0.37 ± 0.18	30.5	0.95 ± 0.01	75.4	0.99 ± 0.01
	5%			21.6	0.88 ± 0.03	55.1	0.93 ± 0.03	152.7	0.92 ± 0.07
	10%			46.4	0.80 ± 0.17	135.8	0.99 ± 0.01	511.6	0.99 ± 0.01
Dickcissel (2)	−10%			−34.4	0.64 ± 0.11	−61.3	0.92 ± 0.03	−86.5	0.91 ± 0.06
	−5%			−18.5	0.56 ± 0.04	−37.0	0.89 ± 0.07	−62.3	0.74 ± 0.14
	−3%			−11.5	0.35 ± 0.16	−24.0	0.52 ± 0.26	−43.4	0.70 ± 0.05
	−1%			−3.9	0.57 ± 0.09	−8.6	0.41 ± 0.27	−17.4	0.98 ± 0.03
	1%			4.0	0.10 ± 0.03	9.4	0.38 ± 0.07	20.8	0.11 ± 0.01
	3%			12.6	0.36 ± 0.16	30.5	0.61 ± 0.14	75.4	0.99 ± 0.01
	5%			21.6	0.64 ± 0.08	55.1	0.63 ± 0.31	152.7	0.98 ± 0.00
	10%			46.4	0.80 ± 0.14	135.8	0.99 ± 0.01	511.6	1.00 ± 0.00
Least Bittern (1)	−10%							−86.5	0.21 ± 0.01
	−5%							−62.3	0.20 ± 0.02
	−3%							−43.4	0.19 ± 0.01
	−1%							−17.4	0.19 ± 0.01
	1%							20.8	0.21 ± 0.01
	3%							75.4	0.26 ±0.01
	5%							152.7	0.40 ± 0.01
	10%							511.6	0.96 ± 0.01
Loggerhead Shrike (14)	−10%	−19.0	0.81 ± 0.05	−34.4	0.97 ± 0.01	−61.3	0.99 ± 0.01	−86.5	0.99 ± 0.01
	−5%	−9.8	0.27 ± 0.07	−18.5	0.91 ± 0.03	−37.0	0.98 ± 0.01	−62.3	0.99 ± 0.01

Table 9. (*Continued*).

		Number of Intervals							
		3 Years		5 Years		10 Years		20 Years	
Species (n[a])	Annual Trend	%Change	Power	%Change	Power	%Change	Power	%Change	Power
	−3%	−5.9	0.21 ± 0.12	−11.5	0.72 ± 0.04	−24.0	0.96 ± 0.01	−43.4	0.99 ± 0.01
	−1%	−2.0	0.00 ± 0.00	−3.9	0.00 ± 0.00	−8.6	0.68 ± 0.05	−17.4	0.67 ± 0.01
	1%	2.0	0.00 ± 0.00	4.0	0.05 ± 0.05	9.4	0.77 ± 0.14	20.8	0.99 ± 0.01
	3%	6.1	0.23 ± 0.12	12.6	0.73 ± 0.07	30.5	0.97 ± 0.01	75.4	0.99 ± 0.01
	5%	10.3	0.47 ± 0.14	21.6	0.95 ± 0.02	55.1	0.99 ± 0.01	152.7	1.00 ± 0.00
	10%	21.0	0.89 ± 0.03	46.4	0.99 ± 0.01	135.8	0.99 ± 0.01	511.6	1.00 ± 0.00
Northern Bobwhite (16)	−10%	−19.0	0.95 ± 0.01	−34.4	0.99 ± 0.01	−61.3	0.99 ± 0.01	−86.5	0.99 ± 0.11
	−5%	−9.8	0.78 ± 0.03	−18.5	0.96 ± 0.01	−37.0	0.98 ± 0.01	−62.3	0.99 ± 0.19
	−3%	−5.9	0.54 ± 0.07	−11.5	0.85 ± 0.05	−24.0	0.96 ± 0.01	−44.4	0.99 ± 0.01
	−1%	−2.0	0.00 ± 0.00	−3.9	0.16 ± 0.04	−8.6	0.93 ± 0.02	−17.4	0.67 ± 0.01
	1%	2.0	0.00 ± 0.00	4.0	0.05 ± 0.05	9.4	0.83 ± 0.06	20.8	0.99 ± 0.01
	3%	6.1	0.77 ± 0.06	12.6	0.91 ± 0.03	30.5	0.98 ± 0.01	75.4	1.00 ± 0.01
	5%	10.3	0.83 ± 0.08	21.6	0.97 ± 0.01	55.1	0.99 ± 0.01	152.7	1.00 ± 0.00
	10%	21.0	0.97 ± 0.02	46.4	0.99 ± 0.01	135.8	1.00 ± 0.00	511.6	1.00 ± 0.00
Prothonotary Warbler (12)	−10%	−19.0	0.74 ± 0.13	−34.4	0.87 ± 0.06	−61.3	0.98 ± 0.01	−86.5	0.77 ± 0.21
	−5%	−9.8	0.35 ± 0.13	−18.5	0.25 ± 0.14	−37.0	0.81 ± 0.08	−62.3	0.92 ± 0.03
	−3%	−5.9	0.01 ± 0.01	−11.5	0.26 ± 0.24	−24.0	0.81 ± 0.03	−43.4	0.88 ± 0.09
	−1%	−2.0	0.00 ± 0.00	−3.9	0.02 ± 0.02	−8.6	0.21 ± 0.19	−17.4	0.86 ± 0.07
	1%	2.0	0.00 ± 0.00	4.0	0.14 ± 0.14	9.4	0.13 ± 0.07	20.8	0.67 ± 0.08
	3%	6.1	0.01 ± 0.01	12.6	0.56 ± 0.18	30.5	0.92 ± 0.06	75.4	0.97 ± 0.02
	5%	10.3	0.59 ± 0.16	21.6	0.66 ± 0.12	55.1	0.96 ± 0.03	152.7	0.99 ± 0.01
	10%	21.0	0.68 ± 0.07	46.4	0.98 ± 0.01	135.8	0.99 ± 0.01	511.6	0.99 ± 0.01
Red-headed Woodpecker (15)	−10%	−19.0	0.29 ± 0.05	−34.4	0.92 ± 0.03	−61.3	0.97 ± 0.01	−86.5	0.98 ± 0.01
	−5%	−9.8	0.45 ± 0.14	−18.5	0.71 ± 0.00	−37.0	0.87 ± 0.09	−62.3	0.97 ± 0.02
	−3%	−5.9	0.01 ± 0.01	−11.5	0.03 ± 0.01	−24.0	0.88 ± 0.07	−43.4	0.96 ± 0.01
	−1%	−2.0	0.00 ± 0.00	−3.9	0.06 ± 0.06	−8.6	0.37 ± 0.09	−17.4	0.82 ± 0.07
	1%	2.0	0.00 ± 0.00	4.0	0.00 ± 0.00	9.4	0.57 ± 0.12	20.8	0.93 ± 0.02
	3%	6.1	0.00 ± 0.00	12.6	0.52 ± 0.12	30.5	0.93 ± 0.01	75.4	0.98 ± 0.01
	5%	10.3	0.33 ± 0.09	21.6	0.85 ± 0.01	55.1	0.98 ± 0.01	152.7	0.99 ± 0.01
	10%	21.0	0.82 ± 0.06	46.4	0.94 ± 0.03	135.8	0.99 ± 0.01	511.6	1.00 ± 0.00
Seaside Sparrow (1)	−10%					−61.3	0.57 ± 0.01	−86.5	0.97 ± 0.01
	−5%					−37.0	0.34 ± 0.02	−62.3	0.78 ± 0.01
	−3%					−24.0	0.26 ± 0.01	−43.4	0.49 ± 0.01
	−1%					−8.6	0.21 ± 0.01	−17.4	0.24 ± 0.05
	1%					9.4	0.23 ± 0.01	20.8	0.27 ± 0.01
	3%					30.5	0.27 ± 0.01	75.4	0.77 ± 0.01
	5%					55.1	0.44 ± 0.01	152.7	0.98 ± 0.01
	10%					135.8	0.87 ± 0.01	511.6	1.00 ± 0.00
Wood Thrush (15)	−10%			−34.4	0.82 ± 0.07	−61.3	0.97 ± 0.01	−86.5	0.99 ± 0.01
	−5%			−18.5	0.69 ± 0.03	−37.0	0.95 ± 0.01	−62.3	0.98 ± 0.01
	−3%			−11.5	0.34 ± 0.17	−24.0	0.79 ± 0.06	−43.4	0.97 ± 0.01
	−1%			−3.9	0.00 ± 0.00	−8.6	0.04 ± 0.04	−17.4	0.55 ± 0.28
	1%			4.0	0.00 ± 0.00	9.4	0.20 ± 0.09	20.8	0.84 ± 0.05
	3%			12.6	0.06 ± 0.04	30.5	0.75 ± 0.13	75.4	0.94 ± 0.03
	5%			21.6	0.59 ± 0.12	55.1	0.95 ± 0.01	152.7	0.99 ± 0.01
	10%			46.4	0.83 ± 0.03	135.8	0.99 ± 0.01	511.6	1.00 ± 0.00

[a] n = number of routes included in simulations.

population trend in Louisiana (Table 4). Loggerhead Shrikes exhibited negative population trends in Louisiana (−3.34% 95% CI:−4.30–−1.98%) and MS-AL (−1.98% 95% CI:−2.96–−0.20%) and a neutral population trend in Texas (Table 4). Northern Bobwhites exhibited statistically significant population declines in all 3 states (Table 4), with greatest annual percent decline in Louisiana (−5.80%; 95% CI:−4.88– −0.70%).

In Texas (Table 7), population changes could be reliably detected for 1 species: Northern Bobwhite (3 years; ±10% annual trend). In Louisiana (Table 8), population changes could be reliably detected for 3 species: Bachman's Sparrow (20 years; +10% annual trend), Prairie Warbler (5 years; +10% annual trend), and Seaside Sparrow (10 years; ±10% annual trend) In MS-AL (Table 9) population changes could be reliably detected for 4 species: Dickcissel (10 years; ±10% annual population change) Loggerhead Shrike (3 years; ±10% annual change), Northern Bobwhite (3 years; ±10% annual trend), and Seaside Sparrow (20 years; ±10% annual trend)

Forest Birds

Gulf Coast Joint Venture Scale

We summarized route count data and evaluated trends for 6 species of forest birds (Figure 3): Brown-headed Nuthatch (*Sitta pusilla*), Kentucky Warbler (*Geothlypis formosus*), Prothonotary Warbler (*Protonotaria citrea*), Red-headed Woodpecker (*Melanerpes erythrocephalus*), Swainson's Warbler (*Limnothlypis swainsonii*), and Wood Thrush (*Hylocichla mustelina*). Kentucky Warblers (−2.18%; 95% CI:−3.82–−0.50%), Swainson's Warblers (−3.44%; 95% CI:−5.73–−1.09%) and Wood Thrushes (−1.78%; 95% CI:−3.05–−0.58%) exhibited negative population trends, Prothonotary Warblers (3.87%; 95% CI:2.12–5.71%) exhibited a positive population trend, and Brown-headed Nuthatches and Red-headed Woodpeckers exhibited a neutral trend (Table 2). Population changes could be reliably detected in 3 species (Table 5): Brown-headed Nuthatch (20 years; ±1% annual trend), Swainson's Warbler (10 years; +10% annual trend) and Wood Thrush (5 years; +10% annual change).

Bird Conservation Region 37 Scale

In BCR 37 (Table 3) Red-headed Woodpeckers exhibited a negative population trend (−3.44%; 95% CI:−5.54–−1.29%), and Prothonotary Warblers exhibited a neutral trend (4.60%; 95% CI: −1.59–10.19%). Population trends were not estimated for Brown-headed Nuthatches, Kentucky Warblers, Swainson's Warblers, or Wood Thrushes due to a lack of detections. Population changes could be reliably detected for 1 species (Table 6): Prothonotary Warbler (3 years; ±10% annual trend).

State Scale

In Texas, Red-headed Woodpeckers exhibited a negative population trend (Table 4). In Louisiana Kentucky Warblers exhibited negative population trends, Brown-headed Nuthatches, Red-headed Woodpeckers, Swainson's Warblers, and Wood Thrushes exhibited neutral trends, and Prothonotary Warblers exhibited increasing trends (Table 4). Wood Thrushes exhibited a declining trend in MS-AL.

In Texas (Table 7), Wood Thrush population changes could be reliably detected after 20 years (±10% annual change). In Louisiana (Table 8), population changes could be reliably detected for 2 species: Brown-headed Nuthatch (5 years; ±10% annual trend), and Swainson's Warbler (10 years; ±10 annual trend). In MS-AL (Table 9), changes in populations could be reliably detected for 4 species: Brown-headed Nuthatch (5 years; ±10% annual trend), Prothonotary Warbler (5 years; −10% annual trend), Red-headed Woodpecker (5 years; +10% annual change), and Wood Thrush (5 years; +10% annual trend).

Waterfowl

Gulf Coast Joint Venture Scale

We summarized route count data and evaluated trends for 4 species of waterfowl (Figure 4): Black-bellied Whistling-Duck (*Dendrocygna autumnalis)*, Fulvous Whistling-Duck (*Dendrocygna bicolor*), Mottled Duck (*Anas fulvigula*) and Wood Duck (*Aix sponsa*). Mottled Ducks (−3.34%; 95% CI:−4.21– −2.47%) exhibited a negative annual trend and the remaining three species, Black-bellied Whistling-Ducks (3.56%; 95% CI:1.71–5.55%), Fulvous Whistling-Ducks (3.67%; 95% CI:1.71–5.55%) and Wood Ducks (4.08%; 95% CI:1.71–6.72%) exhibited positive population trends (Table 2).

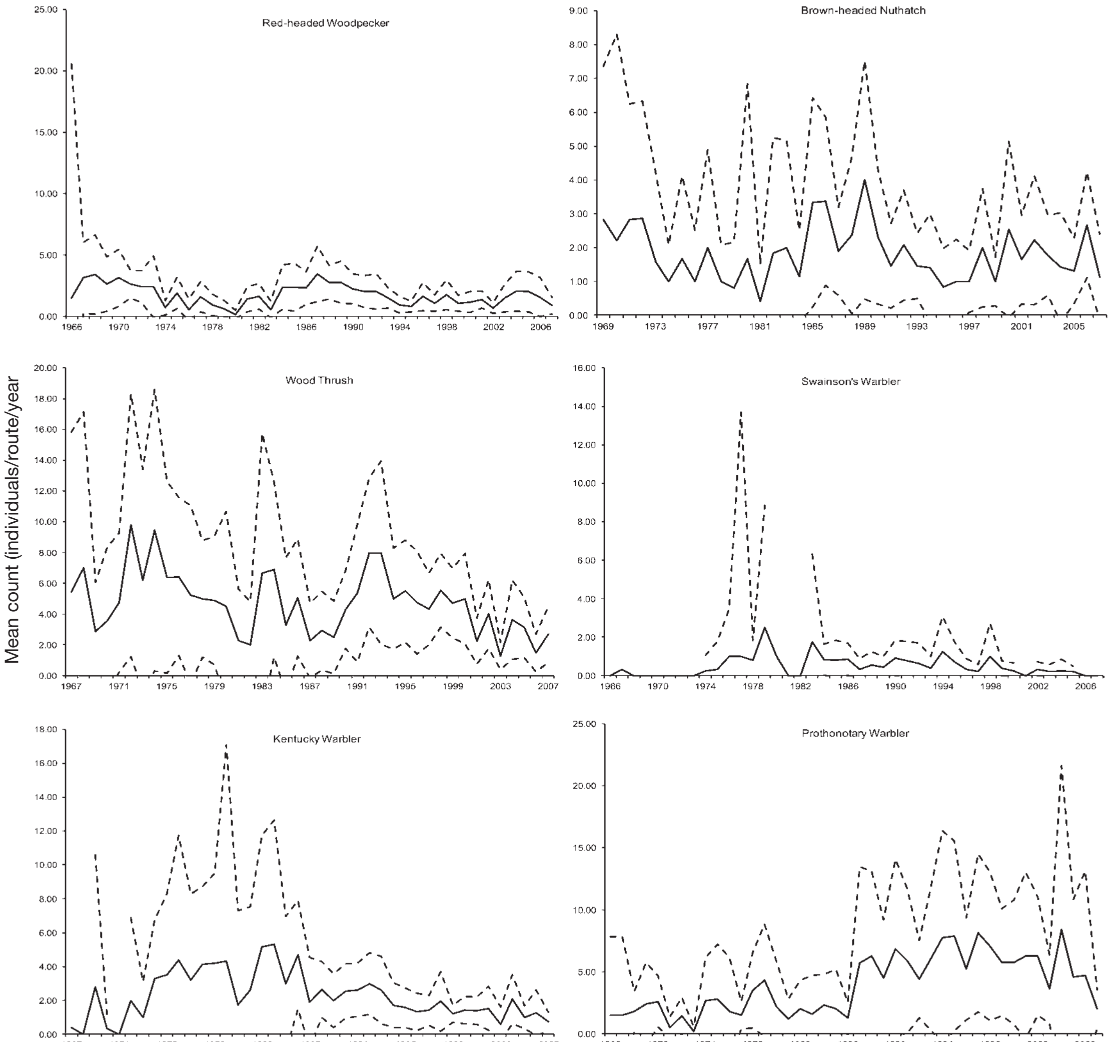


Figure 3. Population trends (based on BBS data) and 95% CI of 6 forest associated species based on the mean breeding bird survey (individuals/route/year) in the Gulf Coast Joint Venture region, 1967-2007.

Bird Conservation Region 37 Scale

In BCR 37 (Table 3), Mottled Ducks exhibited a negative population trend (−3.34%, 95% CI: −4.59–−2.18%), Black-bellied Whistling-Ducks (4.71%; 95% CI: 2.63–6.82%), and Fulvous Whistling-Ducks (3.15%; 95% CI: 1.01–5.13%) exhibited increasing population trends, and Wood Ducks exhibited a neutral population trend.

State Scale

In Texas (Table 4), Mottled Ducks and Wood Ducks exhibited neutral population trends and Black-bellied (4.08%; 95% CI: 2.02–6.18%) and Fulvous Whistling-Ducks (2.63%; 95% CI: 0.50–5.13%) exhibited positive population trends. In Louisiana Mottled Ducks and Wood Ducks exhibited neutral population trends and Fulvous Whistling-Ducks

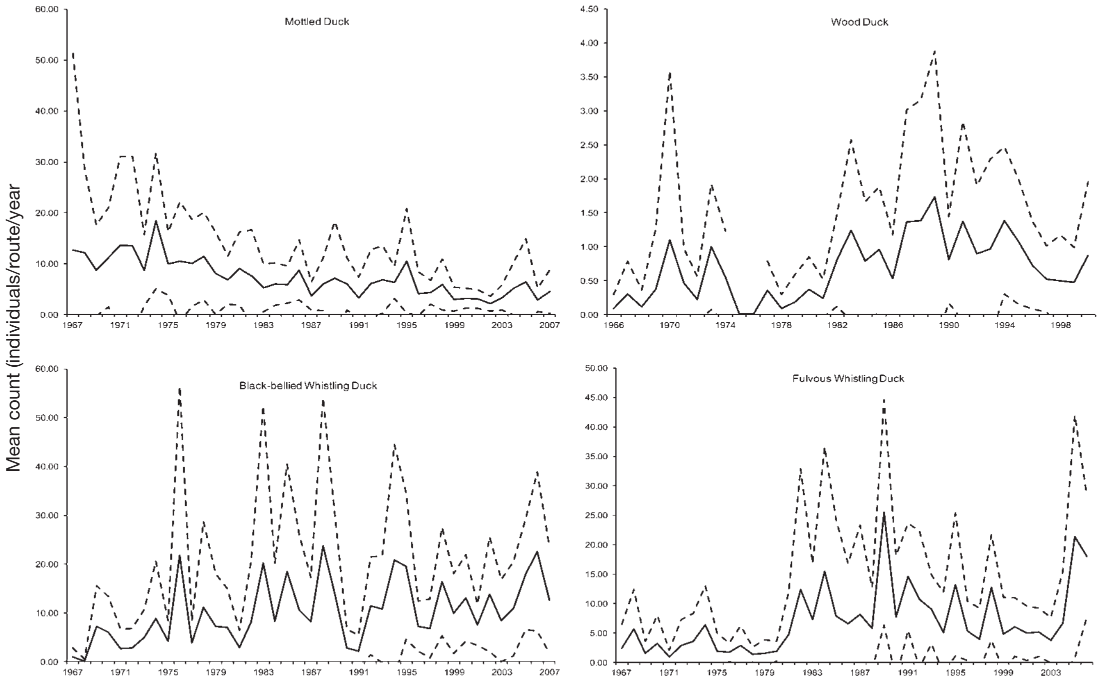


Figure 4. Population trends (based on BBS data) and 95% CI of 4 waterfowl species based on the mean breeding bird survey (individuals/route/year) in the Gulf Coast Joint Venture region, 1967-2007.

(10.52%; 95% CI: 6.18–15.03%) exhibited a positive trend. Wood Ducks exhibited a neutral trend in MS-AL (Table 4) and Mottled Ducks exhibited a positive trend (8.33%; 95% CI:2.12–13.88%).

Waterbirds-Marshbirds

Gulf Coast Joint Venture Scale

We summarized route count data and evaluated trends for 3 species of waterbirds/marshbirds (Figure 5): King Rail (*Rallus elegans*), Least Bittern (*Ixobrychus exilis)*, and Little Blue Heron (*Egretta caerulea*). Least Bitterns (3.46%; 95% CI:070–6.29%) and Little Blue Herons (3.56%; 95% CI:1.61–5.55%) exhibited positive trends, while King Rail exhibited a neutral trend (Table 2).

Bird Conservation Region 37 Scale

In BCR 37 (Table 3), Least Bittern (3.25%; 95% CI: 0.40–6.18%) and Little Blue Heron (3.77%; 95% CI: 1.11–6.40%) exhibited positive population trends and King Rails exhibited a negative population trend (−2.47%; 95% CI: −4.78–−0.50%). Population changes could not be reliably detected for these species at the BCR 37 scale.

State Scale

In Texas (Table 4) King Rails exhibited a negative trend (−4.11%; 95% CI:−6.76–−1.98%) and Least Bittern and Little Blue Heron exhibited neutral trends. In Louisiana, Least Bittern and Little Blue Heron exhibited neutral trends (Table 4). No trends were estimated in MS-AL for these species due to a lack of detections (n <10).

In Texas (Table 7) population changes could be reliably detected for 1 species: King Rail (20 years; ±10% annual trend). Population changes could not be reliably detected for these species in Louisiana. In MS-AL population changes of Least Bitterns could be reliably detected in 20 years given a ±10% annual trend (Table 9), though these results may be unreliable due to lack of detections annually (see Table 4).

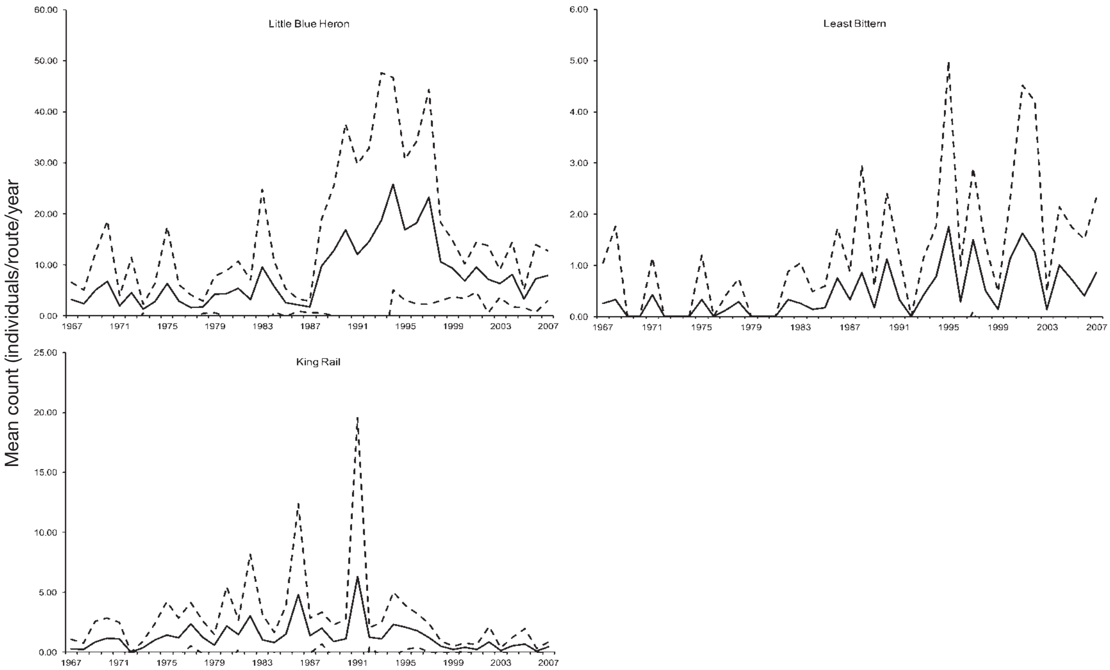


Figure 5. Population trends (based on BBS data) of 3 waterbird/marshbird species in the Gulf Coast Joint Venture, 1967-2007.

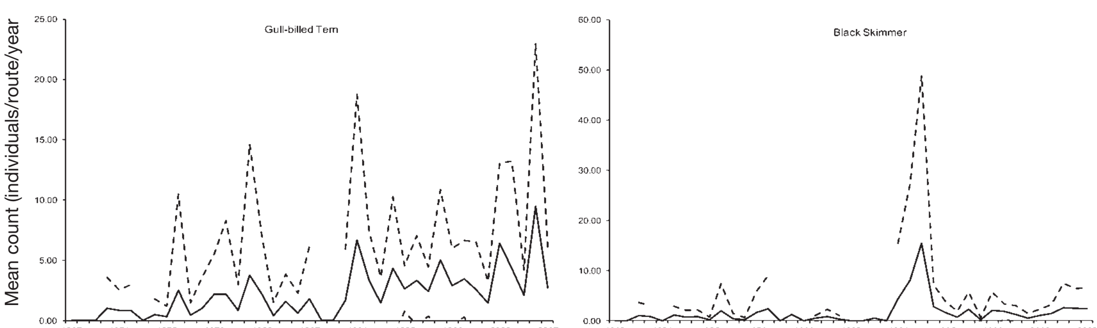


Figure 6. Population trends and 95% CI (based on BBS data) for Gull-billed Tern and Black Skimmer in the Gulf Coast Joint Venture, 1967-2007.

Terns and Skimmers

Gulf Coast Joint Venture Scale

We summarized route count data (Figure 6) and evaluated trends for the Gull-billed Tern (*Gelochelidon nilotica*) and Black Skimmer (*Rynchops niger*). Gull-billed Terns exhibited a positive population trend (5.20%; 95% CI: 3.22–7.15%) and the Black Skimmer trend (2.74%; 95% CI: −0.25–5.81%) appeared neutral (Table 2). Population changes could not be reliably detected for these species at the GCJV scale.

Bird Conservation Region 37 Scale

In BCR 37 (Table 3), Black Skimmers exhibited a neutral population trend and Gull-billed Terns exhibited a positive population trend (5.44%; 95% CI: 3.15–7.90%). Population changes could not be reliably detected for these species at BCR 37 scale.

State Scale

In Texas (Table 4), Black Skimmers exhibited a neutral population trend and Gull-billed Terns exhibited a positive trend (6.18%; 95% CI: 4.08–7.25%). Annual population changes could be reliably detected for Gull-billed Terns in Louisiana (20 years; ±10% annual trend; Table 8), though these results may be unreliable due to lack of detections annually (see Table 4). Reliable detection of population changes could not be made within Texas or MS-AL for either species.

Christmas Bird Count

Mean (±SD) detection of species was 45.42 ± 11.43 and ranged from 12–58 of 58 count circles (Table 10, Figure 1). Of the 37 CBC priority species investigated (Table 1), 1 species, Black Rail (*Laterallus jamaicensis*) was not detected frequently enough to reliably determine a population trends. We provide trend (Tables 11-13) and power estimates (Tables 14-18 where appropriate) for the 36 remaining CBC priority species grouped by habitat associations below.

Grassland-Shrubland Birds

Gulf Coast Joint Venture Scale

We estimated trends for 4 species of grassland birds (Table 11, Figure 7): Northern Bobwhite, Loggerhead Shrike, LeConte's Sparrow (*Ammodramus leconteii*) and Seaside Sparrow. Loggerhead Shrikes (−1.59%; 95% CI: −1.98–−0.80%) and Northern Bobwhites (−2.47%; 95% CI: −3.25–1.59%) exhibited negative population trends, LeConte's Sparrow exhibited a positive trend (4.08%; 95% CI: 2.53–5.55%) and Seaside Sparrows exhibited neutral trends (Table 11). Changes in Loggerhead Shrike populations could be detected in 3 years (±10% annual population trend; Table 14).

Bird Conservation Region 37 Scale

Loggerhead Shrikes (−1.98%; 95% CI:−2.96–−1.49%) and Northern Bobwhites (−3.44%; 95% CI: −4.40–−2.47%) and Seaside Sparrows (−1.59%; 95% CI: −3.25–0.00%) exhibited negative population trends, and LeConte's Sparrows (2.74%; 95% CI: 1.31–4.19%) exhibited positive trends (Table 12). Population changes could be reliably detected for two species (Table 15): LeConte's Sparrow (10 years; ± 10% annual trend) and Loggerhead Shrike (3 years; ±5% annual trend).

State Scale

LeConte's Sparrows exhibited an increasing trend in Texas (4.60%; 95% CI: 3.05−6.08%) and neutral trends in Louisiana and MS-AL (Table 13). Loggerhead Shrikes exhibited negative trends in Texas (−1.49%; 95% CI: −2.08–−0.80%) and MS-AL (−2.08%; 95% CI: −3.73–−0.40%) and neutral trends in Louisiana (Table 13). Northern Bobwhites exhibited decreasing trends in all 3 states within the GCJV boundary (Table 13). Seaside Sparrows exhibited an increasing trend in Texas (1.31%; 95% CI:0.10–2.53%), a decreasing trend in Louisiana (−8.70%; 95% CI: −13.06– −4.40%) and a neutral trend in MS-AL (Table 13).

Population trends could be reliably detected for Loggerhead Shrikes in Texas (3 years ±10% annual trend; Table 16), and Louisiana (3 years, ±10% annual change; Table 17), for LeConte's Sparrow in Louisiana (10 years; ±10% annual trend) and MS-AL (20 years; +5% annual change), and for Northern Bobwhite in Louisiana (10 years; +5% annual trend)

Waterfowl

Gulf Coast Joint Venture Scale

We estimated trends for 21 waterfowl species (Table 11, Figure 8). American Wigeon (*Mareca americana*) exhibited a negative trend (−1.88%; 95% CI: −3.73–−0.20%), Blue-winged Teal (*Spatula discors*) (2.12%; 95% CI: 0.09−3.56%) and Gadwall (*Mareca strepera*) (2.02%; 95% CI: 0.70%–3.36%) exhibited positive trends, and Green-winged Teal (*Anas crecca*), Mallard (*Anas platyrhynchos*), Mottled Duck, Northern Pintail (*Anas acuta*), and Northern Shoveler (*Spatula clypeata*) exhibited neutral population trends (Table 11). Redheads (*Aythya americana*) (5.55%; 95% CI: 2.94–8.00%) exhibited a positive population trend, and Canvasbacks (*Aythya valisineria*), Greater Scaup (*Aythya marila*), Lesser Scaup (*Aythya affinis*), and Ring-necked Ducks (*Aythya collaris*) exhibited neutral population trends (Table 11). Wood Ducks (3.77%; 95% CI:1.71–5.87%) and Black-bellied Whistling-Ducks (11.63%; 95% CI: 9.42−15.03%) exhibited positive population trends, and Fulvous Whistling-Ducks exhibited a neutral population trend (Table 11). Hooded Mergansers (5.34%; 95% CI: 3.87–6.82%) exhibited a positive

Table 10. Detections [number of count circles detecting a species, and mean number of count circles (± standard deviation) contributing count data for a species/year] and mean counts (number of individuals/circle/year) of 36 wintering bird species in the Gulf Coast Joint Venture based on Christmas Bird Count data, 1966-2008.

Species	Number of Circles with Detections	Mean number of Circles (± SD)	Mean Count (95% CI)
American Coot	56	33.86 ± 13.84	1,603.61 (1,289.29–1,917.93)
American Wigeon	56	34.67 ± 13.56	304.74 (249.58–359.90)
Black Rail	12	9.45 ± 2.48	0.20 (−0.08–0.27)
Black Skimmer	34	21.86 ± 8.44	143.70 (122.90–164.46)
Black-bellied Whistling-Duck	40	25.58 ± 9.13	102.94 (63.23–142.65)
Blue-winged Teal	56	33.86 ± 13.84	132.62 (113.11–152.13)
Canada Goose	47	30.64 ± 11.84	280.13 (201.86–358.39)
Canvasback	52	31.98 ± 12.75	79.69 (58.68–100.71)
Fulvous Whistling-Duck	36	24.63 ± 9.33	4.73 (1.69–7.77)
Gadwall	56	33.86 ± 13.84	441.40 (373.80–509.01)
Greater Scaup	42	28.00 ± 10.55	9.14 (1.78–16.50)
Greater White-fronted Goose	54	33.05 ± 13.69	767.68 (586.23–949.07)
Green-winged Teal	56	33.69 ± 13.69	1,240.36 (1,016.18–1,464.55)
Gull-billed Tern	41	26.29 ± 8.93	5.01 (3.81–6.08)
Hooded Merganser	54	33.38 ± 13.32	8.42 (6.78–10.06)
King Rail	50	31.69 ± 12.60	4.11 (3.48–4.75)
LeConte's Sparrow	49	31.38 ± 11.96	8.35 (6.67–10.01)
Lesser Scaup	41	25.69 ± 9.80	840.24 (513.75–1,166.73)
Little Blue Heron	55	33.50 ± 13.58	32.70 (27.48–37.92)
Loggerhead Shrike	58	34.02 ± 13.96	80.00 (74.31–85.70)
Long-billed Curlew	42	26.76 ± 9.91	62.27 (53.84–70.69)
Mallard	55	33.76 ± 13.76	117.65 (77.84–157.47)
Mottled Duck	56	3.81 ± 13.86	57.22 (50.86–63.59)
Northern Bobwhite	55	32.50 ± 10.61	32.01 (27.70–36.31)
Northern Pintail	56	33.90 ± 13.89	1,474.75 (1,201.62–1,747.88)
Northern Shoveler	56	33.67 ± 14.03	567.22 (486.29–648.16)
Reddish Egret	37	25.07 ± 8.83	10.06 (7.50–12.62)
Redhead	56	33.86 ± 13.84	1,054.99 (755.93–1,354.10)
Ring-necked Duck	55	33.81 ± 13.90	78.81 (54.32–103.30)
Ross's Goose	36	22.74 ± 8.63	29.28 (13.72–44.85)
Seaside Sparrow	34	22.50 ± 8.83	19.92 (15.79–24.05)
Snow Goose	55	34.00 ± 13.75	9,351.01 (7,811.68–10,890.34)
Snowy Plover	26	17.95 ± 6.43	8.71 (7.24–10.18)
Stilt Sandpiper	38	25.33 ± 9.17	8.17 (4.59–11.76)
Western Sandpiper	51	31.76 ± 12.65	349.06 (258.82–439.29)
Wilson's Plover	19	13.74 ± 4.73	0.61 (0.42–0.81)
Wood Duck	52	33.14 ± 13.28	26.79 (20.30–33.28)

Table 11. Population trends and root mean square error (RMSE) estimates of survey effort (years) for 36 wintering bird species in the Gulf Coast Joint Venture based on Christmas Bird Count data, 1967-2008.

Species	*n*	Trend Estimate[a] (95%CI)*[b]	RMSE
American Coot	42	1.01% (−0.40–3.05%)	3.44
American Wigeon	42	−1.88% (−3.73–−0.20%)*	3.92
Black Skimmer	42	2.02% (0.90–3.56%)*	2.12
Black-bellied Whistling-Duck	40	11.63% (9.42–15.03%)*	3.92
Blue-winged Teal	42	2.12% (0.09–3.36%)*	2.41
Canada Goose	42	−6.76% (−8.61–−4.59%)*	4.20
Canvasback	42	−0.04% (−1.98–2.02%)	4.28
Fulvous Whistling-Duck	38	1.41%(−3.54−6.72%)	7.91
Gadwall	42	2.02% (0.70–3.36%)*	2.64
Greater Scaup	41	1.01% (−1.98–4.08)%	5.66
Greater White-fronted Goose	42	6.29% (3.87–8.65%)*	4.49
Green-winged Teal	42	−1.00% (−2.86–0.90%)*	3.92
Gull-billed Tern	42	3.56% (1.98–5.13%)*	2.95
Hooded Merganser	42	5.34% (3.87–6.82%)*	2.84
King Rail	42	−0.04% (−1.49–1.41%)	2.80
LeConte's Sparrow	42	4.08% (2.53–5.55%) *	2.81
Lesser Scaup	42	−1.49%(−3.34−0.44%)	3.45
Little Blue Heron	42	1.21% (−0.20–2.53%)	2.74
Loggerhead Shrike	42	−1.59% (−1.98–−0.80%)*	1.44
Long-billed Curlew	42	1.01% (−0.01–2.12%)	1.88
Mallard	42	−0.39% (−2.76–2.02%)	4.84
Mottled Duck	42	0.50% (−0.50–1.51%)	2.05
Northern Bobwhite	42	−2.47% (−3.25–−1.59%)*	1.71
Northern Pintail	42	−1.00% (−1.98–0.3%)	2.69
Northern Shoveler	42	0.90% (−0.36–2.33%)	2.62
Reddish Egret	42	2.33% (0.70–4.08%)*	2.77
Redhead	42	5.55% (2.94–8.00%)*	4.81
Ring-necked Duck	42	1.01% (−0.10–3.05%)	3.67
Ross's Goose	41	22.14% (19.72–24.61)	3.23
Seaside Sparrow	42	−0.10% (−1.69–1.61)	2.70
Snow Goose	42	2.94% (1.71–4.29%)*	2.54
Snowy Plover	42	3.67% (2.63–4.71%)*	1.46
Stilt Sandpiper	42	9.20% (6.61–11.63)*	4.26
Western Sandpiper	42	2.53% (0.44–4.60%)*	3.94
Wilson's Plover	42	1.11% (−1.49–3.77%)	3.26
Wood Duck	42	3.05% (1.41–5.23%)	3.96

[a] Percent change per year based estimate from natural logarithm transformed CBC counts.
[b] Asterisk indicates 95% confidence interval does not overlap 0.0.

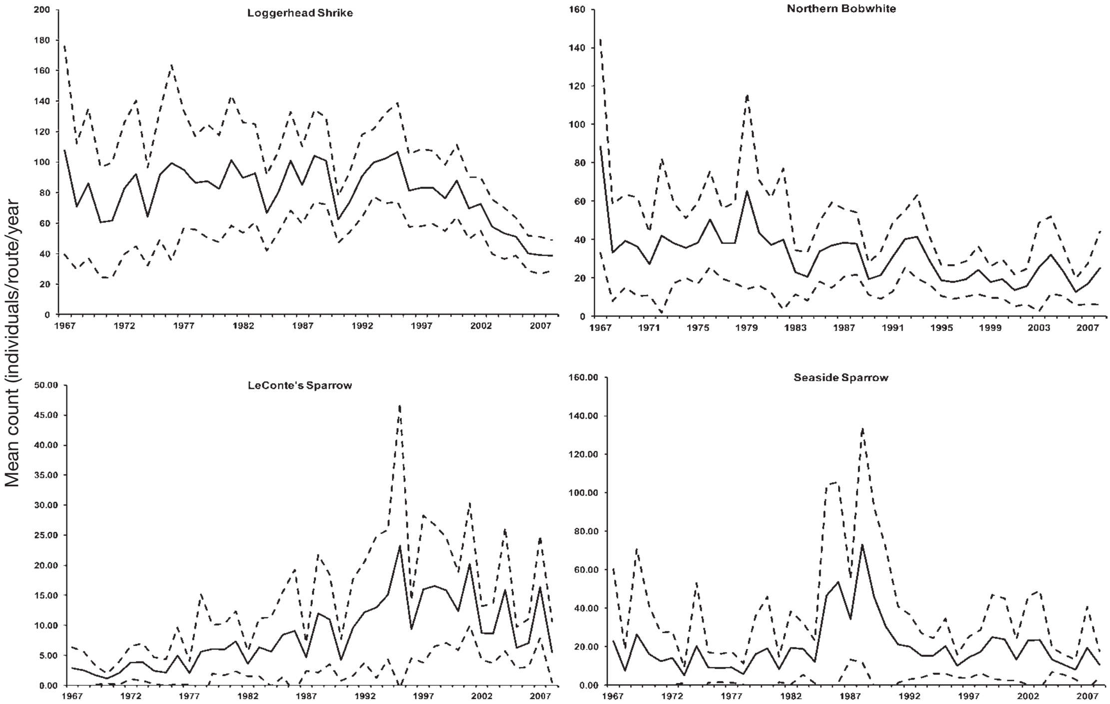


Figure 7. Population trends and 95% CI (based on CBC data) for 4 grassland/shrubland associated species in the Gulf Coast Joint Venture, 1967-2008.

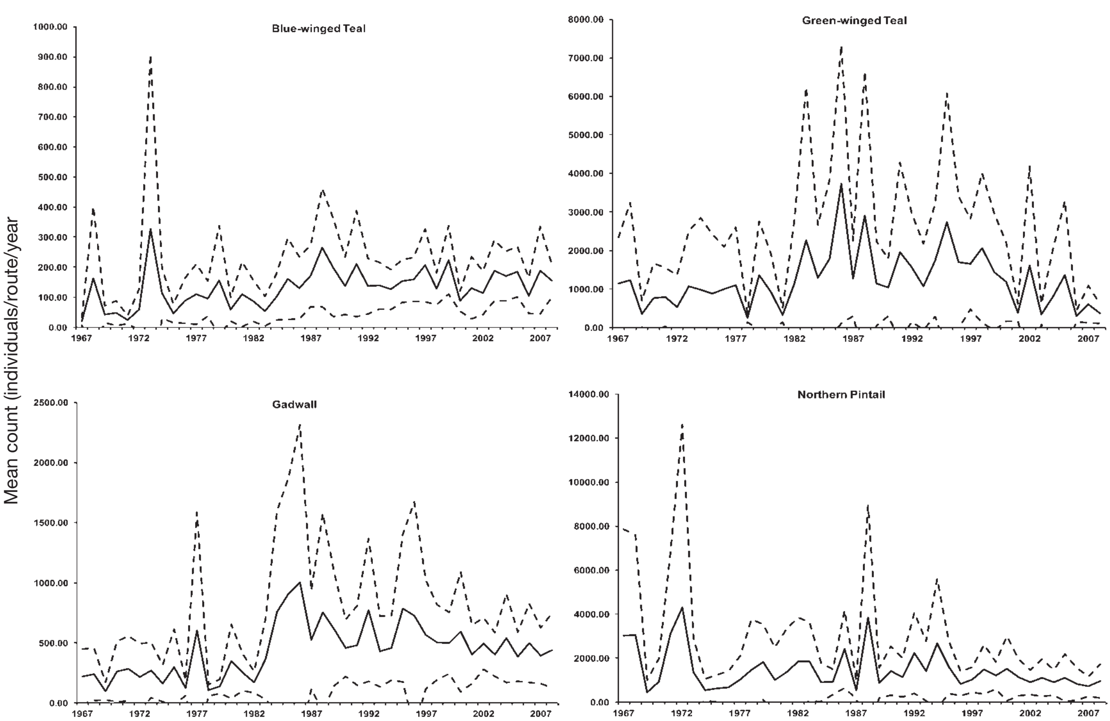
Table 12. Population trends [a] and root mean square error (RMSE) for 36 wintering bird species within BCR 37 (within the GCJV) based on Christmas Bird Count data, 1967-2008.

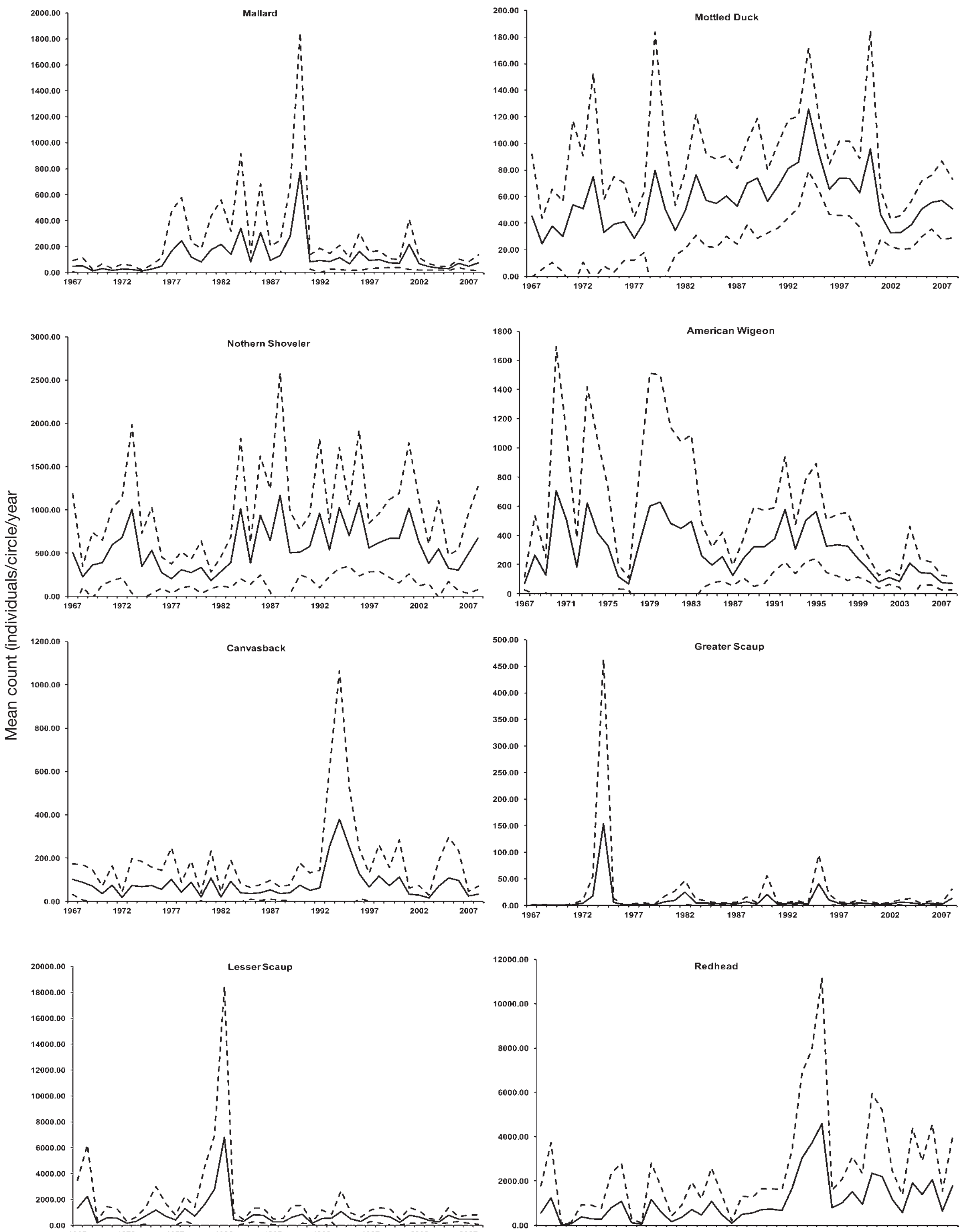
Species	*n*	Trend	95%CI	RMSE
American Coot	42	1.31%	−0.20–2.94%	2.59
American Wigeon	42	−4.21%	−5.92–−2.37%	2.99
Black Skimmer	42	1.01%	0.10–2.74%*	1.74
Black-bellied Whistling-Duck	39	13.88%	9.42–18.53%*	5.12
Blue-winged Teal	42	3.15%	1.31–5.02%*	2.92
Canada Goose	42	−8.61%	−10.42–−6.76%	3.32
Canvasback	42	−0.50%	−2.66–2.02%	3.64
Fulvous Whistling-Duck	42	−3.63%	−2.66–10.52%	7.76
Gadwall	42	1.21%	−0.20–2.74%	2.34
Greater Scaup	41	−2.47%	−5.64–0.70%	4.74
Greater White-fronted Goose	42	6.40%	3.87–8.87%*	3.68
Green-winged Teal	42	−1.86%	−3.92–0.20%	3.50
Gull-billed Tern	42	2.02%	0.50–3.67%*	2.43
Hooded Merganser	42	5.76%	4.39–7.25%*	2.16
King Rail	42	−1.00%	−2.57–0.55%	2.59
LeConte's Sparrow	42	2.74%	1.31–4.19%	2.28
Lesser Scaup	42	−2.86%	−5.26–−0.50%*	3.71

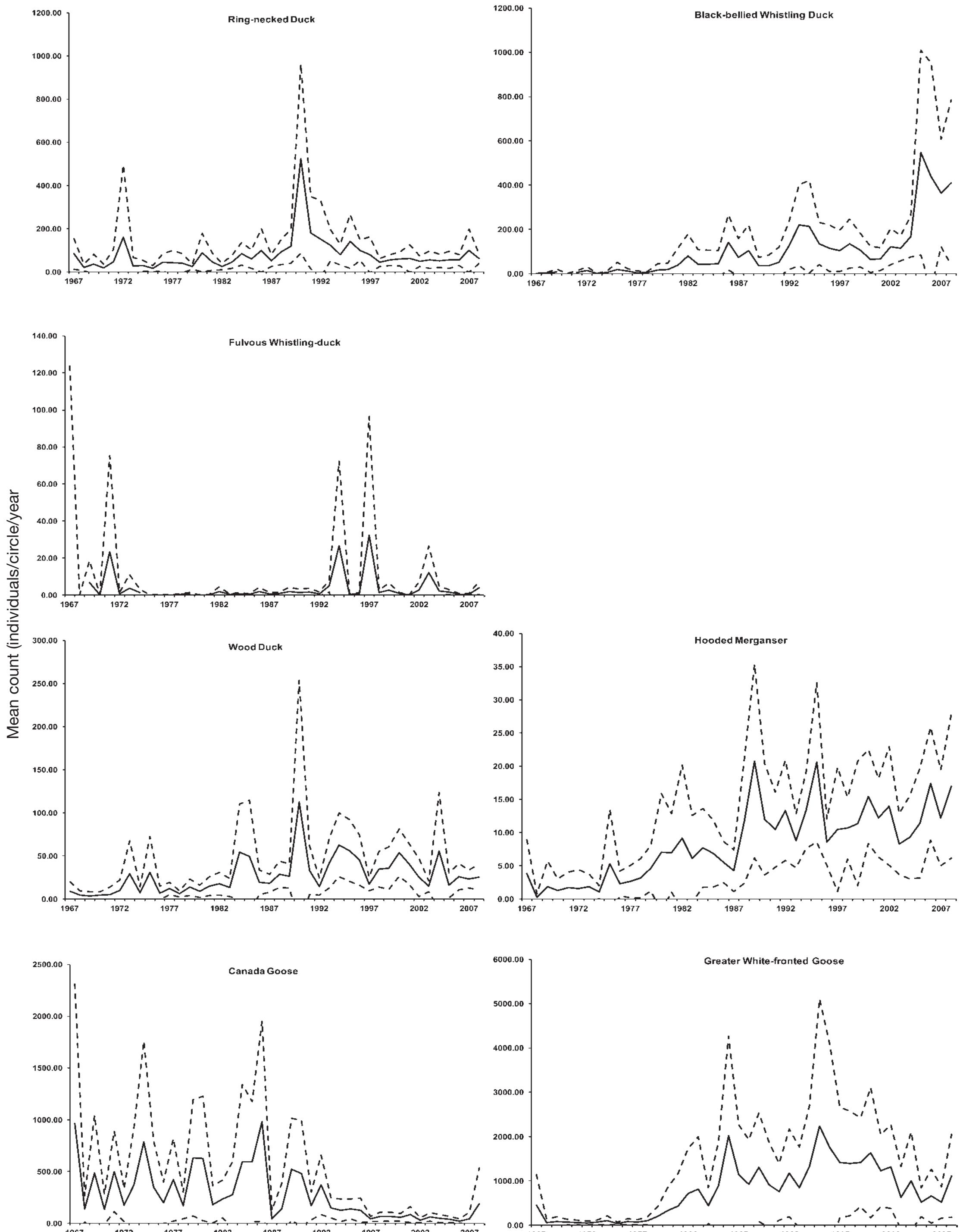
Table 12. (*Continued*).

Species	*n*	Trend	95%CI	RMSE
Little Blue Heron	42	1.41%	0.10–2.74%*	2.07
Loggerhead Shrike	42	−1.98%	−2.96–−1.49%*	1.26
Long-billed Curlew	42	−0.40%	−1.00–0.50%	1.33
Mallard	42	−0.90%	−3.63–1.82%	4.46
Mottled Duck	42	−0.70%	−1.78–0.30%	1.74
Northern Bobwhite	42	−3.44%	−4.40–−2.47%*	1.65
Northern Pintail	42	−1.69%	−3.05–−0.30%*	2.23
Northern Shoveler	42	0.70%	−0.60–2.02%	2.22
Reddish Egret	42	1.51%	−0.10–3.25%	2.39
Redhead	42	5.44%	2.94–8.00%*	3.93
Ring-necked Duck	42	0.80%	−1.00–2.63%	3.00
Ross's Goose	41	17.35%	15.03–19.72%	2.80
Seaside Sparrow	42	−1.59%	−3.25–0.00%*	2.42
Snow Goose	42	2.43%	1.01–3.87%*	2.27
Snowy Plover	42	2.94%	1.82–3.98%*	1.40
Stilt Sandpiper	39	9.09%	6.18–12.75*	4.13
Western Sandpiper	42	0.90%	−1.00–3.05%	3.50
Wilson's Plover	39	1.31%	−1.29–3.98	3.10
Wood Duck	42	3.77%	1.71–5.87%*	3.23

[a] Asterisk indicates 95% confidence interval does not overlap 0.0.




Mallard
Mottled Duck
Nothern Shoveler
American Wigeon
Canvasback
Greater Scaup
Lesser Scaup
Redhead
Mean count (individuals/circle/year


Ring-necked Duck
Black-bellied Whistling Duck
Fulvous Whistling-duck
Wood Duck
Hooded Merganser
Canada Goose
Greater White-fronted Goose
Mean count (individuals/circle/year

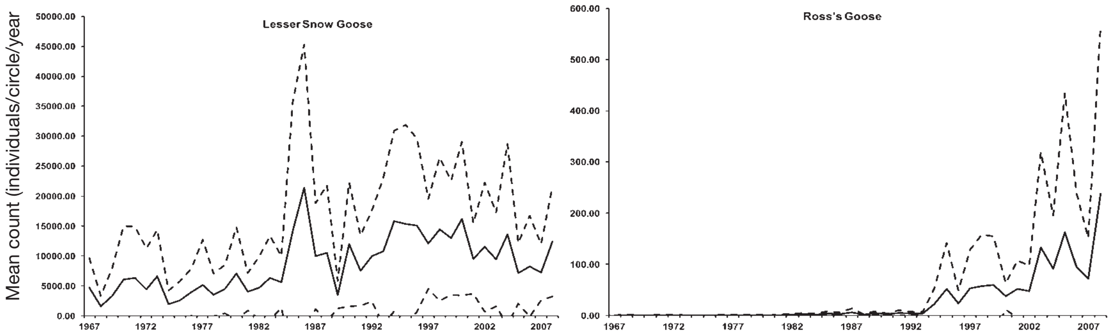


Figure 8. Population trends and 95% CI (based on CBC data) for 21 waterfowl species in the Gulf Coast Joint Venture, 1967-2008.

Table 13. Population trends [a], for 36 wintering bird species in at the state level within the GCJV based on Christmas Bird Count data, 1967-2008.

	State					
	Texas		Louisiana		MS-AL	
Species	*n*	Trend (95%CI)	*n*	Trend (95%CI)	*n*	Trend (95%CI)
American Coot	42	1.71% (0.10–3.25%)*	39	1.01% (−1.98–4.08%)	36	3.77% (−0.30–8.00%)
American Wigeon	42	−2.66% (−4.21–−1.09%)*	41	−1.19% (−6.20–3.98%)	34	1.61% (−2.96–6.40%)
Black Skimmer	42	2.43% (1.11–3.77%)*	32	3.67% (−0.90–8.33%)	35	1.01% (−1.98−4.08%)
Black-bellied Whistling-Duck	40	12.75% (9.75–15.03%)*	12	23.05% (−10.42–19.72%)		
Blue-winged Teal	42	1.92% (0.80–3.15%)*	40	4.19% (0.57–8.00%)*	36	7.79% (3.67–11.63%)*
Canada Goose	42	−6.48% (−8.61–−4.40%)*	24	−5.35% (−2.93–15.03%)	26	8.55% (2.74–14.68%)*
Canvasback	42	0.60% (−1.59–2.94%)	38	−5.64% (−12.19–3.56%)	32	−5.73% (−9.52–−1.98%)*
Fulvous Whistling-Duck	42	0.90% (−3.44–5.65%)	15	−0.50% (−13.76–14.91%)		
Gadwall	42	2.02% (1.01–2.94%)*	39	3.98% (−1.19–9.42%)	35	9.75% (4.39–15.03%)*
Greater Scaup	41	2.43% (1.51–6.18%)*	15	2.74% (−13.06–21.65%)	34	1.41% (−4.30–7.57%)
Greater White-fronted Goose	42	4.71% (2.43–7.25%)*	34	13.88% (8.33–18.53%)*	13	12.75% (−1.98–28.40%)
Green-winged Teal	42	−0.60% (−2.37–1.31%)	42	−1.09% (−3.25–0.90%)	35	12.08% (7.57–16.77%)*
Gull-billed Tern	42	3.15% (1.71–4.08%)*	27	8.00% (1.11–15.37%)*		
Hooded Merganser	42	5.13% (3.56–6.72%)*	36	8.87% (5.87%–11.63%)*	34	3.05% (0.90–5.87%)*
King Rail	42	−0.07% (−1.49–1.41%)	41	−0.65% (−4.11–2.84%)	35	−2.86%(−5.45–−0.30%)*
LeConte's Sparrow	42	4.60% (3.05–6.08%)*	38	−1.01% (−1.98–4.29%)	30	−0.03% (−2.96–3.05%)
Lesser Scaup	42	−1.88% (−3.54–−0.20%)*	35	3.25% (−4.59–10.52%)		
Little Blue Heron	42	3.98% (2.94–4.92%)*	39	−4.02% (−5.73–−2.18%)*	35	−0.80% (−4.88–3.05)
Loggerhead Shrike	42	−1.49% (−2.08–−0.80)*	42	−1.98% (−3.25–0.03%)	36	−2.08% (−3.73–−0.40%)*
Long-billed Curlew	42	1.41% (0.45%−2.43%)*	28	−11.31% (−16.47–−6.20%)*	12	−2.27% (−5.26–0.77%)
Mallard	42	1.31% (−0.60–3.15%)	42	−4.78% (−8.61–−0.89%)*	35	8.98% (6.66–11.63%)*
Mottled Duck	42	0.70% (−0.30–1.71%)	38	1.41% (−2.18–5.02%)	32	9.97% (4.92–15.93%)*
Northern Bobwhite	42	−1.88% (−2.76–−0.90%)*	40	−5.92% (−8.33–−3.34%)*	36	−9.15% (−11.84–−6.29%)*
Northern Pintail	42	−0.80% (−2.80–0.60%)	42	1.61% (−3.05–6.50%)	29	−3.82% (−11.93–5.02%)

Table 13. (*Continued*).

	State					
	Texas		Louisiana		MS-AL	
Species	*n*	Trend (95%CI)	*n*	Trend (95%CI)	*n*	Trend (95%CI)
Northern Shoveler	42	−0.02% (−1.00–1.01%)	42	5.76% (2.22–9.42)*	34	8.76% (4.29–13.31%)*
Reddish Egret	42	3.25% (1.61–4.78%)*	26	−1.00% (−4.88–3.05%)	28	5.55% (2.94–8.00%)*
Redhead	42	5.97% (3.56–8.55%)*	38	2.43% (−1.59–6.61%)	34	0.40% (−4.40–5.34%)
Ring-necked Duck	42	1.11% (−0.59–2.94%)	37	−0.40% (−4.40– − 3.87%)	36	5.87% (2.22–9.64%)*
Ross's Goose	41	22.14% (19.72–24.61)*	22	12.75% (3.67–23.37%)*		
Seaside Sparrow	42	1.31% (0.10–2.53%)*	33	−8.70% (−13.06–−4.40%)*	36	−0.30% (−3.05–2.63%)
Snow Goose	42	1.21% (−0.10–2.63%)	39	15.03% (10.08−20.08%)*	38	22.75% (12.98–33.24%)*
Snowy Plover	42	4.29% (3.25–5.34%)*	30	−1.00% (−3.92–2.02%)	32	−0.70% (−3.82–2.53%)
Stilt Sandpiper	41	8.55% (5.97–11.63)*	22	8.87% (−1.39–19.72%)		
Western Sandpiper	42	3.36% (1.31–5.34%)*	39	2.22% (−3.54–8.53%)	34	−3.73% (−9.52–2.43)
Wilson's Plover	37	2.43% (−0.10–5.02%)	19	−0.10% (−4.50–4.50%)		
Wood Duck	42	2.53% (0.80–4.29%)*	39	0.28% (−2.66–3.25%)	35	11.63% (7.57–15.03%)

[a] Asterisk indicates 95% confidence interval does not overlap 0.0.

population trend (Table 11). Changes in Ring-necked Duck populations could be detected in 10 years (+10% annual trend; Table 14).

For geese, Greater White-fronted Goose (*Anser albifrons*) (6.29%; 95% CI: 3.87–8.65%), Snow Goose (*Anser caerulescens*) (2.94%; 95% CI: 1.71–4.29%), and Ross's Goose (*Anser rossii*) (22.14%; 95% CI: 19.72–24.61%), exhibited positive population trends and Canada Goose (*Branta canadensis*) (−6.76%; 95% CI: −8.61–−4.59%) exhibited a negative population trend. Population changes could not be reliably detected for geese using the criteria we used for our power analysis.

Bird Conservation Region 37 Scale

For dabbling ducks, Blue-winged Teal (3.51%; 95% CI: 1.31−5.02%) exhibited a positive population trend; American Wigeon (−4.21%; 95% CI: −5.92–−2.37%) and Northern Pintails (−1.69%; 95% CI: −3.05–−0.30%) exhibited negative population trends; and Green-winged Teal, Gadwalls, Mallards, Mottled Ducks, and Northern Shovelers exhibited neutral population trends (Table 12). Population changes could be reliably detected for Mottled Ducks (3 years; +10% annual trend; Table 15).

For diving ducks, Redheads (5.44%; 95% CI:2.94−8.00%) exhibited a positive population trend; Lesser Scaup (−2.86%; 95% CI: −5.26–−0.50%) exhibited a negative population trend; and Canvasbacks, Greater Scaup, and Ring-necked Ducks exhibited neutral population trends (Table 12). Population changes could not be reliably detected for these species using the criteria we used for our power analysis.

For perching ducks and mergansers, Wood Ducks (3.77%; 95% CI: 1.71–5.87) and Black-bellied Whistling-Ducks (13.88%; 95% CI: 9.42–18.53%) exhibited positive population trends, and Fulvous-Whistling-Ducks exhibited a neutral population trend (Table 12). Hooded Mergansers (5.76%; 95% CI: 4.39–7.25%) exhibited a positive population trend (Table 12). Population changes could not be reliably detected for these species using the criteria we used for our power analysis.

For geese, Greater White-fronted Geese (6.40%; 95% CI: 3.87–8.87%), Snow Geese (2.43%; 95% CI: 1.01–3.87%), and Ross's Geese (17.35%; 95% CI: 15.03–19.72%) exhibited positive population trends, and Canada Geese exhibited a neutral population trend (Table 12). Population changes could not be reliably detected for these species using our power analysis methodology.

State Scale

For dabbling ducks, American Wigeon exhibited a negative trend in Texas (−2.66%; 95% CI: −4.21–−1.09%), and neutral trends in Louisiana

Table 14. Power (±SE) to detect population changes at 3-, 5-, 10-, and 20-years of sampling for 2 priority bird species in the Gulf Coast Joint Venture using route regression Monte-Carlo simulations (1,000 iterations, n = 3 runs per species) in Program Monitor [a] and Christmas Bird Count data (two-tailed $\alpha = 0.20$).

		Number of Intervals							
		3 Years		5 Years		10 Years		20 Years	
Species (n[a])	Annual Trend	%Change	Power	%Change	Power	%Change	Power	%Change	Power
Loggerhead Shrike (48)	−10%	−19.0	0.89 ± 0.02	−34.4	0.97 ± 0.01	−61.3	0.99 ± 0.01	−86.5	0.99 ± 0.01
	−5%	−9.8	0.74 ± 0.02	−18.5	0.94 ± 0.02	−37.0	0.98 ± 0.01	−62.6	0.99 ± 0.01
	−3%	−5.9	0.23 ± 0.13	−11.5	0.74 ± 0.12	−24.0	0.97 ± 0.01	−43.4	0.99 ± 0.01
	−1%	−2.0	0.00 ± 0.00	−3.9	0.00 ± 0.00	−8.6	0.79 ± 0.02	−17.4	0.98 ± 0.01
	1%	2.0	0.00 ± 0.00	4.0	0.04 ± 0.04	9.4	0.81 ± 0.02	20.8	0.98 ± 0.01
	3%	6.1	0.09 ± 0.07	12.6	0.82 ± 0.04	30.5	0.97 ± 0.01	75.4	0.99 ± 0.01
	5%	10.3	0.76 ± 0.04	21.6	0.95 ± 0.01	55.1	0.99 ± 0.01	152.7	1.00 ± 0.00
	10%	21.0	0.95 ± 0.01	46.4	0.99 ± 0.01	135.8	0.99 ± 0.01	511.6	1.00 ± 0.00
Ring-necked Duck (45)	−10%					−61.3	0.64 ± 0.13	−86.5	0.86 ± 0.06
	−5%					−37.0	0.27 ± 0.18	−62.6	0.68 ± 0.15
	−3%					−24.0	0.16 ± 0.16	−43.4	0.81 ± 0.07
	−1%					−8.6	0.00 ± 0.00	−17.4	0.22 ± 0.13
	1%					9.4	0.00 ± 0.00	20.8	0.26 ± 0.21
	3%					30.5	0.25 ± 0.25	75.4	0.86 ± 0.01
	5%					55.1	0.79 ± 0.06	152.7	0.97 ± 0.01
	10%					135.8	0.98 ± 0.01	511.6	0.99 ± 0.01

[a] n = number of count circles included in simulations.

Table 15. Power (±SE) to detect population changes at 3-, 5-, 10-, and 20-years of sampling for 4 priority bird species in the Bird Conservation Region 37 portion of the Gulf Coast Joint Venture using route regression Monte-Carlo simulations (1,000 iterations, n = 3 runs per species) in Program Monitor [a] using Christmas Bird Count data (two-tailed $\alpha = 0.20$).

		Number of Intervals							
		3 Years		5 Years		10 Years		20 Years	
Species (n[a])	Annual Trend	%Change	Power	%Change	Power	%Change	Power	%Change	Power
LeConte's Sparrow (28)	−10%			−34.4	0.70 ± 0.11	−61.3	0.90 ± 0.07	−86.5	0.99 ± 0.01
	−5%			−18.5	0.08 ± 0.07	−37.0	0.77 ± 0.07	−62.3	0.97 ± 0.01
	−3%			−11.5	0.00 ± 0.00	−24.0	0.80 ± 0.07	−43.4	0.95 ± 0.02
	−1%			−3.9	0.00 ± 0.00	−8.6	0.06 ± 0.04	−17.4	0.21 ± 0.20
	1%			4.0	0.00 ± 0.00	9.4	0.24 ± 0.24	20.8	0.33 ± 0.24
	3%			12.6	012 ± 0.12	30.5	0.58 ± 0.04	75.4	0.92 ± 0.03
	5%			21.6	0.11 ± 0.06	55.1	0.95 ± 0.01	152.7	0.98 ± 0.01
	10%			46.4	0.70 ± 0.02	135.8	0.98 ± 0.01	511.6	0.99 ± 0.01
	10%	21.0	0.00 ± 0.00	46.4	0.0 ± 0.00	135.8	0.00 ± 0.00	572.8	0.00 ± 0.00
Little Blue Heron (33)	−10%					−61.3	0.81 ± 0.07	−86.5	0.97 ± 0.01
	−5%					−37.0	0.77 ± 0.04	−62.3	0.85 ± 0.06
	−3%					−24.0	0.55 ± 0.10	−43.4	0.93 ± 0.02
	−1%					−8.6	0.05 ± 0.05	−17.4	0.43 ± 0.27
	1%					9.4	0.10 ± 0.10	20.8	0.42 ± 0.23
	3%					30.5	0.76 ± 0.11	75.4	0.92 ± 0.04
	5%					55.1	0.84 ± 0.08	152.7	0.99 ± 0.01
	10%					135.8	0.97 ± 0.02	511.6	1.00 ± 0.00
Loggerhead Shrike (32)	−10%	−19.0	0.96 ± 0.01	−34.4	0.98 ± 0.01	−61.3	0.99 ± 0.01	−86.5	1.00 ± 0.00
	−5%	−9.8	0.81 ± 0.03	−18.5	0.95 ± 0.01	−37.0	0.99 ± 0.01	−62.3	0.99 ± 0.01
	−3%	−5.9	0.33 ± 0.19	−11.5	0.87 ± 0.01	−24.0	0.97 ± 0.04	−43.4	0.99 ± 0.01
	−1%	−2.0	0.00 ± 0.00	−3.9	0.25 ± 0.03	−8.6	0.85 ± 0.02	−17.4	0.98 ± 0.01
	1%	2.0	0.00 ± 0.00	4.0	0.38 ± 0.07	9.4	0.95 ± 0.01	20.8	0.99 ± 0.01
	3%	6.1	0.50 ± 0.10	12.6	0.91 ± 0.02	30.5	0.99 ± 0.01	75.4	1.00 ± 0.00

(*Continued*).

Species (n[a])	Annual Trend	Number of Intervals							
		3 Years		5 Years		10 Years		20 Years	
		%Change	Power	%Change	Power	%Change	Power	%Change	Power
	5%	10.3	0.87 ± 0.01	21.6	0.97 ± 0.01	55.1	1.00 ± 0.00	152.7	1.00 ± 0.00
	10%	21.0	0.97 ± 0.01	46.4	0.99 ± 0.01	135.8	0.00 ± 0.00	511.6	1.00 ± 0.00
Mottled Duck	−10%	−19.0	0.58 ± 0.10	−34.4	0.89 ± 0.03	−61.3	0.92 ± 0.03	−86.5	0.99 ± 0.01
	−5%	−9.8	0.00 ± 0.00	−18.5	0.61 ± 0.14	−37.0	0.84 ± 0.07	−62.3	0.98 ± 0.00
	−3%	−5.9	0.00 ± 0.00	−11.5	0.21 ± 0.10	−24.0	0.61 ± 0.19	−43.4	0.97 ± 0.01
	−1%	−2.0	0.00 ± 0.00	−3.9	0.00 ± 0.00	−8.6	0.10 ± 0.10	−17.4	0.79 ± 0.06
	1%	2.0	0.00 ± 0.00	4.0	0.00 ± 0.00	9.4	0.23 ± 0.23	20.8	0.89 ± 0.01
	3%	6.1	0.00 ± 0.00	12.6	0.18 ± 0.18	30.5	0.89 ± 0.03	75.4	0.98 ± 0.01
	5%	10.3	0.00 ± 0.00	21.6	0.27 ± 0.07	55.1	0.95 ± 0.02	152.7	0.99 ± 0.01
	10%	21.0	0.85 ± 0.03	46.4	0.96 ± 0.01	135.8	0.99 ± 0.01	511.6	1.00 ± 0.00

[a] n = number of count circles included in simulations.

and MS-AL. Blue-winged Teal exhibited positive trends at all 3 state scales (Table 13). Green-winged Teal exhibited a neutral trend in Texas (−0.60%; 95% CI: −2.37–1.31%) and Louisiana (−1.09%; 95% CI:−3.25–0.90%), and a positive trend in MS-AL (12.08%; 95% CI: 7.57–16.77%) (Table 13). Gadwall exhibited positive trends in Texas (2.02%; 95% CI: 1.01–2.95%) and MS-AL (9.75%; 95% CI: 4.39–15.03%) and a neutral trend in Louisiana (Table 13). Mallards exhibited a negative trend in Louisiana (−4.78%; 95% CI: −8.61– −0.09%) a positive trend in MS-AL (8.98%; 95% CI: 6.66–11.63%) and a neutral trend in Texas (Table 13). Mottled Ducks exhibited positive trends in MS-AL (9.97%; 95% CI: 4.92–15.93%) and neutral trends in Texas and Louisiana (Table 13). Northern Pintails exhibited neutral trends at each of the 3 state scales (Table 13). Northern Shovelers exhibited positive trends in Louisiana (5.76%; 95% CI: 2.22–0.42%) and MS-AL (8.76%; 95% CI: 4.29–13.31%) and a neutral trend in Texas (Table 13).

For diving ducks and mergansers, Canvasbacks exhibited a negative trend in MS-AL (−5.7%; 95% CI: −9.52–−1.98%) and neutral trends in Texas and Louisiana (Table 13). Greater Scaup exhibited a positive trend in Texas (2.43%; 95% CI: 1.51−6.18%) and neutral trends in Louisiana and MS-AL (Table 13). Lesser Scaup exhibited a negative trend in Texas (−1.88%; 95% CI: −3.54–−0.20%), a positive trend in Louisiana (10.52%; 95% CI: 4.08−18.53%) and neutral trend in MS-AL (Table 13). Redheads exhibited a positive trend in Texas (5.97%; 95% CI: 3.56–8.55%) and neutral trends in Louisiana and MS-AL (Table 13). Ring-necked Ducks exhibited a positive trend in MS-AL (5.87%; 95% CI: 2.22–9.64%) and neutral trends in Texas and Louisiana (Table 13). Hooded Mergansers exhibited positive population trends at all 3 state scales (Table 13).

For perching ducks, Wood Ducks exhibited positive trends in Texas (2.53%; 95% CI: 0.80–4.29%) and MS-AL (11.63%; 95% CI: 7.57–15.03%), and a neutral trend in Louisiana (Table 13). Black-bellied Whistling-Ducks (12.75%; 95% CI: 9.75−15.03%) exhibited a positive trend in Texas and neutral trend in Louisiana (Table 13).

For geese, Canada Geese exhibited a negative trend in Texas (−6.48%; 95% CI: −8.61– −4.40%), a positive trend in MS-AL (8.55%; 95% CI: 2.74–14.68%), and a neutral trend in Louisiana (Table 13). Greater White-fronted Geese exhibited positive trends in Texas (4.71%; 95% CI: 2.43–7.25%) and Louisiana (13.88%; 95% CI: 8.33–18.53%) and a neutral trend in MS-AL (Table 13). Snow Geese exhibited positive trends in Louisiana (15.03%; 95% CI: 10.08–20.08%) and MS-AL (22.75%; 95% CI: 12.98–33.24%), and neutral trend in Texas (Table 13). Ross's Goose exhibited positive trends in Texas (22.14%; 95% CI: 19.72–24.61%) and Louisiana (12.75%; 95% CI: 3.67–23.37%; Table 13).

Population changes could be reliably detected for Mottled Ducks (3 years; +10% annual trend), and Ring-necked Ducks (10 years; ±10% annual trend) in Texas (Table 16), for Greater Scaup (5 years; −10% annual trend) in Louisiana (Table 17), and for Fulvous Whistling-Duck (20 years; +10% annual trend), Hooded Merganser (3 years; ±10% annual trend) and Lesser Scaup (20 years; −10% annual trend) in MS-AL (Table 18).

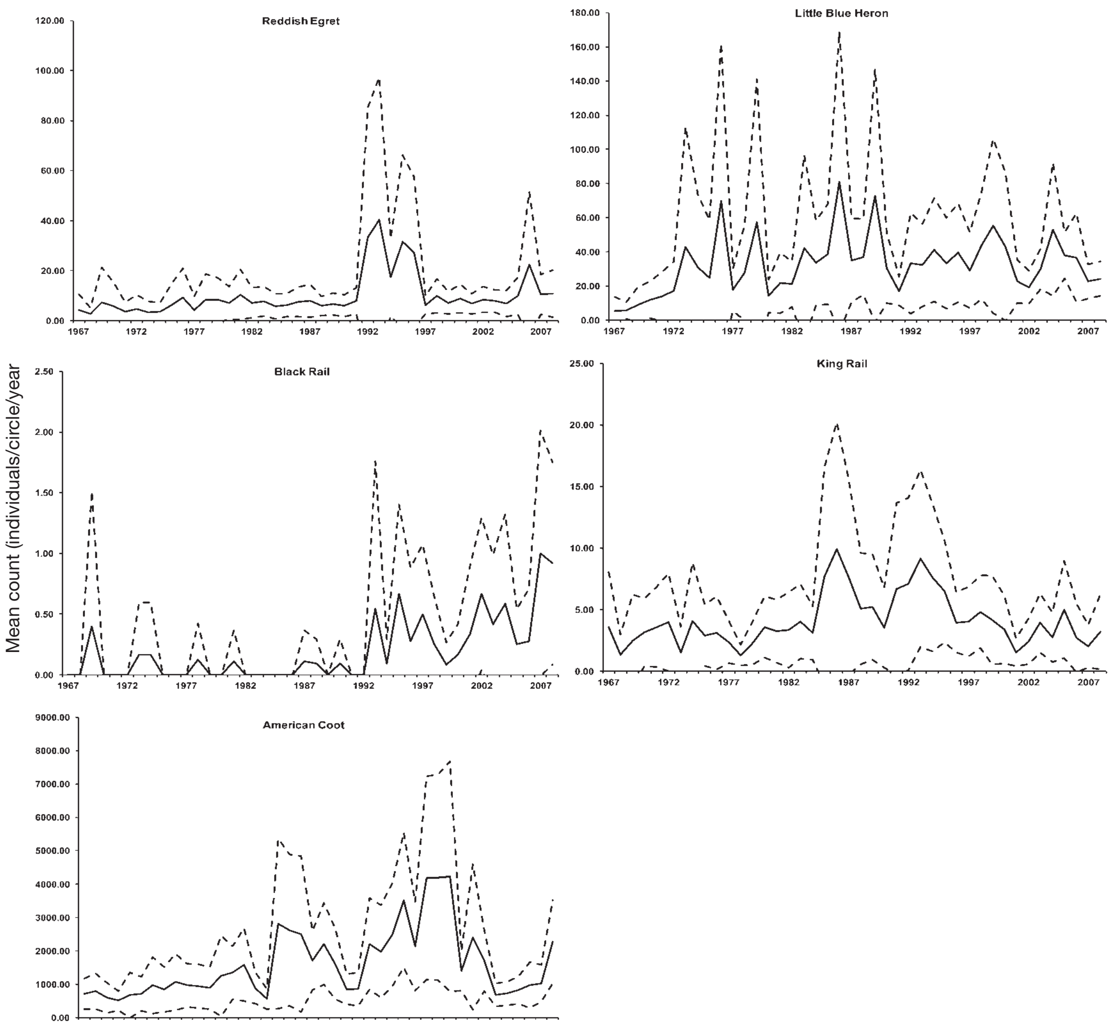


Figure 9. Population trends and 95% CI (based on CBC data) for 5 wetland-water associated species (waterbirds-marshbirds) in the Gulf Coast Joint Venture, 1967-2008.

Waterbirds and Marshbirds

Gulf Coast Joint Venture Scale

We estimated trends for 4 species of waterbirds and marshbirds (Table 11, Figure 9): American Coot (*Fulica americana*), King Rail, Little Blue Heron, Reddish Egret (*Egretta rufescens*). Reddish Egrets (2.33%; 95% CI: 0.70–4.08%) exhibited a positive population trend, while American Coots, King Rails, and Little Blue Herons exhibited neutral trends (Table 11). Population changes could not be reliably detected for any of these species at the GCJV level using the criteria we used for our power analysis.

Bird Conservation Region 37 Scale

Little Blue Herons (1.41%; 95% CI: 0.10–2.74%) exhibited a positive population trend (Table 12). American Coots, King Rails, and Reddish Egrets exhibited neutral population trends (Table 12). Population changes could be reliably detected for Little Blue Herons (10 years, +5% annual trend; Table 15)

State Scale

American Coots exhibited a positive trend in Texas (1.71%; 95% CI: 0.10–3.25%), and neutral trends in Louisiana and MS-AL (Table 13).

Table 16. Power (±SE) to detect population changes at 3-, 5-, 10-, and 20-years of sampling for 4 priority bird species in the Texas portion of the Gulf Coast Joint Venture using route regression Monte-Carlo simulations (1,000 iterations, $n = 3$ runs per species) in Program Monitor and Christmas Bird Count (two-tailed $\alpha = 0.20$).

		Number of Intervals							
		3 Years		5 Years		10 Years		20 Years	
Species (n[a])	Annual Trend	%Change	Power	%Change	Power	%Change	Power	%Change	Power
Loggerhead Shrike (30)	−10%	−19.0	0.95 ± 0.01	−34.4	0.97 ± 0.01	−61.3	0.99 ± 0.01	−86.5	0.99 ± 0.01
	−5%	−9.8	0.64 ± 0.13	−18.5	0.96 ± 0.01	−37.0	0.98 ± 0.01	−62.3	0.99 ± 0.01
	−3%	−5.9	0.38 ± 0.19	−11.5	0.89 ± 0.04	−24.0	0.93 ± 0.03	−43.4	0.99 ± 0.01
	−1%	−2.0	0.00 ± 0.00	−3.9	0.08 ± 0.09	−8.6	0.80 ± 0.07	−17.4	0.98 ± 0.01
	1%	2.0	0.00 ± 0.00	4.0	0.10 ± 0.07	9.4	0.86 ± 0.08	20.8	0.98 ± 0.01
	3%	6.1	0.29 ± 0.15	12.6	0.76 ± 0.07	30.5	0.98 ± 0.01	75.4	0.99 ± 0.01
	5%	10.3	0.64 ± 0.03	21.6	0.97 ± 0.01	55.1	0.99 ± 0.01	152.7	1.00 ± 0.00
	10%	21.0	0.95 ± 0.01	46.4	0.98 ± 0.01	135.8	0.99 ± 0.01	511.6	1.00 ± 0.00
Mottled Duck (29)	−10%	−19.0	0.74 ± 0.06	−34.4	0.94 ± 0.01	−61.3	0.98 ± 0.00	−86.5	0.99 ± 0.01
	−5%	−9.8	0.24 ± 0.14	−18.5	0.77 ± 0.11	−37.0	0.97 ± 0.01	−62.3	0.99 ± 0.01
	−3%	−5.9	0.00 ± 0.00	−11.5	0.55 ± 0.11	−24.0	0.91 ± 0.01	−43.4	0.98 ± 0.01
	−1%	−2.0	0.00 ± 0.00	−3.9	0.00 ± 0.00	−8.6	0.44 ± 0.12	−17.4	0.92 ± 0.01
	1%	2.0	0.00 ± 0.00	4.0	0.00 ± 0.00	9.4	0.41 ± 0.18	20.8	0.95 ± 0.03
	3%	6.1	0.01 ± 0.01	12.6	0.70 ± 0.07	30.5	0.96 ± 0.01	75.4	0.99 ± 0.01
	5%	10.3	0.69 ± 0.13	21.6	0.92 ± 0.01	55.1	0.98 ± 0.01	152.7	1.00 ± 0.00
	10%	21.0	0.85 ± 0.02	46.4	0.97 ± 0.01	135.8	0.99 ± 0.01	511.6	1.00 ± 0.00
Ring-necked Duck (29)	−10%			−34.4	0.50 ± 0.11	−61.3	0.96 ± 0.01	−86.5	0.98 ± 0.01
	−5%			−18.5	0.00 ± 0.00	−37.0	0.71 ± 0.15	−62.6	0.95 ± 0.02
	−3%			−11.5	0.00 ± 0.00	−24.0	0.50 ± 0.22	−43.4	0.90 ± 0.03
	−1%			−3.9	0.00 ± 0.00	−8.6	0.00 ± 0.00	−17.4	0.25 ± 0.14
	1%			4.0	0.00 ± 0.00	9.4	0.00 ± 0.00	20.8	0.34 ± 0.18
	3%			12.6	0.00 ± 0.00	30.5	0.71 ± 0.09	75.4	0.97 ± 0.01
	5%			21.6	0.25 ± 0.13	55.1	0.77 ± 0.05	152.7	0.98 ± 0.01
	10%			46.4	0.82 ± 0.08	135.8	0.98 ± 0.01	511.6	1.00 ± 0.00
Wilson's Plover (16)	−10%			−34.4	0.46 ± 0.23	−61.3	0.91 ± 0.03	−86.5	0.97 ± 0.02
	−5%			−18.5	0.49 ± 0.24	−37.0	0.88 ± 0.04	−62.6	0.96 ± 0.01
	−3%			−11.5	0.18 ± 0.11	−24.0	0.61 ± 0.08	−43.4	0.93 ± 0.01
	−1%			−3.9	0.00 ± 0.00	−8.6	0.00 ± 0.00	−17.4	0.55 ± 0.14
	1%			4.0	0.00 ± 0.00	9.4	0.02 ± 0.01	20.8	0.48 ± 0.24
	3%			12.6	0.05 ± 0.03	30.5	0.78 ± 0.07	75.4	0.96 ± 0.02
	5%			21.6	0.33 ± 0.16	55.1	0.83 ± 0.08	152.7	0.98 ± 0.01
	10%			46.4	0.94 ± 0.03	135.8	0.99 ± 0.01	511.6	0.99 ± 0.00

[a] n = number of count circles included in simulations.

King Rails exhibited a negative trend in MS-AL (−2.86%; 95% CI: −5.45–−0.30%) and neutral trends in Texas and Louisiana (Table 13). Little Blue Herons exhibited a positive trend in Texas (3.98%; 95% CI: 2.94−4.92%), a negative trend in Louisiana (−4.02%; 95% CI −5.73–−2.18%), and a neutral trend in MS-AL (Table 13). Reddish Egrets exhibited positive trends in Texas (3.25%; 95% CI: 1.61–4.78%) and MS-AL (5.55%; 95% CI: 2.94–8.00%) and a neutral trend in Louisiana (Table 13). Population changes in King Rails could be reliably detected in 3 years (+10% annual trend) in MS-AL (Table 18).

Shorebirds

Gulf Coast Joint Venture Scale

We estimated trends for 5 species of shorebirds (Table 11, Figure 10): Long-billed Curlew (*Numenius americanus*), Snowy Plover (*Charadrius nivosus*), Stilt Sandpiper (*Calidris himantopus*),

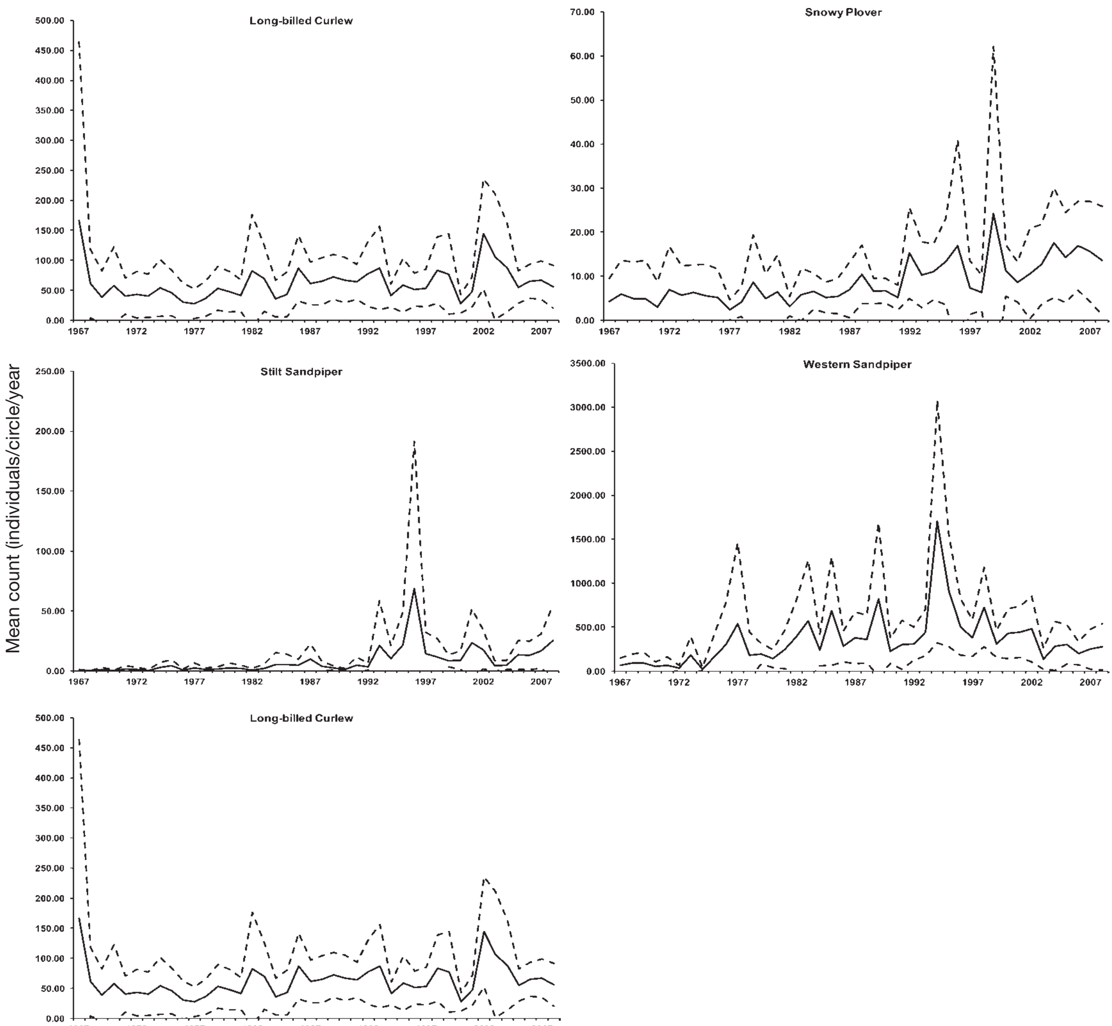


Figure 10. Populations trends and 95% CI (based on CBC data) for 5 shorebird species in the Gulf Coast Joint Venture, 1967-2008.

Western Sandpiper (*Calidris mauri*), and Wilson's Plover (*Charadrius wilsonia*). Snowy Plovers (3.67%; 95% CI: 2.63–4.71%), Stilt Sandpipers (9.20%; 95% CI: 6.61–11.63%), and Western Sandpipers (2.53%; 95% CI: 0.44–4.60%) exhibited positive population trends, and Long-billed Curlews and Wilson's Plovers exhibited neutral population trends (Table 11). Population changes could not be reliably detected at the GCJV scale for these species using the criteria we used for our power analysis.

Bird Conservation Region 37 Scale

Snowy Plovers (2.94%; 95% CI: 1.82–3.98%) and Stilt Sandpipers (9.90%; 95% CI: 6.18–12.75%) exhibited positive population tends (Table 12). Long-billed Curlews, Western Sandpipers, and Wilson's Plovers exhibited neutral population trends (Table 12). Population changes could not be reliably detected at the BCR 37 scale for these species using the criteria we used for our power analysis.

Table 17. Power (±SE)to detect population changes at 3-, 5-, 10-, and 20-years of sampling for 5 priority bird species in the Louisiana portion of the Gulf Coast Joint Venture using route regression Monte-Carlo simulations (1,000 iterations, $n = 3$ runs per species) in Program Monitor and Christmas Bird Count data (two-tailed $\alpha = 0.20$).

		Number of Intervals							
		3 Years		5 Years		10 Years		20 Years	
Species (n^a)	Annual Trend	%Change	Power	%Change	Power	%Change	Power	%Change	Power
Greater Scaup (8)	−10%			−34.4	0.82 ± 0.07	−61.3	0.91 ± 0.03	−86.5	0.90 ± 0.07
	−5%			−18.5	0.19 ± 0.19	−37.0	0.79 ± 0.06	−62.3	0.92 ± 0.03
	−3%			−11.5	0.01 ± 0.01	−24.0	0.46 ± 0.18	−43.4	0.94 ± 0.03
	−1%			−3.9	0.00 ± 0.00	−8.6	0.06 ± 0.06	−17.4	0.36 ± 0.29
	1%			4.0	0.06 ± 0.06	9.4	0.01 ± 0.01	20.8	0.26 ± 0.13
	3%			12.6	0.15 ± 0.15	30.5	0.24 ± 0.12	75.4	0.97 ± 0.01
	5%			21.6	0.33 ± 0.17	55.1	0.73 ± 0.06	152.7	0.99 ± 0.01
	10%			46.4	0.60 ± 0.07	135.8	0.99 ± 0.01	511.6	0.99 ± 0.01
LeConte's Sparrow (6)	−10%					−61.3	0.94 ± 0.02	−86.5	0.95 ± 0.02
	−5%					−37.0	0.65 ± 0.20	−62.3	0.98 ± 0.01
	−3%					−24.0	0.42 ± 0.15	−43.3	0.88 ± 0.01
	−1%					−8.6	0.29 ± 0.28	−17.4	0.78 ± 0.04
	1%					9.4	0.08 ± 0.08	20.8	0.19 ± 0.19
	3%					30.5	0.57 ± 0.17	75.4	0.89 ± 0.04
	5%					55.1	0.91 ± 0.05	152.7	0.96 ± 0.01
	10%					135.8	0.96 ± 0.02	511.6	0.99 ± 0.01
Loggerhead Shrike (13)	−10%	−19.0	0.86 ± 0.01	−34.4	0.98 ± 0.00	−61.3	0.99 ± 0.01	−86.5	0.99 ± 0.01
	−5%	−9.8	0.79 ± 0.03	−18.5	0.86 ± 0.11	−37.0	0.98 ± 0.01	−62.3	0.99 ± 0.01
	−3%	−5.9	0.39 ± 0.23	−11.5	0.84 ± 0.01	−24.0	0.96 ± 0.01	−43.4	0.99 ± 0.01
	−1%	−2.0	0.00 ± 0.00	−3.9	0.13 ± 0.08	−8.6	0.91 ± 0.04	−17.4	0.96 ± 0.02
	1%	2.0	0.00 ± 0.00	4.0	0.04 ± 0.04	9.4	0.57 ± 0.22	20.8	0.96 ± 0.03
	3%	6.1	0.25 ± 0.20	12.6	0.82 ± 0.05	30.5	0.96 ± 0.03	75.4	0.99 ± 0.01
	5%	10.3	0.71 ± 0.04	21.6	0.92 ± 0.01	55.1	0.99 ± 0.01	152.7	1.00 ± 0.00
	10%	21.0	0.90 ± 0.04	46.4	0.98 ± 0.01	135.8	0.99 ± 0.01	511.6	1.00 ± 0.00
Northern Bobwhite (10)	−10%			−34.4	0.63 ± 0.27	−61.3	0.90 ± 0.04	−86.5	0.97± 0.01
	−5%			−18.5	0.47 ± 0.11	−37.0	0.69 ± 0.15	−62.3	0.93 ± 0.03
	−3%			−11.5	0.09 ± 0.09	−24.0	0.77 ± 0.06	−42.4	0.83 ± 0.04
	−1%			−3.9	0.00 ± 0.00	−8.6	0.10 ± 0.07	−17.4	0.82 ± 0.09
	1%			4.0	0.04 ± 0.04	9.4	0.45 ± 0.23	20.8	0.69 ± 0.07
	3%			12.6	0.22 ± 0.22	30.5	0.37 ± 0.19	75.4	0.98 ± 0.01
	5%			21.6	0.46 ± 0.23	55.1	0.95 ± 0.02	152.7	0.98 ± 0.01
	10%			46.4	0.79 ± 0.15	135.8	0.98 ± 0.01	511.6	0.99 ± 0.01
Wilson's Plover (4)	−10%			−34.4	0.92 ± 0.04	−61.3	0.98 ± 0.01	−86.5	0.99± 0.01
	−5%			−18.5	0.84 ± 0.06	−37.0	0.93 ± 0.03	−62.3	0.99 ± 0.01
	−3%			−11.5	0.79 ± 0.12	−24.0	0.95 ± 0.02	−42.4	0.98 ± 0.01
	−1%			−3.9	0.47 ± 0.17	−8.6	0.27 ± 0.12	−17.4	0.88 ± 0.06
	1%			4.0	0.18 ± 0.11	9.4	0.31 ± 0.21	20.8	0.94 ± 0.02
	3%			12.6	0.70 ± 0.09	30.5	0.96 ± 0.02	75.4	0.98 ± 0.01
	5%			21.6	0.74 ± 0.12	55.1	0.98 ± 0.01	152.7	0.99 ± 0.01
	10%			46.4	0.97 ± 0.02	135.8	0.99 ± 0.01	511.6	1.00 ± 0.00

[a] n = number of count circles included in simulations.

Table 18. Power (±SE)to detect population changes at 3-, 5-, 10-, and 20-years of sampling for 5 priority bird species in the Mississippi-Alabama portion of the Gulf Coast Joint Venture using route regression Monte-Carlo simulations (1,000 iterations, n = 3 runs per species) in Program Monitor using Christmas Bird Count Data (two-tailed α = 0.20).

		Number of Intervals							
		3 Years		5 Years		10 Years		20 Years	
Species (n[a])	Annual Trend	%Change	Power	%Change	Power	%Change	Power	%Change	Power
Fulvous Whistling-Duck (1)	−10%							−86.5	0.12 ± 0.01
	−5%							−62.3	0.13 ± 0.01
	−3%							−43.4	0.13 ± 0.01
	−1%							−17.4	0.14 ± 0.01
	1%							20.8	0.17 ± 0.01
	3%							75.4	0.21 ± 0.01
	5%							152.7	0.30 ± 0.01
	10%							511.6	0.92 ± 0.01
Hooded Merganser (6)	−10%	−19.0	0.86 ± 0.03	−34.4	0.96 ± 0.02	−61.3	0.98 ± 0.01	−86.5	0.99 ± 0.01
	−5%	−9.8	0.29 ± 0.15	−18.5	0.82 ± 0.05	−37.0	0.98 ± 0.01	−62.3	0.99 ± 0.01
	−3%	−5.9	0.14 ± 0.07	−11.5	0.59 ± 0.29	−24.0	0.93 ± 0.05	−43.4	0.99 ± 0.01
	−1%	−2.0	0.00 ± 0.00	−3.9	0.51 ± 0.28	−8.6	0.45 ± 0.13	−17.4	0.96 ± 0.01
	1%	2.0	0.07 ± 0.06	4.0	0.03 ± 0.03	9.4	0.47 ± 0.26	20.8	0.84 ± 0.08
	3%	6.1	0.02 ± 0.02	12.6	0.62 ± 0.08	30.5	0.94 ± 0.03	75.4	0.99 ± 0.01
	5%	10.3	0.55 ± 0.19	21.6	0.82 ± 0.12	55.1	0.98 ± 0.01	152.7	0.99 ± 0.01
	10%	21.0	0.91 ± 0.03	46.4	0.97 ± 0.01	135.8	0.99 ± 0.01	511.6	1.00 ± 0.00
King Rail (6)	−10%	−19.0	0.02 ± 0.02	−34.4	0.69 ± 0.08	−61.3	0.88 ± 0.06	−86.5	0.95 ± 0.04
	−5%	−9.8	0.15 ± 0.10	−18.5	0.32 ± 0.22	−37.0	0.82 ± 0.08	−62.3	0.97 ± 0.01
	−3%	−5.9	0.11 ± 0.11	−11.5	0.15 ± 0.08	−24.0	0.78 ± 0.09	−43.4	0.89 ± 0.04
	−1%	−2.0	0.37 ± 0.19	−3.9	0.13 ± 0.13	−8.6	0.27 ± 0.26	−17.4	0.49 ± 0.27
	1%	2.0	0.00 ± 0.00	4.0	0.01 ± 0.01	9.4	0.40 ± 0.06	20.8	0.83 ± 0.04
	3%	6.1	0.10 ± 0.10	12.6	0.45 ± 0.22	30.5	0.91 ± 0.03	75.4	0.97 ± 0.01
	5%	10.3	0.10 ± 0.05	21.6	0.61 ± 0.19	55.1	0.93 ± 0.03	152.7	0.99 ± 0.01
	10%	21.0	0.80 ± 0.05	46.4	0.83 ± 0.04	135.8	0.99 ± 0.01	511.6	0.99 ± 0.01
LeConte's Sparrow (5)	−10%							−86.5	0.06 ± 0.03
	−5%							−62.3	0.18 ± 0.07
	−3%							−43.4	0.52 ± 0.27
	−1%							−17.4	0.01 ± 0.01
	1%							20.8	0.40 ± 0.18
	3%							75.4	0.75 ± 0.13
	5%							152.7	0.98 ± 0.01
	10%							511.6	0.99 ± 0.01
Lesser Scaup (1)	−10%							−86.5	0.90 ± 0.01
	−5%							−62.3	0.57 ± 0.01
	−3%							−43.4	0.37 ± 0.01
	−1%							−17.4	0.23 ± 0.01
	1%							20.8	0.23 ± 0.01
	3%							75.4	0.44 ± 0.01
	5%							152.7	0.75 ± 0.01

[a] n = number of count circles included in simulations.

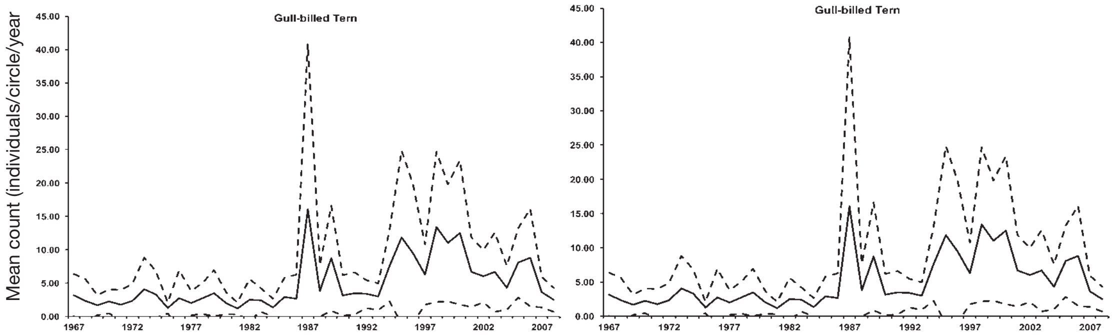


Figure 11. Population trends (based on CBC data) for Black Skimmer and Gull-billed Tern in the Gulf Coast Joint Venture, 1967-2008.

State Scale

Long-billed Curlews exhibited a positive trend in Texas (1.41%; 95% CI: 0.45–2.43%), a negative trend in Louisiana (−11.31%; 95% CI: −16.47–−6.20%), and a neutral trend in MS-AL (Table 13). Snowy Plovers exhibited a positive trend in Texas (4.29%; 95% CI: 3.25–5.34%) and neutral trends in Louisiana and MS-AL (Table 13). Stilt Sandpipers exhibited a positive trend in Texas (8.55%; 95% CI: 5.97–11.63%) and a neutral trend in Louisiana (Table 13). Wilson's Plovers exhibited a neutral trend in Texas and Louisiana, and no trends were estimated for MS-AL due to a lack of detections. Changes in Wilson's Plover populations could be reliably detected in Texas (10 years; ±5% annual trend; Table 16) and Louisiana (5 years; −5% annual trend; Table 17).

Terns and Skimmers

Gulf Coast Joint Venture Scale

We estimated trends for 2 species of skimmers and terns (Table 11, Figure 11): Black Skimmer and Gull-billed Tern. Black Skimmers (2.02%; 95% CI: 0.90–3.56%) and Gull-billed Terns (3.56%; 95% CI: 1.98–5.13%) exhibited positive population trends (Table 11). However, population changes could not be reliably detected at the GCJV scale for either species using the criteria we used for our power analysis.

Bird Conservation Region 37 Scale

Black Skimmers (1.01%; 95% CI: 0.10–2.74%) and Gull-billed Terns (2.02%; 95% CI: 0.50–3.67%) exhibited positive population trends (Table 12). Population changes could not be reliably detected at the BCR 37 scale for either species using the criteria we used for our power analysis.

State Scale

Black Skimmers exhibited a positive trend in Texas (2.43%; 95% CI: 1.11–3.77%) and neutral trend in Louisiana and MS-AL (Table 13). Gull-billed Terns exhibited positive trends in Texas (3.15%; 95% CI: 1.71–4.08%) and Louisiana (8.00%; 95% CI: 1.11–15.37%; Table 13). Population changes could not be reliably detected at the state scale for these species using the criteria we used for our power analysis.

DISCUSSION

Given that approximately 36% of species detected by the BBS and 11% of species detected by the CBC appear to be declining in abundance at the GCJV scale, it is important for managers to be able to detect declining trends from broad-scale bird population monitoring data. These data provide a basis for statistical power analysis that is intended to investigate a suite of species of concern in the GCJV. Use of a Monte Carlo simulation power analysis (e.g., Program MONITOR, Gibbs and Ene 2010) of these broad scale survey data allowed us to determine the species for which the BBS and/or CBC provide suitable monitoring data. These analyses also inform as to which species may require more intensive surveys for the entire GCJV scale and for specific Bird Conservation Regions within the GCJV by incorporating the variation associated with these 2 long-term bird monitoring datasets.

We incorporated 10 routes outside of GCJV into the analysis to obtain data that provide a close approximation of trends for birds in the eastern Louisiana and western Mississippi region of the GCJV. Fourteen species were detected on the

Mississippi routes and 13 species were detected on the 3 Louisiana routes. Generally, these data represented a small portion of the total dataset for widespread and/or often detected species (e.g., Northern Bobwhite, Painted Bunting, Loggerhead Shrike), or significant portion of the dataset for narrowly distributed and/or rarely detected species (e.g., Brown-headed Nuthatch). For widespread and often detected species incorporation of these routes had a negligible impact on trends and power estimates. For narrowly distributed-rarely detected species these routes provide the best approximation of trends and power estimates for GCJV at these locations. In practice, however, these routes would likely not be used to monitor this subset of species within the GCJV.

Power estimates provided by monitoring appear sensitive to both within (temporal) route/circle variation and between (spatial) route/circle variations (Hatch 2003). Given existing datasets (BBS and CBC) managers should not expect to reliably estimate trends for more than 4 species of birds using the BBS (Brown-headed Nuthatch, Northern Bobwhite, Swainson's Warbler, and Wood Thrush) or 2 species (Loggerhead Shrike, Ring-necked Duck) of birds using the CBC at the GCJV level. The general pattern of our results suggest that within the subsets of the GCJV (BCR 37, Texas, Louisiana, MS-AL) more species (3-9 BBS; 4-5 CBC) may be monitored using these broadscale surveys, but monitoring and management decisions must be evaluated on a case-by-case basis. In general, power of detection was greater for species with increasing annual population trends. There were 2 cases in the BBS (Prothonotary Warbler, MS-AL state scale; and Wilson's Plover, Texas state scale) and 2 cases in the CBC (Greater Scaup, Louisiana state scale; Lesser Scaup, MS-AL state scale), however, where negative annual trends had higher power than positive trends. It is likely that these results represent an artifact of the simulation process, especially in the case of relatively small sample size (e.g., Lesser Scaup, CBC) and should be interpreted with caution. Future research would benefit by evaluating subsets of states or ecoregions (e.g., clusters or routes or points) where knowledge of trends would be helpful from a conservation-management perspective.

ACKNOWLEDGMENTS

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SHORT COMMUNICATIONS

TWO ADJACENT EASTERN PHOEBE NESTS, ONE TYPICAL, THE OTHER ATYPICAL

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A female Eastern Phoebe (*Sayornis phoebe*) built two adjacent nests (Figs 1, 2)—the first atypically tall (25 cm) and the second of typical height (6 cm). The nest site was typical—adhering to the wall and resting on the narrow inner base ledge of a front porch frieze (8022 Appomattox, Flint, Texas (32°13'20.93"N; 95°19'46.33"W). The first nest was completed within a week and was finished about 10 March 2017. Then, the second nest was built, but not completed (little lining). Completed nests may remain empty for as long as 2 weeks before receiving eggs (Weeks 1994, 2001). The bird returned to the tall nest and 4 chicks were fledged about 6 May.

Both nests were of typical structure and composition—dried mud pellets (apparently from a single source), moss, and interwoven grass stems (Weeks 1994, 2001). The tall nest was embedded its entire length with interwoven moss and grass stems similar to the nest described by Hill (1987). The porch ceiling was 2.45 m above the porch floor and the top of the ledge upon which the nests rested was 2.09 m high; so, the distance from the ceiling to the base of the nests was 0.36 m. The distance from the ceiling to the top of the nests was 11 cm (tall nest) and 30 cm (short nest). The distance between the two nests was 5 cm and the distance from the tall nest to the porch corner wall was 10.8 cm (top and

Figure 1. Location of adjacent typical and atypical Eastern Phoebe nests on house porch.

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Figure 2. Close view of adjacent typical and atypical Eastern Phoebe nests.

bottom) and 12.5 cm (center); so, there was a slight inward bend. Nest measurements were: height (25 cm and 6 cm), width (12 and 15 cm), cup width (7 cm each); and cup depth 3 cm each).

Three weeks after the young fledged, at homeowner request, the nests were removed to prevent possible renesting at that site where there had been an accumulation of excrement on the porch passageway. They were carefully kept intact for preservation and study. Three similar atypically tall nests have been reported: 22.5 cm (Smith 1905), 38 cm (Van Tyne 1957), and 74 cm (Hill 1987). Eastern Phoebes usually nest close to overhead cover which offers protection from rain (Weeks 1994, 2001). These abnormally tall nests were built on a base structure some distance from overhead cover. Perhaps these nests were built in response to two conflicting nest site requirements; the first, a base for attachment and the second, the need for the nest cup to be near overhead cover (Hill 1987). Although building these nests required additional time and energy, since they were productive, they appear to have resulted from adaptive behavior (Hill 1987).

ACKNOWLEDGMENTS

I thank Susan Hearn, Treasurer, Board of Directors, Camp Tyler Outdoor School, for reporting the unusual Eastern Phoebe nest to Audra Dunning, Office Manager who, then, notified me. I appreciate transportation and assistance from Jim Cunningham, Executive Director, CTOS.

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RECOLLECTIONS OF SOME EARLY TOS MEMBERS

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During the decade following WWII, the United States was notably ambitious and forward looking. New special interest groups sprang up, and established organizations such as civic clubs became more robust and adventured into new areas of engagement. I was a teenager at the time and it seemed that everywhere I looked there was movement in my small town of Denton, Texas.

It was in this atmosphere, in 1952, that the Texas Ornithological Society was born. The founders, as I recall, were a remarkably aspiring and enterprising group of men and women. Many of them may have been caught up in the excitement and bold thinking that some historians attribute to the end of the war. In any event, these TOS founders must have realized the historical importance of their new organization.

They included eccentrics as well as conventional "organization men;" housewives who birded daily with almost religious fervor; weekend and backyard birdwatchers; and competent, self-confident businessmen who seemed to know exactly how to create a thriving organization.

Perhaps TOS members then were no different than today, but these were privileged to be the architects of this new state organization. I can still remember the great energy and liveliness that dominated the meetings.

Below are some anecdotes and character sketches of several TOS charter member—some I knew casually, others quite well. The accounts are listed alphabetically.

1956 TOS Membership Directory.

Richard O. Albert, M.D. Photo from 1947 [*The Cactus*] University of Texas Yearbook.

Richard O. Albert MD (1920-1990). Richard was a surgeon in Alice who liked to fly his small plane to TOS meetings. When the meetings were held in places like rural church camps he would land on the farm to market road, park his plane on the shoulder, and walk several hundred yards to the camp.

At one TOS meeting in College Station I casually remarked how nice it would be to go birding on the coast. Ten minutes later we were in his small plane headed for the beach south of Galveston. This was my first flight in a small plane, and he easily impressed me by flying low over the water and landing on the beach.

After birding on the beach for a few minutes we walked back into the grassy sand dunes. There were very few birds in the dunes, so after about fifteen minutes we decided to turn back. It was at this time that Richard calmly announced he had just been bitten by a rattlesnake.

So we began a painfully slow return to the plane. The beach wasn't visible, but we had a general idea which direction to take.

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We had hardly walked fifty feet when Richard said, "Let's go back. I want to photograph that snake for my records."

"That's insane," I replied. But he insisted. While he was poking around the grass with a small stick, I stood on top of a bare sand dune and watched incredulously.

He gave up after a few minutes so we resumed our trek to the plane. One leg of his trousers was tighter than the other because of the swelling, and he was starting to limp. We walked at an unnervingly slow pace, but at least that allowed me to look for snakes behind the patches of grass.

Suddenly Richard stopped and said,"Would you take a photo of my leg?"

"Why?"

"For my records."

For many years Richard had been recording in minute detail every event of his life he considered worth archiving, and these events were numerous.

I was anxious to get on with the hike because clearly we were racing the clock, but I agreed. He lifted the leg of his pants to expose the two fang marks and the two little streams of blood trickling down his leg. He asked me to photograph his leg several times, close up and from a few feet away, and from different angles.

Finally, after concluding this, we resumed our slow walk back to the beach. When we reached the plane—the beach was desolate as far as we could see—Richard began to look quite drowsy. Since there was no option but to fly back, he asked me to get in the pilot's seat.

"I'll have to teach you how to fly us back home," he announced.

My disbelief in what was happening was matched only by my anxiety of how all this was going to end. I had never been in a small plane before, much less flown one, but groggy as he was, he seemed to think it would work.

Taking off, of course, was easy (just pull back on the steering wheel), but I knew that landing required experience. Up in the air everything seemed to be working, but he was giving instructions with slurred speech, and he looked like he was going to pass out at any moment.

We flew over Galveston's airport. I urged him to land and be given some antivenin while he was still conscious, but he wanted to continue flying.

As we approached College Station he tried to explain how to land, but I balked because I felt certain I would crash the plane. Suddenly he seemed less drowsy and landed the plane perfectly, which made me wonder about the extent of his drowsiness during the flight.

At the banquet that evening the noisy conversation in the dining hall was mostly about Richard's snakebite. Richard was an officer so had a place at the head table. His seat was empty.

The speaker began his talk, unaware that he was about to be upstaged by Richard. About half way through his talk the door in the back of the hall opened noisily.

Everyone turned around to look. There stood Richard. He had a distant expression on his face, even more mask-like than his usual expressionless face. As he limped up to the head table, never making eye contact with anyone, we all stared at him. Everyone must have been wondering if his wobbly gait meant he would collapse in front of us.

He took his seat. The speaker, like everyone else in the room, looked over at Richard as Richard drowsily glanced at his plate. Richard never touched his food.

The speaker weakly finished his talk, and Richard limped out of the hall as dramatically as he had entered.

The next day he flew home. Later we learned that the previous year he had deliberately held a rattlesnake to his buttocks and allowed it to inject him with venom, giving him some degree of immunity.

I would have welcomed that bit of information when we were up in the sky.

Mrs. Robert Bowman (1888-1982). Ethel was well known throughout Texas for her numerous rare bird sightings and her extensive knowledge of North Texas birds. I knew her only briefly.

She was was self-confident, somewhat reserved, and exceedingly gracious towards visitors to her home. She was proud of an expensive painting of a Blue Jay by Menaboni that hung over the mantle of her fireplace. She would hand all visitors a magnifying glass and urge them to examine the minute details of the feathers.

She always referred to birds as "who." I took that to mean she felt she shared a special intimacy with birds that gave her license to break a grammatical rule I had just been taught in high school.

L. Irby Davis. Photo Cornell Laboratory of Ornithology

L. Irby Davis (1897-1987). Irby, also known as "Louie," was an early Texas legend, perhaps the most controversial Texas birder at the time. After a varied career in science and engineering, he took a position directing a medical technology laboratory in Harlingen. He spent much of his life in South Texas and northern Mexico making important bird observations and recording numerous bird songs.

The 1957 cover of the Christmas Count issue of *Audubon Birds* carried a photo of Irby and several others who more than once made the Harlingen Christmas count number one in the nation. The total number of species was exceeded only by Irby Davis' bird count in Xilitla, Mexico, which was not considered official since it didn't take place in the U.S.

Several people objected to the way Irby conducted his Mexico count. He invited anyone who was interested to participate, and that included inexperienced birders wishing a Mexican birding experience. In some cases Irby would add to the species list a bird based on a verbal description provided to him by an inexperienced birder. This lack of rigor offended many birders who insisted that a bird should not be included on any bird count unless seen by at least two people.

Irby's book on Mexican birds stirred up even more controversy. All standard bird guides at the time followed the American Ornithologists' Union's taxonomic order, even if the authors personally disagreed with it. Authors and publishers followed the A.O.U. as much for the reader's convenience (consistency of names among field guides) as out of respect for the A.O.U.'s authority, which dated back to the late 19th Century.

Irby had his own ideas about how to name birds, which of course was his prerogative as an author. However, many of the names he gave Mexican birds, including species also found in the U.S., were unintelligible to birders familiar only with the standard field guides by Peterson and Pough.

Someone came to the rescue and prepared an extensive "glossary" that matched Irby's bird names with the standard ones. This allowed birders who followed Irby's guide to communicate with the rest of us, but it was still cumbersome to deal with two sets of bird names.

Irby once complained to me, at an A.O.U. meeting, that he was "over the hill" because, like most of us, he didn't understand the new, highly specialized biochemical and physiological research presentations upon which the never ending revisions of bird nomenclature are based.

On the other hand, even though his book and system of nomenclature became obsolete when Peterson's new Mexican field guide was published, Irby's extensive bird recordings of South Texas and Mexican birds, deposited at Cornell and other repositories, remain an important contribution to North American ornithology. He did not know that after his death a dramatic resurgence of interest in bird recordings would take place that would lead to the recording of almost all of the planet's bird songs (cf. Xeno-Canto); and that his recordings contributed significantly to the foundation of this monumental task.

Edward C. "Ned" Fritz, Photo Save Americas Forests

Edward C. "Ned" Fritz (1916-2008). Ned Fritz—endowed with twice as much enthusiasm and energy as anyone in the TOS, with the possible exception of Edgar Kincaid—was a brilliant, self-confident, and highly articulate attorney who practiced law in Dallas for more than twenty-five years.

On a hot day in May, after spending hours climbing up mountains through Lechuguilla in search of Colima Warbler nests, he returned to headquarters several hours later than the rest of us. He didn't seem exhausted at all and was still as keyed up as when he set out that morning. He was in his late fifties then.

In 1970 he retired to become a full time environmental advocate.

"Larger than life" is an over-used cliché but in his presence I always felt it applied to him, and among the early TOS members, only to him.

The last time I saw him he was ninety. We hadn't seen each other for several years. He had lost none of his enthusiasm or self-confidence. Immediately he asked what I had been doing, and when I said I was raising cattle on my ranch, he spent ten minutes convincing me to consider a land trust. Although his body had been weakened by age, he was no older than fifty in his enthusiastic and forceful way of speaking. I doubt anyone would have wanted to be Ned's adversary in a court of law.

John E. Galley (1905-1997). John was as dedicated to the birds of Texas and their conservation as Ned Fritz, but his *modus operandi* was entirely different. John, a geologist by training, approached conservation issues in a more measured way and argued by means of quiet persuasion rather than by verbally overwhelming you as Ned Fritz did. He was unassuming, soft spoken, careful with his words, and always polite and respectful; but he was as persistent and determined as anyone when arguing for conserving our natural resources.

It may be encouraging that both of these active men, who devoted so much of their lives to conserving Texas' natural resources, lived to the age of 92.

During the sixties, when John was having dinner with my wife and me at our home in Lubbock, I noticed he was "living sensibly" well ahead of his time. He carefully cut the fat from his steak, ate only a portion of it, ate mostly the vegetables, and walked everywhere while in Lubbock.

Under the same circumstances at our home the next year, Richard Albert ate two steaks, fat and all, and drove everywhere in Lubbock. Such were the contrasting lifestyles among TOS charter members.

Mrs. Jack "Connie" Hager. Photo compliments of Texas A&M University.

Mrs. Jack "Connie" Hager (1886-1973). During the early to mid-20th Century only three women were prominent in American ornithology, and all three worked and/or lived in adjacent states: Texas, Oklahoma, and New Mexico. Two of these women were born three years apart and died one year apart: Connie Hager (1886-1973; died age 87), and Margaret Nice (1883-1974; died age 91). The third, Florence Merriam Bailey, was born a decade earlier (1883-1948; died age 85), and was the author of the classic *Birds of New Mexico*.

None of the three was trained as an academic ornithologist, yet all three gained prominence among the ornithological community, if for different reasons. Two (Nice and Bailey) achieved international recognition for their contributions to academic ornithology. The third, Connie Hager, equally as gifted and focused, was best known for her voluminous, meticulously documented field notes and for her skill in distinguishing all the plumages, songs, and principal behaviors of Coastal Texas birds. Many prominent ornithologists, including Roger Tory Peterson, visited her in Texas to sharpen their bird identification skills.

I saw Connie only occasionally. Her enthusiasm for birds intensified my own. She was cheerful, bubbly, and excited as she described the birds she had seen that day, and what they had been doing.

When I glanced over at her bookshelf, I saw not only many bird books—not uncommon among serious birders—but that her eighteen volume set of Bent's *Life Histories of North American Birds* was all but worn out! That I had never seen, nor have I seen since, in a birder's personal library. Having heard for several years about her astonishing memory for details, I assumed that everything of importance in Bent's volumes was safely tucked away in her brain and was available for retrieving whenever she saw a bird. Some of my other birding friends may have been equally as virtuosic in identifying birds in the field, but I doubt any were as knowledgeable as she about the lives of the birds they saw.

Edgar B. Kincaid, Jr. (L) and Rod Rylander. Photo compliments of Kent Rylander

Edgar B. Kincaid, Jr. (1921-1985). I first met Edgar when he was in his thirties and was leading a field trip to see the Golden-cheeked Warbler. He walked briskly and talked most of the time, pointing out plants and identifying them by common and scientific names. He was dressed in a coat and tie—his usual field clothing. This happened to also be the field attire of another Texas naturalist, John Kern Strecker, Jr. (1875-1933), curator of the natural history museum at Baylor named after him. Both men were extraordinarily gifted and knowledgeable about the plants and animals of Texas, and both made significant contributions to the natural history of the state.

Everyone accepted Edgar's unusually fast paced physical and mental activity. His quick thinking and rapid speech made him stand out in any group. When he ate he took small, quick bites of food and between bites talked in short sentences.

His rapid and exaggerated facial movements seemed to be physiologically based. Many of us assumed that what came across as extreme restlessness or nervousness would have made it very difficult for him to hold a conventional job; yet it certainly didn't interfere with the enormous task of editing Oberholser's *The Bird Life of Texas*.

Anne LeSassier, from Midland, was one of his best friends. My brother and I accompanied them on a field trip to some canyons that were about to be inundated by the Amistad Reservoir. We walked quickly and saw very few birds because Edgar and Anne had a lot of things to discuss. Anne had been helping Edgar edit Oberholser's book and told me that a book could be written about the enormous effort Edgar had been expending on this task.

I regretted that I could not have known him better, but he was not easy for me to connect with. Maybe I was too young to have anything of importance to say, but I certainly appreciated listening to him whenever he lectured to me about birds.

Jack Eitniear's article in this issue describes the life this colorful, legendary Texas ornithologist.

Hal Kirby and Edmund W. "Ned" Mudge, Jr. with latter's gift of mounted ivory-billed woodpecker and passenger pigeon, 1967. From Walt Davis. 2016. *Building an Ark for Texas: The Evolution of a Natural History Museum*, p. 85. College Station: Texas A&M University Press.

Edmund W. "Ned" Mudge, Jr. (1905-1985). Ned realized a fantasy that many people who like both birds and books must have had at one time: to own a large library of important bird books. Ned went a step further by buying numerous rare and out of print bird books, the oldest dating back to 1555, and created one of the largest collections of rare bird books in the U.S.

In the late nineteen sixties he invited me to examine these books in his elegant home in Dallas. The books—hundreds of them—were housed in a special room in his house in handsomely crafted wall to wall bookshelves. He brought me a scotch and some snacks and left me alone in the room, knowing that I would be absorbed for several hours. Now and then he would walk in and point out a favorite book of his and comment on it. He spoke slowly and in a low, authoritative tone of voice; yet even though he had been highly successful in the oil business, he was unassuming and warm.

I found numerous classical ornithological treatises and all the expensive current books. I recognized one book for which only three copies are known to exist. I had to leave after about four hours, as he and his wife were going to the opera that night.

Their son lived in Lubbock for several years and when they visited him they would invite me out to eat. We talked mainly about birds, but their interests were broad and the conversation often rambled. Even though Ned was a Harvard graduate and quite wealthy, he was like the proverbial Texas millionaire who is down to earth and who enjoys talking to most people if he considered them sincere.

In keeping with his generous spirit, Ned left his extraordinary library to the Dallas Museum of Natural History, where the books will be safe forever.

Harry C. Oberholser. Photo from *Bird Life of Texas*. University of Texas Press

Harry C. Oberholser (1870-1963). Oberholser holds an interesting place in Texas ornithology. In 1900, long before most TOS charter members were born, the United States Bureau of Biological Survey sent him to the Big Bend region to collect and conduct studies of the region's birds. This trip was the basis of his monumental *The Bird Life of Texas*, edited by Edgar Kincaid, Jr. and published in 1974, eleven years after Oberholser's death.

It could be argued that spending approximately sixty years writing a treatise on Texas birds qualifies Oberholser as the "Dean of Texas Ornithology" except that it seems he rarely visited Texas during his lifetime. He was unapologetically a "museum person" and a world class one at that. However, birders sometimes snidely remarked that he "birded in Texas and Louisiana at 60 miles per hour" in order to write his large books.

I didn't meet Oberholser until he gave a talk to the TOS. He was ninety at the time. In a social setting he had very little to say that wasn't an argument for the species or subspecies he had proposed. His encyclopedic memory apparently had waned very little by then, as scientific names of birds rolled off his tongue swiftly and effortlessly. Most of us who talked to him were a little intimidated by his self assured posture and forceful delivery. I asked him a question about Harlan's Hawk and received an authoritative response that quickly put an end to the discussion.

He is supposed to have collected many objects—coins, stamps, even rubber bands (which he carried in his pocket). Evidently it was easy for him to deal with many minute details, which may have had something to do with his reputation as a taxonomic "splitter" rather than "lumper." Take a look in *The Bird Life of Texas* at the "Pecos Scrub Jay" that he described as a separate subspecies—a bird later lumped by others with another subspecies.

Roger Tory Peterson. Photo compliments of Washington Biologists' Field Club

Roger Tory Peterson (1908-1996). I think it's fair to consider Peterson as the "Patron Saint of TOS." From the beginning, he was a source of encouragement and inspiration to the organization. He had confidence in this new, vibrant society and perhaps we had something to do with his decision to write a field guide just for Texas.

Peterson's commanding voice added to his charismatic demeanor. He seemed as certain about his views as Oberholser was about his, although their focus differed. Peterson spoke with confidence about bird identification and conservation; but he also spoke with equal confidence, to several of us at lunch, about personality changes that accompany aging in males. I took it that he confidently expressed his views on any subject.

Perhaps one of the traits of some ageing men is grumpiness. Peterson certainly showed some of that at a slide show I attended. He was impatient and a bit gruff with his wife who was assisting him at a talk, as she fumbled helplessly with the slide projector.

Once I asked him, "What is the most difficult part of writing a field guide?" He answered that it was composing succinct field marks; but he pointed out that he mastered these because some of his best grades in high school were in writing poetry. He also said that committing to writing a book was like volunteering for a prison sentence.

What astonished me were his self doubts about his career. Of all things! At a national ornithological meeting we had been listening to technical presentations by university faculty and their graduate students. During the break he said, rather sadly, that he wished he had taken the university route, writing scientific articles and guiding graduate students rather than writing popular bird guides.

To a young assistant professor worried more about getting tenure than becoming famous, this was incomprehensible. Regardless of how much research I did or how many graduate students I helped, I could never impact the birding world like Peterson did. Relatively few of the thousands of ornithological articles published each year are read except by specialists in a particular area, so the academic ornithologist's impact, while not trivial, is nonetheless modest. Peterson truly changed the playing field when he wrote his bird guides.

As a case in point, not long after a celebrated article on paper electrophoresis was published by a Cornell full professor, the technique became obsolete. The article had already sunk into the historical literature by 1975. However, Peterson's gift to the world—the concise field guide—continues to flourish and will remain an important method of identifying birds for at least another generation.

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I am grateful to Stan Casto and Jack Eitniear for providing information for this article and for critically reading it. Glenn Gomez kindly assisted in locating the photo of Connie Hagar.

TEXAS BIRD RECORDS COMMITTEE REPORT FOR 2016

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The Texas Bird Records Committee (hereafter "TBRC" or "committee") of the Texas Ornithological Society requests and reviews documentation on any record of a TBRC Review List species (see TBRC web page at http://www.texasbirdrecordscommittee.org). Annual reports of the committee's activities have appeared in the Bulletin of the Texas Ornithological Society since 1984. For more information about the Texas Ornithological Society or the TBRC, please visit www.texasbirds.org. The committee reached a final decision on 107 records during 2016: 99 records of 47 species were accepted and 8 records of 7 species were not accepted, an acceptance rate of 92.52% for this report. A total of 191 observers submitted documentation (to the TBRC or to other entities) that was reviewed by the committee during 2016.

The TBRC accepted 3 first state records in 2016. The additions of Wilson's Storm-Petrel, Common Crane, and Pacific-slope Flycatcher bring

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the official Texas State List to 645 species in good standing. This total does not include the five species on the Presumptive Species List.

In addition to the review of previously undocumented species, any committee member may request that a record of any species be reviewed. The committee requests written descriptions as well as photographs, video, and audio recordings if available. Information concerning a Review List species may be submitted to the committee secretary, Eric Carpenter, 4710 Canyonwood Drive, Austin, Texas 78735 (email: ecarpe@gmail.com). Guidelines for preparing rare bird documentation can be found in Dittmann and Lasley (1992) or at http://www.greglasley.net/document.html.

The records in this report are arranged taxonomically following the AOU Check-list of North American Birds (AOU 1998) through the 57th supplement (Chesser et al. 2016). A number in parentheses after the species name represents the total number of accepted records in Texas for that species at the end of 2016. Species added to the Review List because of population declines or dwindling occurrence in recent years do not have the total number of accepted records denoted as there are many documented records that were not subjected to review (e.g. Brown Jay, Pinyon Jay, Tamaulipas Crow, and Evening Grosbeak). All observers who submitted written documentation or photographs/recordings of accepted records are acknowledged by initials. If known, the initials of those who discovered a particular bird are in boldface but only if the discoverer(s) submitted supporting documentation. The TBRC file number of each accepted record will follow the observers' initials. If photographs or video recordings are on file with the TBRC, the Texas Photo Record File (TPRF) (Texas A&M University) number is also given. If an audio recording of the bird is on file with the TBRC, the Texas Bird Sounds Library (TBSL) (Sam Houston State University) number is also given. Specimen records are denoted with an asterisk () followed by the institution where the specimen is housed and the catalog number. The information in each account is usually based on the information provided in the original submitted documentation; however, in some cases this information has been supplemented with a full range of dates the bird was present if that information was made available to the TBRC. All locations in italics are counties. Please note that the county designations of offshore records are used only as a reference to the nearest point of land.

TBRC Membership—Members of the TBRC during 2016 who participated in decisions listed in this report were: Randy Pinkston, Chair; Keith Arnold, Academician; Eric Carpenter, (non-voting) Secretary; Greg Cook, Petra Hockey, Mark Lockwood, Jim Paton, Byron Stone, Dan Jones, Stephan Lorenz, Tony Frank, Chris Runk. During 2016, Jim Paton's and Byron Stone's second term each expired with Tony Frank and Chris Runk elected to fill those vacancies. The Chair, Academician, and Secretary were also re-elected.

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Additional Abbreviations—A.O.U. = American Ornithologists' Union; N.P. = National Park; N.S. = National Seashore; N.W.R. = National Wildlife Refuge; S.H.S. = State Historic Site; S.N.A. = State Natural Area; S.P. = State Park; TBSL = Texas Bird Sounds Library (Sam Houston State University); TCWC = Texas Cooperative Wildlife Collection (Texas A&M University); W.M.A. = Wildlife Management Area.

ACCEPTED RECORDS

Brant (*Branta bernicla*) (33). One in *Deaf Smith* on 11 December 1979 (**CB**; 2015-90; TPRF 3352).

Masked Duck (*Nomonyx dominicus*) (96). One near Indianola, *Calhoun* on 22 November 2015 (JHu; 2015-77; TPRF 3342).

Mangrove Cuckoo (*Coccyzus minor*) (14). One at Las Palomas W.M.A.—Arroyo Colorado Unit, *Cameron* on 18 June 2016 (**JL**, BrC; 2016-37; TPRF 3375).

Mexican Violetear (*Colibri thalassinus*) (81). One east of Briggs, *Burnet* on 21 May 2015 (**RKe**; 2015-45; TPRF 3314). One east of Canyon Lake, *Comal* on 25 May 2015 (**HM**; 2015-42; TPRF 3311). One at Inks Lake S.P., *Burnet* on 4 June 2015 (**VG**, RSh, JHo, TK; 2015-46; TPRF 3315). One at Davis Mountains Resort, *Jeff Davis* from 4–19 September 2015 (**KB**; 2015-61; TPRF 3328).

White-eared Hummingbird (*Hylocharis leucotis*) (38). Up to three at Davis Mountains Resort, *Jeff Davis* from 18 June–24 September 2015 (**KB**, COJ, MJo; 2015-50; TPRF 3319). One at Boot Canyon, Big Bend N.P., *Brewster* from 6 July–28 August 2015 (**RP**, SH; 2015-54; TPRF 3322). Up to three near Tobe Canyon, Davis Mountains Preserve, *Jeff Davis* from 24 July–16 August 2015 (**RKo**, JKa, EC, RP; 2015-58; TPRF 3325).

Spotted Rail (*Pardirallus maculatus*) (2). One at Victoria, *Victoria* on 17 October 2015 (CBr, TS; 2015-69; TPRF 3335).

Common Crane (*Grus grus*) (1). One to two at Muleshoe N.W.R. and environs, *Bailey/Lamb* from 18 November 2014–14 March 2015 (**JBo**, AT, EC, BP, RP, JO, GL, MRe, TFr, GF, AW; 2014-61; TPRF 3291). This represents the first documented record for Texas.

Collared Plover (*Charadrius collaris*) (3). One at Hargill Playa, *Hidalgo* from 21 July–19 October 2015 (DJ, MEs, BM, FB, RP, EC, DHa; 2015-55; TPRF 3323).

Northern Jacana (*Jacana spinosa*) (38). One at Estero Llano Grande S.P., *Hidalgo* from 19 September–2 November 2015 (**JY**, MEs, MDu, EC, RP, PSe, JO; 2015-63; TPRF 3330). Up to three at Santa Ana N.W.R., *Hidalgo* from 11 October 2015–13 March 2016 (**SK**, EC, LSt, AP, LK, LP, BP, BM, JHo; 2016-06; TPRF 3356).

Surfbird (C*alidris virgata*) (12). One at Goose Island, *Aransas* on 12 March 2016 (**JKe**, **KK**; 2016-20; TPRF 3365).

Ruff (*Calidris pugnax*) (38). One at Anahuac N.W.R., *Chambers* from 5–10 March 2015 (**DSh**, ER; 2015-21; TPRF 3302). One at Anahuac N.W.R., *Chambers* on 13 April 2016 (**RG**; 2016-27; TPRF 3369). One at Hornsby Bend, *Travis* from 8–11 May 2016 (**EC**, NM, AM; 2016-30; TPRF 3372).

Black-legged Kittiwake (*Rissa tridactyla)* (103). One east of High Island, *Galveston* on 21 April 2015 (**WE**, CE; 2015-51; TPRF 3320). One at Granger Lake, *Williamson* from 29 November–4 December 2015 (**TFe**, EC, SM, RKo; 2015-76; TPRF 3341). One at Lake Tawakoni Dam, *Rains* on 26 December 2015 (**GC**; 2015-86). One at Tres Palacios Bay, Palacios, *Matagorda* on 26 January 2016 (**PHo**; 2016-11).

Heermann's Gull (*Larus heermanni*) (4). One at Bolivar & Texas City Dike, *Galveston* from 25–31 March 2016 (**PSw**, EC, SH; 2016-22; TPRF 3366).

Mew Gull (*Larus canus*) (39). One at White Rock Lake, *Dallas* on 15 February 2015 (**GC**; 2015-48; TPRF 3317).

(Vega) Herring Gull (*Larus argentatus vegae*) (yy). One at Brownsville Landfill, *Cameron* from 7–27 February 2015 (**MRe**, **WS**; 2015-22; TPRF 3303).

Iceland Gull (*Larus glaucoides*) (7). One at Ash Lake/Cedar Bayou, *Chambers/Harris* from 30 December 2014–6 March 2015 (**CTL**, JBe, AW, DHa, RW, SL; 2014-75; TPRF 3294).

Great Black-backed Gull (*Larus marinus*) (57). One at Ash Lake/Cedar Bayou, *Chambers/Harris* from 14 December 2014–26 February 2015 (**CTL**, DHa; 2014-67; TPRF 3292). One at Ash Lake, *Chambers* from 20–30 December 2014 (**CTL**; 2014-69; TPRF 3293). One at Ash Lake/Cedar Bayou, *Chambers/Harris* from 3–6 February 2015 (**CTL**, RW; 2015-05; TPRF 3296). One at Quintana Jetty, *Brazoria* on 20 December 2015 (**JR**, **DSa**; 2015-84; TPRF 3348).

Brown Noddy (*Anous stolidus*) (21). Two offshore from Matagorda Island, Calhoun, *Calhoun* on 14 August 2015 (**PHo**; 2015-59; TPRF 3326).

Sooty Shearwater (*Ardenna griseus*) (19). One at South Padre Island jetty, *Cameron* on 26 June 2015 (**BM**; 2015-52; TPRF 3321).

Great Shearwater (*Ardenna gravis*) (21). One offshore of South Padre Island, *Cameron* on 29 August 2015 (**RP**, **EC**; 2015-62; TPRF 3329). One offshore near Hospital Rock, *Nueces* on 25 November 2015 (**JoM**; 2015-75; TPRF 3340).

Manx Shearwater (*Puffinus puffinus*) (9). One offshore of South Padre Island, *Cameron* on 10 October 2015 (**BM**, **RP**, **PSe**, **JFi**; 2015-68; TPRF 3334).

Wilson's Storm-Petrel (*Oceanites oceanicus*) (1). One 22 nautical miles offshore from Port O'Connor, *Calhoun* on 11 June 2015 (**PHo**; 2015-49; TPRF 3318). This represents the first documented record for Texas.

Leach's Storm-Petrel (*Oceanodroma leucorhoa*) (32). One offshore from South Padre Island, *Cameron* on 11 July 2015 (**DPe**, **BF**, **RP**; 2015-56; TPRF 3324). Sixty offshore from South Padre Island, *Cameron* on 29 August 2015 (**RP**, **EC**, **GH**, **DJ**, **EBr**, **CMi**, **BM**; 2015-60; TPRF 3327).

Brown Booby (*Sula leucogaster*) (60). Up to five at Baytown Nature Center, *Harris* from 14 September–16 November 2014 (MA, CMi, BSt, DS, CGa; 2014-51; TPRF 3287). One offshore and near South Padre Island jetty, *Cameron* from 25–26 October 2014 (**EC**, **PHo**, **RP**, **BM**, DJ; 2014-57; TPRF 3289). One 10 miles offshore from Port Aransas, *Nueces* on 30 April 2015 (**CMo**; 2015-39; TPRF 3308). One south of Lake O'The Pines, *Marion* on 9 May 2015 (**KO**; 2015-40; TPRF 3309). One at Texas City Dike, *Galveston* on 17 May 2015 (**PR**; 2015-41; TPRF 3310). One at Windy Point/Lake Travis, *Travis* from 9–26 December 2015 (**EBe**, TFe, RP, EC, BD; 2015-67; TPRF 3333). One at Smithers Lake, *Fort Bend* on 19 December 2015 (**MSc**; 2015-82; TPRF 3346). One at Texas City Dike, *Galveston* from 24–28 December 2015 (**KH**, JFa; 2015-88; TPRF 3350). One offshore southeast of Port Aransas, *Aransas* on 12 February 2016 (**BE**; 2016-21). One at Anahuac N.W.R., *Chambers* on 20 April 2016 (**ESt**, **ESm**; 2016-33; TPRF 3373). One west of Wimberley, *Hays* on 2 May 2016 (**MJa**, AM, CR; 2016-29; TPRF 3371). One at Chester Island, w. Matagorda Bay, *Matagorda* on 20 May 2016 (**BF**, **BB**; 2016-36; TPRF 3375).

Short-tailed Hawk (*Buteo brachyurus*) (46). One to two in the Chisos Mountains, Big Bend N.P., *Brewster* from 21 April–24 May 2015 (**TLu**, ML, FC, CC, MF, LT, PB, US, SFa; 2015-29; TPRF 3305). One at Boulder Meadows, Big Bend N.P., *Brewster* on 13 August 2015 (**EC**; 2015-89; TPRF

3351). One at Tobe Canyon, Davis Mountains Preserve, *Jeff Davis* on 14 August 2015 (**GC**, **BlC**; 2015-85).

Northern Pygmy-Owl (*Glaucidium gnoma*) (5). One at Pine Canyon, Big Bend N.P., *Brewster* from 2–31 May 2015 (**GL**, **MRo**, **LO**, SCa, CC, EC, ML, SFa; 2015-33; TPRF 3306).

Greater Pewee (*Contopus pertinax*) (28). One at Bear Creek Park, *Harris* from 31 August 2014–26 March 2015 (**DMu**, DWo, RP, TK; 2014-55; TPRF 3288). One at Anzalduas County Park, *Hidalgo* from 31 October 2015–10 February 2016 (MEs, MG, GVa, BrC; 2015-70; TPRF 3336). One at Lions/Shelly Park, *Refugio* from 27 November 2015–12 April 2016 (**GC**, PHo, EC, RKo, NB, RP, RSt, BSt; 2015-80; TPRF 3345).

Pacific-slope Flycatcher (*Empidonax difficilis*) (1). One at Sabal Palm Sanctuary, *Cameron* from 6 November 2015–7 April 2016 (**ID**, **DG**, BSt, PHo, EC, BM, DJ, RP, MC, GVa, BL, RSt; 2015-71; TPRF 3337). This represents the first documented record for Texas.

(Lawrence's) Dusky-capped Flycatcher (*Myiarchus tuberculifer lawrenceii*) (yy). One at Sabal Palm Sanctuary, *Cameron* from 29 December 2014–10 February 2015 (**MSu**, SS; 2015-07; TPRF 3297). One at Estero Llano Grande S.P., *Hidalgo* from 3–7 November 2015 (**SK**, **DJ**, **DPo**, BH; 2016-03; TPRF 3354). One at Bentsen S.P., *Hidalgo* on 10 November 2015 (**MM**, DF; 2015-72; TPRF 3338).

Sulphur-bellied Flycatcher (*Myiodynastes luteiventris*) (27). One at Sabine Woods, *Jefferson* on 1 October 2015 (**JHa**; 2015-66).

Piratic Flycatcher (*Legatus leucophaius*) (6). One near Barker Reservoir, Houston, *Harris* on 26 September 2015 (**KS**; 2015-64; TPRF 3331).

Rose-throated Becard (*Pachyramphus aglaiae*) (55). One at Alamo, *Hidalgo* on 20 January 2016 (**PP**; 2016-08). One at Arroyo Colorado Unit, Las Palomas W.M.A., *Cameron* on 8 March 2016 (**RSn**; 2016-19; TPRF 3364).

Black-whiskered Vireo (*Vireo altiloquus*) (38). One at Hooks Woods, High Island, *Galveston* on 17 April 2016 (**AG**, **EI**; 2016-26; TPRF 3368).

White-throated Thrush (*Turdus assimilis*) (18). One at Estero Llano Grande S.P., *Hidalgo* from 6–20 February 2015 (SS, AW, DHo, JCo; 2015-13; TPRF 3300). One at Estero Llano Grande S.P., *Hidalgo* from 5–9 February 2016 (MEs, DJ, JDe, LSo; 2016-12; TPRF 3360). One at Bentsen S.P., *Hidalgo* from 6–16 February 2016 (**JCu**, MG, JS, AM; 2016-14; TPRF 3361). One at Harlingen, *Cameron* on 15 February 2016 (**DMc**; 2016-16; TPRF 3363).

Rufous-backed Robin (*Turdus rufopalliatus*) (22). One at El Paso, *El Paso* from 3–20 November 2014 (JP, SCu, MHo, JK; 2014-58; TPRF 3290). One at Rincon del Diablo, Del Rio, *Val Verde* from 22–26 December 2015 (KGl, WS; 2015-83; TPRF 3347).

Common Redpoll (*Acanthis flammea*) (16). One at Plainview, *Hale* on 20 November 2015 (**N.P.**; 2015-73; TPRF 3339). One at Nacogdoches, *Nacogdoches* from 10 January–1 February 2016 (**TD**, **JDa**, SO, EC, SH, AW, ET; 2016-07; TPRF 3357).

Evening Grosbeak (*Coccothraustes vespertinus*) (18). One at Lubbock Cemetery, *Lubbock* on 30 November 2014 (**MG**; 2015-09). One at Big Bend N.P., *Brewster* from 11 April–7 May 2015 (**MB**, ML, TK; 2015-27; TPRF 3304). One northeast of Fort Davis, *Jeff Davis* on 12 April 2015 (**TLa**; 2015-43; TPRF 3312). One at Davis Mountains Resort, *Jeff Davis* from 24–27 April 2015 (**MEa**, **ME**; 2015-36; TPRF 3307). One at Davis Mountains Resort, *Jeff Davis* on 29 April 2015 (**KGo**; 2015-44; TPRF 3313).

Gray-crowned Yellowthroat (*Geothlypis poliocephala*) (46). One at Estero Llano Grande S.P., *Hidalgo* from 24 January–16 March 2015 (**HH**, MEs, WS, AW, AC, MDu; 2015-08; TPRF 3298).

Rufous-capped Warbler (*Basileuterus rufifrons*) (33). One at Lost Maples S.N.A., *Bandera* from 27 September–19 October 2015 (**MHe**, EC, SFr, CG; 2015-65; TPRF 3332). One at Love Creek Preserve, *Bandera* from 7 December 2015–1 February 2016 (**MH**, **RR**; 2015-79; TPRF 3344). One at Dolan Falls Preserve, *Val Verde* on 13 January 2016 (**RSm**; 2016-15; TPRF 3362).

Golden-crowned Warbler (*Basileuterus culicivorus*) (23). One at Lions/Shelly Park, *Refugio* from 5 December 2015–15 February 2016 (**WS**, TO, AW, BP; 2015-78; TPRF 3343).

Slate-throated Redstart (*Myioborus miniatus*) (14). One at Elbow Canyon, Davis Mountains Preserve, *Jeff Davis* from 26 May–6 June 2015 (**SFa**, **RKo**, ML; 2015-47; TPRF 3316). One at Elephant Mountain W.M.A., *Brewster* on 2 May 2016 (**GVo**; 2016-41; TPRF 3376; TCWC#23757).

Golden-crowned Sparrow (*Zonotrichia atricapilla*) (39). One at Palo Duro Canyon, *Randall* from 31 March–18 April 2016 (**MHa**, BP; 2016-23; TPRF 3367).

Yellow-eyed Junco (*Junco phaeonotus*) (8). One at Lost Mines, Big Bend N.P., *Brewster* on 2 March 2015 (**PC**; 2015-25).

Flame-colored Tanager (*Piranga bidentata*) (13). One at Lions/Shelly Park, *Refugio* from 11 January–31 March 2016 (**SFa**, PHo, WS, OD, YL, RKo, AM, AO, FB, MDe, BP; 2016-04; TPRF 3355). One at Chisos Basin, Big Bend N.P., *Brewster* on 29 April 2016 (**MF**, KT, HFe; 2016-28; TPRF 3370).

Crimson-collared Grosbeak (*Rhodothraupis celaeno*) (40). One to two at McAllen Nature Center, *Hidalgo* from 25–28 November 2015 (**JBr**, SH; 2015-74). One at Alamo, *Hidalgo* from 26–27 December 2015 (**PHe**, MBS, DPa; 2015-87; TPRF 3349). One at Frontera Audubon, *Hidalgo* from 29 December 2015–23 April 2016 (**AP**, DJ, GVa, EC, MDu; 2016-01; TPRF 3353). One at Laguna Atascosa N.W.R., *Cameron* from 25 January–25 April 2016 (**LD**, MEs, GVa, DJ, BM, ALa; 2016-09; TPRF 3358).

Blue Bunting (*Cyanocompsa parellina*) (49). One at Laguna Atascosa N.W.R., *Cameron* from 24 January–7 March 2015 (**DK**, HS, MEs; 2015-10; TPRF 3299). One at Bentsen S.P., *Hidalgo* from 4–6 March 2015 (**JMS**, CLy, GE; 2015-19; TPRF 3301). One at Frontera Audubon, *Hidalgo* from 31 January–13 April 2016 (**SB**, **JL**, JMS, MEs, DJ, EC, BP, BM, CyB, ALi; 2016-10; TPRF 3359).

Black-vented Oriole (*Icterus wagleri*) (10). One near West Columbia, *Brazoria* from 1 December 2014–3 March 2015 (AW, MSc, RW; 2015-02; TPRF 3295).

NOT ACCEPTED

A number of factors may contribute to a record being denied acceptance. It is quite uncommon for a record to not be accepted due to a bird being obviously misidentified. More commonly, a record is not accepted because the material submitted was incomplete, insufficient, superficial, or just too vague to properly document the reported occurrence while eliminating all other similar species. Also, written documentation or descriptions prepared entirely from memory weeks, months, or years after a sighting are seldom voted on favorably. It is important that the simple act of not accepting a particular record should by no means indicate that the TBRC or any of its members feel the record did not occur as reported. The non-acceptance of any record simply reflects the opinion of the TBRC that the documentation, as submitted, did not meet the rigorous standards appropriate for adding data to the formal historical record. The TBRC makes every effort to be as fair and objective as possible regarding each record. If the committee is unsure about any particular record, it prefers to err on the conservative side and not accept a good record rather than validate a bad one. All records, whether accepted or not, remain on file and can be resubmitted to the committee if additional substantive material is presented.

White-cheeked Pintail (*Anas bahamensis*). One at Temple, Bell from 7 June–17 July 2008 (2015-20). One at Mad Island W.M.A., *Matagorda* from 26 April–3 May 2014 (2014-23).

Western Gull (*Larus occidentalis*). One at Balmorhea Lake, *Reeves* on 23 April 2015 (2015-37).

Brown Booby (*Sula leucogaster*). One 10 miles offshore from Port Aransas, *Nueces* on 13 June 2015 (2015-53).

Greater Pewee (*Contopus pertinax*). One at Davis Mountains Preserve, *Jeff Davis* on 24 July 2015 (2015-57).

Dusky-capped Flycatcher (*Myiarchus tuberculifer*). One at Resaca de la Palma S.P., *Cameron* on 30 January 2015 (2015-12).

Connecticut Warbler (*Oporornis agilis*). One at Santa Ana N.W.R., *Hidalgo* on 27 December 2014 (2016-02).

Striped Sparrow (*Oriturus superciliosus*). One east of Granger Lake, *Williamson* from 11 January–7 April 2015 (2015-04).

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REVIEW LIST A—RARITIES

These species, in general, include birds that have occurred four or fewer times per year anywhere in Texas over a ten-year average. The TBRC requests documentation for review for any new or any previously unsubmitted record of the below species no matter how long ago the record occurred. The TBRC also requests details on any record of a species not yet accepted on the Texas State List (see Species not yet documented for Texas. http://www.texasbirdrecordscommittee.org/home/texas-review-list/species-not-yet-documented)

NOTE: the numbers in parentheses that follow each species name indicate the number of accepted records as of *September 29, 2017*. An asterisk after the number - e.g. "(14*)" - indicates that there are one or more records of known/presumed returning birds which may be counted more than once in the total (if they were allocated separate TBRC record numbers). *Note*: for formerly non-Review species added to the Review list (e.g. Tamaulipas Crow), pre-Review data may not exist, thus only records since inclusion on the TBRC list are accumulated (marked with "#").

Swans, Geese, and Ducks
- Brant (34)
- Trumpeter Swan (13)
- Garganey (4)
- Eurasian Wigeon (55)
- American Black Duck (9)
- White-cheeked Pintail (1)
- King Eider (2)
- Common Eider (1)
- Harlequin Duck (2)
- Barrow's Goldeneye (10*)
- Masked Duck (96)

Flamingos
- American Flamingo (8)

Grebes
- Red-necked Grebe (29)

Pigeons and Doves
- Ruddy Ground-Dove (22)
- Ruddy Quail-Dove (1)

Cuckoos, Roadrunners, and Anis
- Dark-billed Cuckoo (1)
- Mangrove Cuckoo (14)

Swifts
- White-collared Swift (6)

Hummingbirds
- Mexican Violetear (84)
- Green-breasted Mango (20)
- Amethyst-throated Hummingbird (1)
- Costa's Hummingbird (39)
- Berylline Hummingbird (5)
- Violet-crowned Hummingbird (19)
- White-eared Hummingbird (40)
- Rails, Gallinules, and Coots
- Paint-billed Crake (1)
- Spotted Rail (2)

Cranes
- Common Crane (2*)

Thick-knees
- Double-striped Thick-knee (1)

Plovers and Lapwings
- Pacific Golden-Plover (1)
- Collared Plover (3*)

Jacanas
- Northern Jacana (41*)

Sandpipers and Phalaropes
- Eskimo Curlew (19)
- Bar-tailed Godwit (1)
- Black-tailed Godwit (1)
- Surfbird (12)
- Ruff (38*)
- Sharp-tailed Sandpiper (3)
- Curlew Sandpiper (12)
- Red-necked Stint (2)
- Purple Sandpiper (26)
- Wandering Tattler (1)
- Spotted Redshank (1)
- Red Phalarope (47)

Skuas, Gulls, Terns, and Skimmers
- South Polar Skua (1)
- Long-tailed Jaeger (25)
- Black-legged Kittiwake (re-added to the Review List July 2005; 104 incl. prior recs)
- Black-headed Gull (27*)
- Black-tailed Gull (2)
- Heermann's Gull (4)
- Mew Gull (40)
- Western Gull (3)
- Yellow-legged Gull (2)

Slaty-backed Gull (7)
Glaucous-winged Gull (1)
Great Black-backed Gull (59*)
Kelp Gull (5*)
Brown Noddy (21)
Black Noddy (4)
Brown/Black Noddy (1)
Roseate Tern (2)
Arctic Tern (9)
Elegant Tern (6)

Tropicbirds
White-tailed Tropicbird (1)
Red-billed Tropicbird (14)

Loons
Yellow-billed Loon (6)

Albatrosses
Yellow-nosed Albatross (4)

Shearwaters and Petrels
Black-capped Petrel (3)
Stejneger's Petrel(1)
White-chinned Petrel (1)
Sooty Shearwater (20) *Sight or photo records of Sooty or Short-tailed Shearwaters are difficult to positively identify. The TBRC has voted to label all such records as Sooty Shearwater and acknowledges that Short-tailed Shearwaters are a remote possibility, based on one Gulf of Mexico record and one from the south Atlantic as of 2012.*
Great Shearwater (23)
Manx Shearwater (9)

Storm-Petrels
Wilson's Storm-Petrel (1)
Leach's Storm-Petrel (35)

Storks
Jabiru (12)

Boobies and Gannets
Blue-footed Booby (2)
Red-footed Booby (3)

Herons
Bare-throated Tiger-Heron (1)

Kites, Hawks, Eagles, and Harriers
Snail Kite (4)
Double-toothed Kite (1)
Northern Goshawk (25)
Crane Hawk (1)
Roadside Hawk (9)
Short-tailed Hawk (50)

Typical Owls
Snowy Owl (7)
Northern Pygmy-Owl (5)
Mottled Owl (2)
Stygian Owl (2)
Northern Saw-whet Owl (32)

Trogons
Elegant Trogon (6)

Kingfishers
Amazon Kingfisher (3)

Woodpeckers
Red-breasted Sapsucker (3)
Ivory-billed Woodpecker (3)
Caracaras and Falcons
Collared Forest-Falcon (1)
Gyrfalcon (1)
Antshrikes and Antwrens
Barred Antshrike (1)

Tyrant Flycatchers
Greenish Elaenia (1)
White-crested Elaenia (1)
Tufted Flycatcher (5)
Greater Pewee (28*)
Pacific-slope Flycatcher (1)
Buff-breasted Flycatcher (28)
Nutting's Flycatcher (1)
Social Flycatcher (3)
Sulphur-bellied Flycatcher (30*)
Sulphur-bellied/Streaked Flycatcher (1)
Piratic Flycatcher (6)
Variegated Flycatcher (1)
Piratic/Variegated Flycatcher (1)
Thick-billed Kingbird (18)
Gray Kingbird (12)
Fork-tailed Flycatcher (29)

Tityras and Becards
Masked Tityra (1)
Rose-throated Becard (57*)

Vireos
Black-whiskered Vireo (39)
Yucatan Vireo (1)

Jays, Magpies, and Crows
Brown Jay (added to Review List July 2007) (#5)
Pinyon Jay (added to Review List March 2011) (#2)
Clark's Nutcracker (23)
Black-billed Magpie (5)
Tamaulipas Crow (added to Review List Nov 2000) (#9)

Swallows
Gray-breasted Martin (2)

Chickadees and Titmice
- Black-capped Chickadee (1)

Dippers
- American Dipper (9)

Old World Warblers, Flycatchers, and Thrushes
- Northern Wheatear (2)
- Orange-billed Nightingale-Thrush (2)
- Black-headed Nightingale-Thrush (1)
- White-throated Thrush (19)
- Rufous-backed Robin (23)
- Varied Thrush (46)
- Aztec Thrush (6)

Mockingbirds and Thrashers
- Blue Mockingbird (3)
- Black Catbird (1)

Waxwings
- Bohemian Waxwing (17)

Silky-flycatchers
- Gray Silky-flycatcher (2)
- Olive Warbler
- Olive Warbler (8)

Northern Finches
- Evening Grosbeak (added to Review List Sept 2008) (#18)
- Pine Grosbeak (6)
- Gray-crowned Rosy-Finch (1)
- Common Redpoll (16)
- White-winged Crossbill (9)
- Lawrence's Goldfinch (19)

Longspurs and allies
- Snow Bunting (8)

Sparrows, Blackbirds, Wood Warblers, Cardinals, and "Tanagers"
- Golden-crowned Sparrow (39*)
- Yellow-eyed Junco (8)
- Black-vented Oriole (10*)
- Streak-backed Oriole (2)
- Shiny Cowbird (12)
- Connecticut Warbler (12)
- Gray-crowned Yellowthroat (46)
- Fan-tailed Warbler (1)
- Rufous-capped Warbler (34*)
- Golden-crowned Warbler (24*)
- Slate-throated Redstart (14)
- Flame-colored Tanager (13)
- Crimson-collared Grosbeak (41)
- Blue Bunting (50)
- Red-legged Honeycreeper (1)
- Yellow-faced Grassquit (4)

REVIEW LIST B

List of recognizable subspecies which, if they were elevated to full species status, would qualify for placement under Review List A: Reports of these subspecies will always be solicited and formally reviewed. Eight such subspecies have been accepted:

- *Green-winged ("Eurasian") Teal (1)*
- *Whimbrel ("Eurasian") (1)*
- *Herring ("Vega") Gull (5)*
- *Dusky-capped ("Lawrence's") Flycatcher (17)*
- *Swainson's ("Russet-backed") Thrush (2)*
- *Orchard ("Fuertes's") Oriole (2)*
- *Fox ("Slate-colored") Sparrow (1)*
- *Dark-eyed ("White-winged") Junco (7)*

PRESUMPTIVE LIST

The following is the official TBRC list of species for which written descriptions have been accepted by the TBRC but the species has not yet met the requirements for full acceptance on the Texas List (specimen, photo, video, or audio recording identifiable to species for at least one record). NOTE: any species marked "*" below has recent records in circulation that include identifying photographs, and will be elevated to Review List A when(if) those records are formally accepted.

- *White-crowned Pigeon (1)*
- *Black Swift (1)*
- *Murre species (1)*
- *Razorbill (1)*
- *Crescent-chested Warbler (1)*

FULVOUS X BLACK−BELLIED WHISTLING−DUCK HYBRID… A PHOTOGRAPHIC RECORD

Daniel Jones[1]

351 Moon Lake, Progreso Lakes, TX 78596

Hybridization between different species of birds, though rare, has been documented for many species. In particular, members of the family Anatidae are well known for their tendency to cross, sometimes even between different genera. With their unusual often colorful plumage, hybrid ducks are always a favorite of bird watchers and duck hunters alike and thus are often documented by photograph or mounted as trophies.

One hybrid paring that has not been documented in nature is the Fulvous Whistling-Duck (*Dendrocygna bicolor*) crossed with Black-bellied Whistling-Duck (*Dendrocygna autumnalis*) (McCarthy, 2006). This is despite the fact that both species are very common and are sympatric throughout much of their range in subtropical and tropical America (Johnsgard, 2010). In addition, they share similar habitat preferences and are similarly structured with long legs and necks. They even have somewhat similar calls. For the past ten years the author has annually observed both species breeding and raising young at the effluent pond for the sugar refinery located in eastern Hidalgo County, Texas

OBSERVATION AND DESCRIPTION

On Dec. 28, 2016 the author sighted an unusual whistling-duck on Moon Lake, Progreso Lakes, Hidalgo County, Texas . Moon Lake is a former oxbow of the Rio Grande River and is bordered by native brush and residential housing. The unusual duck was in the company of Black-bellied Whistling-Ducks and superficially appeared to be a Fulvous Whistling-Duck. The body was somewhat colored like a Fulvous Whistling-Duck, but was more of a richer red-brown. The back was a dark brown with the anterior feathers lightly scaled with chestnut blending into the reddish brown that ran around the back and sides of the breast as opposed to the bold fulvous anterior dorsal scaling of the Fulvous Whistling-Duck. The gray streaking normally present of the neck of the Fulvous Whistling-Duck was faint. The rump and under tail coverts were white with black rectrices as would be in Fulvous Whistling-Duck but some of the rump feathers were black edged. The white side plumes of the Fulvous were present but reduced. The sides of the face were a pale grayish-brown contrasting with a dark brown vertical stripe running up the back of the neck and onto the crown as would be expected in the Black-bellied Whistling-Duck The face also contrasted with the reddish-fulvous coloring of the body. The face and body are the same fulvous color on Fulvous Whistling-Duck. A faint pale eye ring was present on the pale face as in the Black-bellied Whistling-Duck and the gray bill had a pinkish base. Upon seeing the pale face, eye ring and pink based bill, the author surmised he was observing a Fulvous Whistling-Duck X Black-bellied Whistling-Duck hybrid.

The following day the bird was observed in flight and black under wings were noted. The upper surface of the flight feathers and coverts were black with the lesser coverts being chestnut in color. The feet and legs were a pinkish gray. The bird was observed several more times during the next two months with the last observation being on 2/25/17.

DISCUSSION

Eight species have been described within the genus *Dendrocygna*, with representatives ranging in tropical and subtropical parts North and South America, the Caribbean, Africa, Australia, and Southeast Asia (Johnsgard, 2010). All species share a similar body shape with long legs and neck and superficially similar whistling calls. All

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are highly social, occurring in large flocks during the non-breeding season. According to McCarthy (2006), various combinations of these eight species have crossed in captivity but there are no records of natural hybridization (McCarthy cites a record of the allopatric species *D. bicolor* and *D. eytoni* having naturally crossed but this must be in error). In the Rio Grande Valley of south Texas, Black-bellied Whistling-Ducks and Fulvous Whistling-Ducks are common breeders and a naturally occurring hybrid between the two would not be unexpected.

In the case of the observed duck at Progreso Lakes, Black-bellied Whistling-Duck must be in the parental lineage because of the pale face with eye ring, the pinkish tone to the bill and legs and reddish brown aspect of the plumage. No other whistling-duck has an eye ring and all the other species within the genus have gray or black legs and bill. As for the other parent, only the locally native Fulvous Whistling-Duck shares the black under wing and white rump with black rectrices. As many of the members *Dendrocygna* are kept in captivity, it is possible for that one of the other six members of the genus could be in the parental lineage. However they all possess characteristics that are lacking in this observed duck such as the rufous upper tail coverts of Lesser Whistling-Duck (*D. javanica*), the white facial pattern of White-faced Whistling-Duck (*D. viduata*), the long side plumes and black feather edging of Plumed Whistling-Duck (*D. eytoni*), the spotted sides of Spotted Whistling-Duck (*D. guttata*) and West Indian Whistling-Duck (*D. arborea*) or the speckled breast and black bill and legs of Wandering Whistling-Duck (*D. arcuata*). Hybridization involving another genus is not indicated by the physical features of the observed bird nor would be expected considering the unique physical features and behavior of members of *Dendrocygna*.

CONCLUSION

The observed duck at Progreso Lakes must be a hybrid of Fulvous Whistling-Duck and Black-bellied Whistling-Duck. Given the preponderance of *D. bicolor* characteristics the bird could be a hybrid of the two species back-crossed with the Fulvous Whistling-Duck.

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Flight photo of the hybrid duck showing dark under wings, reddish-fulvous coloration of under parts and pinkish-gray legs and feet.

Hybrid showing faintly scalloped scapulars, rudimentary side plumes and pink based bill.

AN UNUSUAL NORTHERN CARDINAL NEST SITE

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Northern Cardinals (*Cardinalis cardinalis*) typically nest in concealed foliage; the nest not attached to vegetation but wedged into position, usually in shrubs or small trees often in thick tangles of vines (Halkin and Linville 1990, 1999). On 2 April 2017, I found such a nest (Fig. 1) in a large Japanese honeysuckle vine (*Lonicera japonica*) on top of a southern wax-myrtle shrub (*Myrica cerifera*) at a height of 1.2 m (Fig. 2) located at 11780 S. Hill Creek Road, Whitehouse, Texas (32°14'23.93"N; 95°13'00.68"W). Two eggs were laid, but were eaten (3 April) by a juvenile Texas Ratsnake (*Pantherophis [Elaphe] obsoletus*). Ratsnake nest predation in common at this location, particularly in early spring when the snakes are seeking food after hibernation.

The pair of birds remained in the vicinity; and, I sought to locate a second nest site. It was found 10 May, but was in a highly unusual exposed site (Fig 3). It was wedged between the hinged door and wires of an open television satellite junction box located beneath the building roof (17.1 m from the

Figure 1. Typical nest site of Northern Cardinals in a vine on top of a shrub.

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Figure 2. The vine-covered shrub containing the Northern Cardinal nest (inside upper right area of vegetation).

Figure 3. Atypical nest site of Northern Cardinals in a television satellite junction box.

Figure 4. Nest site locations of both Northern Cardinal nests (right, first nest in shrub; left, second nest below building roof in the television satellite junction box).

site of the original nest, Fig. 4). The nest was 2.1 m above the ground, 16 cm from the top of the junction box, and 17 cm from the brick wall. A clutch of 2 eggs was laid and incubation began; but, during the night of 18 May, strong winds from an associated nighttime thunderstorm caused the hinged lid of the junction box to swing thus causing the nest to tilt enough that one of the eggs fell to the grass below but remained unbroken. In the morning, to test the bird's response, I straightened and anchored the nest and replaced the egg; but, the nest was abandoned and both eggs disappeared on 20 May apparently, again, as a result of ratsnake predation.

On 28 June I found a third cardinal nest 2.01 m high in a sapling winged elm (*Ulmus alata*) at the edge of the adjacent tree line 13.9 m from the first nest. The nest contained one egg; then, two additional eggs were laid on 29 and 30 June. On 1 July, one of the eggs disappeared; but, incubation continued until 9 July when the remaining two eggs disappeared. Between late March and late May, 3 juvenile ratsnakes were seen in the vicinity. So, I assume that the clutch in the third nest was also eaten by ratsnakes.

Northern Cardinal nests are highly variable in size and composition, some being 6 times the volume of the smallest (Halkin and Linville 1990, 1999). In structure, they range from compact and well-lined to flimsy and scarcely-lined (Bent 1968). In composition, there is a wide range of materials. The three nests I observed were similar. The first was composed of small pliable twigs, bark strips, a piece of clear cellophane, and lined with leaves; the second was composed of small pliable twigs, small vine stems with tendrils, leaves, a piece of clear cellophane, bark strips, and lined with grass stems; and, the third was composed of pliable twigs, bark strips, leaves, and lined with grass stems. Nest measurements were: width (15 x 16, 13 x 14 cm, and 13 x 13 cm), outer depth (6, 10, and 7 cm); cup width (8, 8, and 7 cm); and cup depth (4, 4, and 5 cm). The greater outer depth of the second nest related to the vertical position of the junction box lid and wires which required more nest material to anchor the nest.

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CACTUS WREN NEST CHARACTERISTICS IN SOUTH TEXAS

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The Cactus Wren (*Campylorhynchus brunneicapillus*) is a resident of the western portion of Texas and is common in the deserts of the southwestern United States to central Mexico (Ricklefs and Hainsworth 1968, Anderson and Anderson 1973). They are known to occupy very dry habitats generally dominated by cacti as their name suggests. Nest building and placement by Cactus Wrens has been well documented in Arizona from the 1920s through the 1980s (Bailey 1922, Anderson and Anderson 1957, Austin 1973, Facemire et al. 1990). However, Cactus Wren behavior in Texas and the rest of their range (Marr and Raitt 1983) has not been a focus of recent literature. Considering the arid landscape of South Texas is prime habitat for this species, this warrants additional focus on the Cactus Wren.

This note shares documentation of three Cactus Wren nests found on the East Foundation's San Antonio Viejo Ranch. The ranch is located W of Hebbronville and N of Guerra within Jim Hogg and Starr Counties. The nests described here are assumed to be roosting nests based on the time of the year they were observed being constructed. A roosting nest for this species is a nightly dwelling for an individual during the non-breeding season. Nest placement by the Cactus Wren can be problematic because it involves the consideration of various factors that may affect their present and future status. A Cactus Wren must avoid impaling itself on the protective thorns of the plants in which it chooses to create its nest, yet place the nest in an accessible area that is well protected from predators and weather.

During non-breeding bird surveys on 04 November 2016 at 0800 CST, sightings of three Cactus Wrens prompted us to observe as one was in the process of constructing a nest. This individual was carrying dried grass to the nest seen in Figure 1. Since 2010, these surveys have never captured such active Cactus Wrens (more than 20 recorded that day), particularly for the month of November in which they are considered dormant or inactive (Anderson and Anderson 1957). This individual was in the process of building a roosting nest in a prickly pear cactus (*Opuntia engelmannii*) surrounded by Texas persimmon (*Diospyros texana*) to the N, and tasajillo (*Cylindropuntia leptocaulis*), honey mesquite (*Prosopis glandulosa*), and Spanish dagger (*Yucca treculeana*) to the S. The nest, globular in shape (Figs. 1-2), had an entrance approximately 4 cm in diameter facing E and was approximately 30.5 cm long, 23 cm wide, 18 cm high, and 1.42 m from the ground.

Nest size and shape agreed with previous literature from Arizona (Bailey 1922, Anderson and Anderson 1957) and placement appears to be similar, as well, with nest locations documented in vegetation of the same family Cactaceae. However, we noted differences in the placement choice and lifespan of the nests surrounded by the structural diversity of vegetation, particularly those with thorns, in comparison to those that were placed in similar vegetation but with little to no protection

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Figure 1. Front view of Cactus Wren nest placed in prickly pear cactus surrounded by Texas persimmon, tasajillo, honey mesquite, and Spanish dagger.

from surrounding vegetation. A second nest, 178 m N from the nest of Figure 1, was noted the same day and found a month later (12 December 2016) partially destroyed exposing the interior of the nest which contained down feathers (Fig. 3). The exterior of the nest was primarily made of lovegrass (*Eragrostis* spp.), similar to others observed on this ranch. This second nest was placed in prickly pear but not surrounded by any protective vegetation. The nearest vegetation was a small tasajillo about 0.5 m to the SW of the prickly pear in which the nest was placed (Fig. 4). Again, the entrance was facing E, and the nest was approximately 20 cm long, 14 cm wide, 13 cm high, and 1.4 m from the ground. Because the nest was placed in a location with very little protection, it is possible that inclement weather received at the ranch in the month prior to these observations may have torn the nest open. A predator or competitor, such as the Curve-billed or Long-billed Thrasher (*Toxostoma curvirostre* and *Toxostoma longirostre*, respectively), both residents of the ranch, may have also taken advantage of easily accessible nest materials (Anderson and Anderson 1957).

Figure 2. Side view of Cactus Wren nest placed in prickly pear cactus.

Figure 3. Entrance to destroyed Cactus Wren nest lined with down feathers. Missing top portion can be seen in photo as this nest was placed in a prickly pear cactus that lacked surrounding protective vegetation.

Figure 4. Destroyed Cactus Wren nest in prickly pear cactus.

Figure 5. Cactus Wren nest placed in honey mesquite surrounded by tasajillo, granjeno, honey mesquite, and lime prickly ash.

A third nest was found 34 m E of the second nest and was wedged between the branches of a honey mesquite (Fig. 5). It was surrounded by tasajillo to the E and granjeno (*Celtis pallida*), honey mesquite, and lime prickly ash (*Zanthoxylum fagara*) to the S. The entrance to this nest was placed facing NW and was approximately 38 cm long, 13 cm wide, 13 cm high, and 1.4 m off of the ground. Considering the different entrance direction and vegetation use, the nest appeared to remain intact and possibly still in use based on changes in its appearance (i.e., fresh grass added to entrance and back of nest). Other Cactus Wren nests were observed throughout our surveys, all placed within the same vegetation community types with the exception of one within lime prickly ash. A majority of nests noted on this ranch were placed in prickly pear cactus of genus *Opuntia*, different from Zimmerman (1957) who did not observe any nests of the Yucatán Cactus Wren (*C. yucatanicus*) in *Opuntia* spp. and Anderson and Anderson (1957) and Facemire et al. (1990) who report cholla cactus (i.e., tasajillo) of genus *Cylindropuntia* (formerly *Opuntia*, Pinkava 1999) as primary nest locations–vegetation available in South Texas but not selected for primary nest placement on this ranch based on our observations.

The nests we observed show similarity between Cactus Wren behavior in South Texas and other locations within its range. Although habitat and environmental conditions may be slightly different from one location to another, Cactus Wrens appear to maintain a comparable routine as far as nest placement and vegetation selection based on our observations reported here. It appears that nests surrounded by high amounts of thorny vegetation have prolonged life and sustained usage because of the protection the vegetation provides. While nest descriptions appear to be similar to existing literature, there may be other aspects of Cactus Wren behavior (e.g., mate selection, territories, diet) worth investigating in other parts of its range. The burst of activity and abundance observed here is uncommon during the winter and calls for more attention to the species.

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EDGAR BYRAN KINCAID, JR. AKA CASSOWARY "FATHER OF TEXAS BIRDING"

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Edgar Bryan Kincaid, Jr. ornithologist, was born in San Antonio, Texas, on 30 December 1921, the son of Edgar Bryan and Lucille (McKee) Kincaid. He grew up on the family's ranch in Uvalde County and moved to Austin in 1939 to live with his aunt and uncle, Bertha McKee and J. Frank Dobie, a famous Texas folklorist. Kincaid studied zoology, botany, and history at the University of Texas and graduated in 1943 with a bachelors degree in Botany.

According to Winkler (1986) he loved to tell the story of how, at about age six, he first laid eyes on a meadowlark on the cover of Burgess *Bird Book for Children* in a Joske's department store in San Antonio, and how he begged his mother (he claimed he threw a tantrum) to buy it for him. Ultimately it would be the first in a collection that grew to more than 1,000 volumes, now housed at Texas A&M University. Subsequently, yellow (the shade of the meadowlark's breast) was his favorite color. He displayed it often in the form of stocking caps, neckties, and socks. Also according to Suzanne Winckler (2008)

"He was a lonely prophet, forecasting the decline of many bird species well before academically trained ornithologists would amass the data to prove his point. Many of his predictions can be read in *The Bird Life of Texas*, published in 1974 by the University of Texas Press. The treatise, originally written by Henry Church Oberholser in the early 20th century, was edited over a 14-year period by Kincaid and various helpers, of whom [Susan Winckler] was one. Because he foresaw a

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world with ever more people and fewer birds, he was not what you would call a happy person. A tall, stooped man whose craggy features made him appear much older than his years, Kincaid seemed to bear the burden of the biologically compromised planet on his shoulders. Gloom notwithstanding, Kincaid possessed a zany wit and a madcap sense of adventure, which explains why so many young disciple-birders swarmed to him. He was the antithesis of normal. While he became increasingly reluctant to travel in later years, in the 1950s, '60s and '70s, he roamed the byways of Texas and Mexico, chronicling birds in their habitats, and to be in his entourage on these outings was a gift beyond measure."

Edgar Kincaid (left) and Rod Rylander (right) during the 1957 Texas Ornithological Society meeting in Austin.

Without doubt the single greatest contribution of Edgar Kincaid was the eleven years he spent editing Henry Church Oberholser's *Bird Life of Texas*. The history of the book was detailed in Casto (2013). After six decades of work the BLOT manuscript had grown to 11,754 typewritten pages. According to Casto if the pages were laid end to end they would extend over two miles! Despite numerous promises and proposals over the years on Christmas Day, 1963 Obserholser passed away in Cleveland, Ohio leaving the book unpublished.

Kincaid and a group of associates (chiefly Ruth Black, Bertha McKee Dobie, Carolyn Sue Coker, Victor L. Emanuel, Frances Gillotti, Anne LeSassier, G.F. Oatman Jr., J.L. Rowlett, Rose Ann Rowlett

The Bird Life of Texas

and Dan Scurlock) not only edited the existing manuscript but drove, alone or in parties, some 400,000 miles in the 243 underbirded counties, gathering records to fill in the blank spaces in the maps! In addition to this new information Kincaid added a "changes" section detailing species that "have historically or recently undergone major changes in status or distribution" (Winckler 2008). This change section often had a gloomy, negative overtone reflecting Kincaid's overall feelings about man's impact on the environment. Close friend and UT philosophy professor Charles Hartshorne remembered in his memoir one of Kincaid's great quotes: "The two strongest forces in the universe are the condensation of things you don't want and the evaporation of things you do want" (Thomas 2016).

Still too voluminous to publish the 300 plus pages of the a "gazetteer" were eliminated and the bibliography reduced from 572 pages to 30! The resulting book, in two volumes, was a trim 1069 pages. Finally, published in 1974 by the University of Texas Press the BLOT provides a historical record of the distribution and status of Texas birds.

In addition to his editing The Bird Life of Texas, Kincaid published three papers in ornithological journals. The first on a Ringed Kingfisher sighted at Barton Springs, Zilker Park in Austin (Kincaid 1956). The second, with R. Pasil, on a Cave Swallow

Edgar Kincaid's tombstone at Mission Burial Park South, San Antonio, Texas.

colony in New Mexico's Goat Cave, about eight miles southwest of the entrance to Carlsbad Caverns, Eddy' County, New Mexico. A survey by Kincaid in the summer of 1953 indicated that the closest cave used by Cave Swallows is approximately 293 miles away in southwestern Edwards County in central Texas (Kincaid and Prasil 1956). In the third paper Kincaid (1962) observed a European Starling landing on the freighter SS. Hawaiian Famer 1160 nautical miles from Honolulu, Hawaii and 920 nautical miles from San Francisco California.

Surprisingly Kincaid was not a prolific writer although he did contribute a series of short articles to Texas Game and Fish from 1957 to 1965 (Kincaid 1957a, 1957b, 1958a, 1958b, 1958c, 1959a, 1960, 1965) and was an early editor of the TOS Newsletter.

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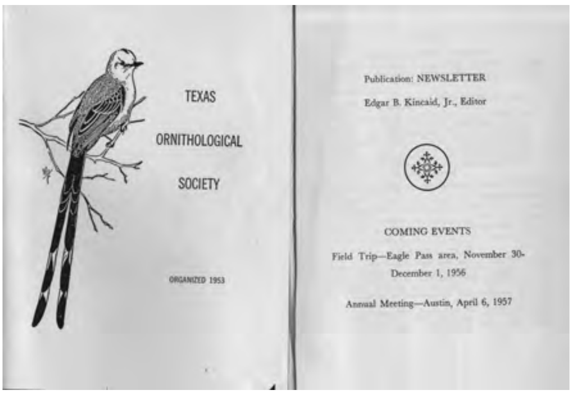

Early issues of the TOS Newsletter were edited by Edgar Kincaid.

JOHN H. CLARK'S MONTEZUMA QUAIL SPECIMEN USNM 9355 FROM LAREDO, TEXAS

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USNM 9355 is a cased, un-filled skin of a male Montezuma Quail (*Cyrtonyx montezumae*) collected by J. H. Clark, U.S. Boundary Commission (USBC), at Laredo, TX, no date (Figure 1). This specimen is housed at the Division of Birds, Smithsonian Institution, Washington D.C. USNM 9355 is of particular interest because of its seemingly extralimital nature and possibly unusual riverine association, controversial status, and because a critical review of it will inform an understanding of the spectrum of historical distributions of Montezuma Quail in Texas. In his unpublished typescript of "The Bird Life of Texas" (Oberholser n. d.), H. C. Oberholser seemed to accept USNM 9355 at face value based on his summary of Montezuma Quail records and accompanying range map. However, in the published version (Oberholser 1974), the range map for Montezuma Quail showed a question mark at Laredo, TX in reference to Clark's specimen record. "The Bird Life of Texas" was published posthumously, under the editorial direction of Edgar B. Kincaid, Jr., who apparently questioned the Laredo locality of USNM 9355. The extralimital nature of USNM 9355 has been cause over the years for other ornithologists to question its validity (e.g., Lockwood and Freeman 2014).

J. H. CLARK AND U.S.-MEXICO BOUNDARY SURVEY

J. H. Clark served the USBC as a computer (1851-1853) and later as principal assistant astronomer (1854-1855) during the survey of the U.S.-Mexico boundary (Emory 1857, Rebert 2001). Although not officially so designated, Clark also performed as one of several naturalists with the USBC making hundreds of valuable zoological collections of fish, birds, and mammals along nearly the entire length the international boundary line. Clark is best remembered for his numerous collections of type specimens of fishes along the U.S.-Mexico boundary (Hoy et al. 1852-53, Baird et al. 1854-55). Clark's bird collections, received by the US National Museum, Smithsonian Institute, in the 1850s, show he collected 98 specimens representing 70 taxa, and these have been studied by J. P. Hubbard, Southwest Museum of Biology (J. P. Hubbard, unpubl. data). Clark is credited with collection of the cotype of Clark's Grebe (*Aechmophorus clarkii*) which bears his name (USNM 9930) (Deignan 1961).

COLLECTION OF USNM 9355 MADE IN 1853

Spencer F. Baird's account of Massena Partridge (= Montezuma Quail) in the "Birds of the Boundary" (Baird, 1859:23) presented summaries of 3 leading field naturalists (C. B. R. Kennerly, Lt. D. N. Couch, and J. H. Clark) who had recent experience with this new bird in Texas and northern Mexico. Caleb B. R. Kennerly remarked, "This bird I have never seen further south in Texas than Turkey Creek" (southwestern Uvalde County, TX). In reference to the lower Rio Grande, he concluded, "In the valley of this river (Ft. Hancock, TX through Albuquerque, NM) it is rarely seen, giving way apparently to the Scaly and Gambel's partridges." However, Kennerly's duties with the USBC (1854-1855) did not include those portions of the lower Rio Grande in Texas south of Turkey Creek. Also, Lt. Darius N. Couch's, US Army (USA), observations of Montezuma Quail were restricted to a locality near Monterrey, Nuevo Leon, Mexico, well south of the lower Rio Grande (Baird 1859). J. H. Clark's zoological collecting experiences along the U.S.-Mexico boundary did include the lower Rio Grande, and with respect to Montezuma Quail, were perhaps the most geographically extensive of the 3 collectors. He remarked, "It was first met in the neighborhood of San Antonio (TX), and thence sparsely

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distributed as an inhabitant of both prairies and mountains, as far westward as Sonora (Mexico)" (Baird 1859:23). Curiously, Clark's account in Baird (1859) did not make direct reference to USNM 9355. However, Clark's lead sentence in the account seems to describe his encounter with USNM 9355—"Once on flushing a covey of *Ortyx texanus* (= *Colinus virginianus* = Northern Bobwhite), my attention was attracted by a bird that remained behind showing no inclination to follow the rest. It attempted to hide in the grass but not to fly, and on being shot proved to be a male massena (= *Crytonyx massena* = *C. montezumae*)." USNM 9355, taken at Laredo, TX, is the only Montezuma Quail known to have been collected by Clark (VertNet 2017, D. Holdermann, unpubl. data). My interpretation of this connection is further coalesced by the fact that the only other bird specimen collected by Clark at Laredo, TX was USNM 9349, a male Northern Bobwhite (Baird 1858:642, J. P. Hubbard, unpubl. data).

Most of Clark's bird specimens have a locality, but a majority of them, including USNM 9355, have no date. J. P. Hubbard has devised a system using Clark's known itinerary and specimen-specific data to determine the year(s) of collection for many of Clark's undated, USNM specimens. In the example of USNM 9533, Baird's (1858:648) list of specimens shows that it was collected by = J. H. Clark at locality = Laredo, TX and whence obtained (shipped from the field to the Smithsonian Institute) = Major Emory, but when collected is left blank. The key information to determining the year or range of years for when USNM 9355 was collected is its association with "Major Emory". Clark was under the command of Lt. Col. J. D. Graham, USA, in 1851, and then Maj. W. Emory, USA, from 1852 to 1855 (Emory 1857, Rebert 2001). Finally, Clark and Emory worked together proofing astronomical determinations on the lower Rio Grande between April and September 1853, including at Ringgold Barracks and Ft. McIntosh (Laredo), TX and other points (Emory 1857). I concur with Hubbard (pers. comm.), who, using the above line of reasoning, concludes that USNM 9355 was collected between April and September 1853.

MONTEZUMA QUAIL DISTRIBUTION AND HABITAT ON THE SOUTH TEXAS PLAINS

Currently, I am reviewing historical records (1849-1949) of Montezuma Quail in Texas, and detailed findings of this effort will be published at a later date. Preliminary historical results for the South Texas Plains ecoregion (1853-1901) include 9 extant specimen records and 10 records of occurrence of Montezuma Quail distributed by county: Frio (0 specimens/1 record of occurrence), southern Kinney (7/3), Maverick (0/2), Medina (0/2), southern Uvalde (1/0), Webb (1/1), and Zavala (0/1). This distribution included the western half of the South Texas Plains from the Balcones Escarpment south to the Rio Grande (Figure 2), where Montezuma Quail and Northern Bobwhite were sympatric. Specimen USNM 9355 from Laredo, Webb County, TX represents the extreme southern locality in the South Texas Plains distribution with closest neighbor historical records in Texas at Eagle Pass (Ft. Duncan), TX (W. Negley, in 1884 according to Oberholser n. d.), along the Nueces River near present Crystal City, TX (Lloyd 1887), and along the Frio River near present Dilley, TX (Lloyd 1887).

In addition to USNM 9355, other 19th century observers reported Montezuma Quail from prairies and/or savannas in Texas. For example, Capt. S. G. French, USA, (Cassin 1862) and Lt. Col. G. McCall, USA, (McCall 1851) both reported Montezuma Quail along an approximate 162-km stretch of broken tablelands and prairies between the head of the San Pedro (Devil's River) and Pecos River crossing; J. H. Clark reported it in "both mountains and prairies" in western Texas westward to Sonora (Mexico); and W. Lloyd reported it in the plains "east of Castle Mountains" (King Mountain) and eastward in the upper Middle Fork of the Concho River (Lloyd 1887). Further, localities of extant Montezuma Quail specimens strongly suggest an association with prairies or open mesquite savannas. In 1887, W. Lloyd collected a female specimen at Pecos City (Pecos), Reeves County, TX (American Museum of Natural History 80381). Between 1853 and 1898, 4 different collectors collected 7 specimens at Ft. Clark, Kinney County, TX (D. Holdermann, unpubl. data) (Figure 2).

If Clark's description (Baird 1859) for the collection of a male Montezuma Quail in the company of a flock of Northern Bobwhite pertained to USNM 9355, then a reference to "grass" is the only known vegetative feature described for this specimen. The Smithsonian Institution bird catalogue or USNM 9355's specimen tags do not provide addition details relating to the locality or habitat affiliation of the specimen (C. M. Milensky, pers. comm.). Probable collecting sites in the vicinity of Laredo, TX would have been along the Rio Grande floodplain or more likely on the uplands immediately north of the Rio Grande where Clark traveled taking astronomical readings for the U.S.-Mexico boundary line.

At Eagle Pass, TX, Havard (1885) described the river floodplain as having a diverse herbaceous vegetation, and listed 49 forbs and 14 grasses. He stated the vegetation along the river did not change much between Eagle Pass and Laredo, TX. At Laredo, he found the river shore mostly bare, punctuated by clumps of black willow (*Salix nigra*), hackberry (*Celtis* sp.), and green ash (*Fraxinus pennsylvanica*), but details for herbaceous vegetation were not given. Inglis (1964) reconstructed broad vegetation patterns for the South Texas Plains based on the accounts of early travelers who passed through the region. During the mid-19th century, he concluded uplands in the western portion of the South Texas Plains were mainly open country (i.e., open mesquite prairie) with low to abundant forage (grasses), and stands of dense chaparral (thornscrub) were few and localized. In contrast, Johnston (1963) thought these uplands supported mostly low mesquite or mixed scrub vegetation, sometimes with broad, grassy areas among the shrubbery. Johnston (1963) did not consider the latter vegetation to be true prairie or grassland.

Regardless of the character of the woody vegetation, crucial components of Montezuma Quail habitat are perennial grass cover and presence of one or more tuber- or corm-bearing food plants such as yellow flatsedge (*Cyperus esculentus*) or wood sorrel (*Oxalis* spp.) (Leopold and McCabe 1957, Bishop and Hungerford 1965). Montezuma Quail excavate such underground plant organs with their long-clawed feet. Sorola (1986) and Albers and Gehlbach (1990) found relict populations of Montezuma Quail in the Edwards Plateau relied heavily on *O. drummondii*. J. Torrey (Torrey 1859:41) noted *O. drummondii* occurred on the "plains between the Leona (River) and the Rio Grande" (i.e., South Texas Plains). Recent vegetation reconnaissance shows that *O. drummunidii* is widespread and locally abundant in the South Texas Plains and *C. esculentus* occurs widely on soils disturbed by agriculture (E. Grahmann, pers. comm).

Figure 1. Specimen USNM 9355, an adult, male Montezuma Quail (*Cyrtonyx montezumae*), collected by J. H. Clark, U. S. Boundary Commission, at Laredo, TX, ca. April-September 1853. Photo: Christopher M. Milensky, Collections Manager, Division of Birds, Smithsonian Institution, Washington D.C.

USNM 9355 WAS A WILD BIRD

I considered the possibility that USNM 9355 might have been an escaped captive bird, since it was and remains a common practice of rural Mexicans to keep wild birds as cage pets (Jouy 1893, Róldan-Clarà et al. 2017). Accordingly, USNM 9355 was recently examined by C. M. Milensky, Collections Manager, Division of Birds, Smithsonian Institution, who found it showed no physical signs of having been a captive bird (C. M. Milensky, pers. comm.). For example, the claw tips are well worn from excavating natural food items and the plumage does not show cage wear (Figure 1).

CONCLUSIONS

Regarding USNM 9355, I conclude the locality of Laredo, TX assigned to it is logical and correct, and that Clark collected USNM 9355 there in the period April-September 1853. Multiple observations and collections show Montezuma Quail was a resident of the western South Texas Plains prior to 1900. Montezuma Quail in this region would have represented a dilute continuum of the central Texas distribution centered on the Edwards Plateau (Figure 2). Recently, Montezuma Quail was documented at 2 localities in the vicinity of Sierra de Picachos, Nuevo Leon, Mexico, approximately 167 km south of Laredo, Texas (J. Eitniear, per. comm.). Therefore, on a broader biogeographical scale, it seems plausible, as recently as 150 years ago, that populations of Montezuma Quail in central Texas

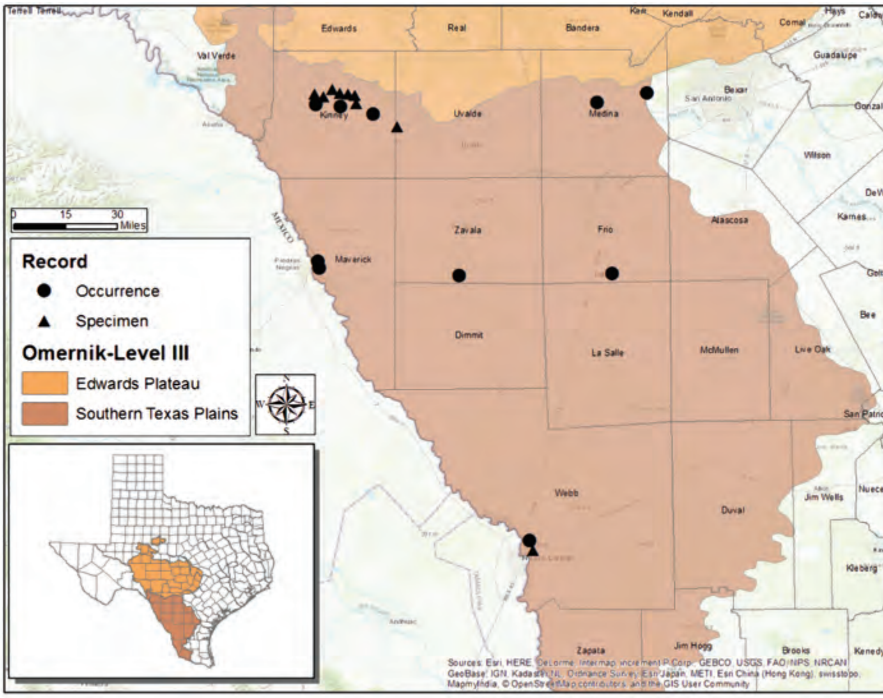

Figure. 2. Localities of historical (1853-1898) Montezuma Quail (*Cyrtonyx montezumae*) records, including specimen USNM 9355, in the South Texas Plains ecoregion of Texas.

connected loosely across the South Texas Plains with those of the northern Sierra Madre Oriental in northeastern Mexico. The Laredo, TX locality (122 m elev.) of USNM 9355 appears to be the lowest elevation recorded for this species in North America.

ACKNOWLEDGMENTS

I express my gratitude to Drs. John P. Hubbard, Museum of Southwest Biology, University of New Mexico, and Stanley D. Casto, Department of Biology, University of Mary Hardin-Baylor for their unfailing guidance and encouragement in pursuing a review of the historical records of Montezuma Quail in Texas. I thank Christopher M. Milensky, Collections Manager, Division of Birds, Smithsonian Institution for inspecting and photographing NM 9355 (Figure 1). I thank Jason Estrella, GIS Specialist, Texas Parks and Wildlife Department for creating Figure 2. Dr. George Yatskievych, Curator, Billy L. Turner Plant Resources Center (PRC) of the University of Texas at Austin, provided helpful assistance and access to PRC databases. This paper was funded by American sportsmen's contributions through the U.S. Fish and Wildlife Service to the Texas Parks and Wildlife Department, Wildlife Division, Wildlife Restoration Program, Nongame Bird Project WL.W166R1.

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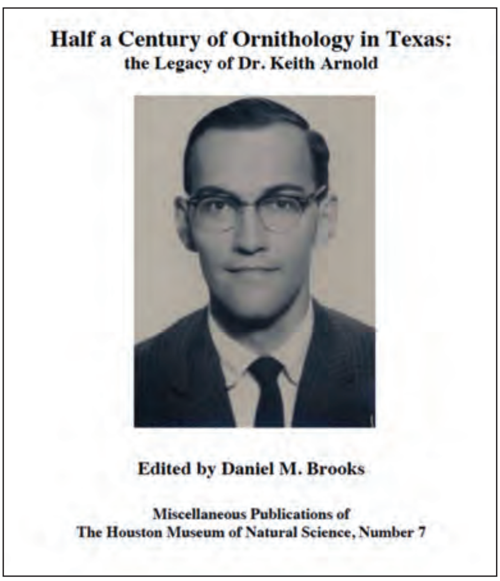
BOOK REVIEWS

HALF A CENTURY OF ORNITHOLOGY IN TEXAS: THE LEGACY OF DR. KEITH ARNOLD

Daniel M. Brooks, Miscellaneous Publications of The Houston Museum of Natural Science, Number 7. 2017
Available online at http://www.hmns.org/wp-content/uploads/2015/06/Book_ArnoldFestschrift-1.pdf



Dr. Keith Arnold, Professor Emeritus and Curator Emeritus of Birds, Texas A&M University, College Station, almost certainly will be remembered as the last academically trained classical ornithologist in Texas. It is fitting that the Houston Museum of Natural Science publish this volume to honor Dr. Arnold.

The Foreword, a warm and sincere tribute by Dr. Daniel Brooks, is followed by a biography of Dr. Arnold written by Fred Collins, Kleb Woods Nature Center, and Dr. Brooks.

The biography follows Dr. Arnold from childhood through his distinguished career at Texas A & M University. In some respects, the story of his life parallels that of many outstanding ornithologists and naturalists: he developed an interest in nature as a child, worked at various part-time jobs during school, was blessed with one or two mentors along the way, obtained his doctorate under an inspiring and supportive major professor (Dr. George Lowery), and had the opportunity to pursue a highly successful career at an academic institution. Dr. Arnold clearly made the most of his opportunities and for half a century filled a critical niche in Texas ornithology. Among his other contributions, he prepared thousands of specimens for A & M's bird collection. Relatively few Texas ornithologists today can even prepare a museum bird specimen, much less prepare one as rapidly and properly as Dr. Arnold could (and can!).

The remainder of the issue follows the *Festschrift* tradition of publishing original scientific articles to honor a scholar's long and distinguished career. There are five articles about Texas ornithology, three on Neotropical ornithology, and four on avian art. The volume concludes with ecomia from twelve of Dr. Arnold's students and admirers.

This book offers a glimpse of how ornithology students, including Dr. Arnold as a student, pursue their goal of becoming professional ornithologists, and how professors and students develop a long-lasting camaraderie by supporting each other's passion for birds.

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Texas Tech University-Junction Campus

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BULLETIN OF THE TEXAS ORNITHOLOGICAL SOCIETY GUIDELINES FOR AUTHORS

SUBMISSION

For initial submission, e-mail one copy of the manuscript and photographs/illustrations[1] to jclintoneitniear@gmail.com or mail to Jack C. Eitniear, 218 Conway Drive, San Antonio, Texas 78209-1716. If you do not have access to the internet mail a DVD or CD containing a word processor version (MS WORD 2015 preferred or Apache Open Office 4.1) of the manuscript with all figures and tables, as separate documents

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Multi-authored Submissions.—All authors should have contributed in a significant manner to designing and performing the research, writing the manuscript, and reading and approving the manuscript prior to submission.

Non-U.S. Submissions.—Authors whose native language is not English should ensure that colleagues fluent in English have critically reviewed their manuscript before submission.

GENERAL INSTRUCTIONS

(Carefully read and follow these instructions before submitting your manuscript. Papers that do not conform to these guidelines will be returned.)

Prepare manuscripts on 8.5 X 11 inch format with 1-inch margins. Double-space all text, including literature cited, figure captions, and tables. Insert page numbers top right beginning on the second page. Use a font size of at least 11 point. Consult a recent issue of the journal for correct format and style as you prepare your manuscript.

Write in the active voice whenever possible. Use U.S. English and spelling. Use *italics* instead of underlining (i. e., scientific names, third-level headings, and standard statistical symbols). Use Roman typeface (**not boldface**) throughout the manuscript.

Common and scientific names of bird species that occur in North and Middle America should follow the AOU *Check-list of North American Birds* (1998, 7th ed., and its supplements. Reference http://www.americanornithology.org/content/checklist-north-and-middle-american-birds. Names for other bird species should follow an appropriate standard (cite standard used). Use subspecific identification and list taxonomic authorities only when relevant. Give the scientific name at first mention of a species in the abstract and in the body of the paper. Capitalize common names of birds except when referred to as a group (i. e., Northern Cardinal, Golden-cheeked and Yellow warblers, vireos). Do not italicize family names.

The common names of other organisms are lower case except for proper names (i. e., yellow pine, Ashe juniper, Texas kangaroo rat).

Cite each figure and table in the text. Sequence tables and figures in the order cited. Use "figure" only outside of parentheses; otherwise, use "Fig." if singular, "Figs." if plural (i. e., Fig. 1, Figs. 2–3). To cite figures or tables from another work, write figure, fig., or table in lowercase (i. e., figure 2 in Jones 1980; Jones 1980:fig. 2; Jones 1987: table 5).

Use the following abbreviations: d (day), wk (week), mon (month), yr (year), sec (second), min (minute), h (hour); report temperature as °C (i. e., 15° C). In text months should be abbreviated (Jan, Feb, Mar, Apr, etc.) in figures and tables. Define and write out acronyms and abbreviations the first time they appear in text; abbreviate thereafter: "Second-year (SY) birds . . . We found SY birds in large numbers."

Present all measurements in metric units. Use continental dating (i. e., 15 August 2007), the 24-hour clock (i. e., 0500, 1230), and local standard time. Specify time as Standard Time (i. e., CST for Central

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Standard Time) at first reference to time of day. **Study site location(s) should be identified by latitude and longitude.** Present latitude and longitude with one space between each element (i. e., 28° 07' N, 114° 31'W). If latitude and longitude are not available indicate the distance and direction from the nearest permanent location. Abbreviate and capitalize direction (i. e., north = N, southwest = SW, or 5 km W Abilene, Taylor County [but Taylor and Bexar counties]). Also capitalize regions such as South Texas or Southwest United States.

Numbers.—The conventions presented here revise what has often been called the "Scientific Number Style (SNS)". The SNS generally used words for 1-digit whole numbers (i.e., 9 = nine) and numerals for larger numbers (i.e., ten = 10), a distinction that may be confusing and arbitrary. The revised SNS treats numbers more consistently by extending the use of numerals to most single-digit whole numbers that were previously expressed as words. This style allows all quantities to be expressed in a single manner, and because numerals have greater visual distinctiveness than words, it increases the profile of quantities in running text. The objective of emphasizing quantity with numerals is further facilitated by the use of words for numbers appearing in a context that is only secondarily quantitative, i.e., when a number's quantitative function has been subordinated to an essentially nonquantitative meaning or the number is used idiomatically. In these cases, use words to express numbers (i.e., the sixty-four-dollar question). However, the numbers zero and one present additional challenges. For these numbers, applying consistent logic (numerals for quantities and words otherwise) often increases tedium in making decisions about correct usage and creates an inconsistent appearance, primarily because "one" has a variety of functions and readers might not quickly grasp the logic. For example, "one" can be used in ways in which quantity is irrelevant: as a personal pronoun or synonym for "you" (i.e., "one must never forget that") or as an indefinite pronoun ("this one is preferred"). The usage of the numeral in these cases would possibly be confusing to a reader. "Zero" and "one" are also used in ways that are more like figures of speech than precise quantifications (i.e., "in one or both of the ….", "in any one year", "a zero-tolerance policy"). In addition the numeral"1" can be easily confused with the letters "l" and "I", particularly in running text, and the value"0" can be confused with the letter "O" or "o" used to designate a variable. Therefore simplicity and consistent appearance have been given priority for these 2 numbers.

Cardinal Numbers.—quantitative elements in scientific writing are of paramount importance because they lead the way to the findings. Use numerals rather than words to express whole and decimal numbers in text tables and figures. This practice increases their visibility and distinctiveness and emphasizes their enumerative function.

2 hypotheses 5 birds 65 trees 0.5 mm 5 times 8 samples Also use numerals to designate mathematical relationships.

6:1 at 200X magnification 5-fold not five-fold

Use words in to represent numbers in 4 categories of exceptions:

(1) If a number begins a sentence, title, or heading, spell out the number or reword the sentence so the number appears elsewhere in the sentence.

Five eggs were in the nest, but the typical clutch size is 12. The nest contained 5 eggs, but the typical clutch size is 12.

(2) When 2 numbers are adjacent, spell out the first number and leave the second as a numeral or reword the sentence.

The sample area was divided into four 5 ha plots.

I divided my sample area into 4 plots containing 5 ha.

(3) For most general uses, spell out zero and one.

one of the species was one of the most important on the one hand values approaching zero one peak at 12-14 m, the other at 25-28 m.

However, express the whole numbers zero and one as numerals when they are directly connected to a unit of measure or a calculated value.

1 week 1 m a mean of 0 1-digit numbers when $z = 0$

Similarly, express zero and one as numerals when part of a series or closely linked to other numbers.

1 of 4 species between 0 and 5 of these, 4 samples were…1 sample was… and 8 samples

(4) When a number is used idiomatically or within a figure of speech.

the one and only reason a thousand and one possibilities comparing one to the other the two of them one or two of these an extra week or two of growth.

Ordinal Numbers

Ordinal numbers usually convey rank order, not quantity. Rather than expressing how many, ordinals often describe what, which, or sequence. Ordinals are more prose oriented than quantitative within the text and it is less important to express ordinal numbers as numerals.

(1) Spell out single-digit ordinals used as adjectives or adverbs.
the third chick hatched   first discovered   a third washings   for the seventh time

(2) The numeric form of 2-digit ordinals is less confusing, so express larger ordinals as numerals.
the 20th century   for a 15th time   the 10th replication   the 50th flock

(3) Express single digit ordinals numerically if in a series linked with double-digit ordinals.
The 5th, 6th, 10th, and 20th hypotheses were tested or We tested hypotheses 5, 6, 10, and 20

Zeros before Decimals.

For numbers less than 1.0, always use an initial zero before the decimal point.
0.05 not .05 P = 0.05 not P = .05

Numbers Combined with Units of Measure

(1) Use a single space to separate a number and a subsequent alphabetic symbol
235 g   1240 h   8 mm

(2) Generally close up a number and a non alphabetic symbol whether it precedes or follows the number. 45° for angles   45 °C for temperature   ±9   35±   <5 but P < 0.001

(3) Geographic coordinate designation for latitude and longitude have a space between each unit. 35º 44' 77" N

(4) If the number and associated symbol or unit start a sentence, spell out the number and associated factor. Twenty-five percent of nests

Numeric Ranges, Dimensions, Series, and Placement of Units

(1) When expressing a range of numbers in text, use the word to or through to connect the numbers. Alternatively, an en dash, which means to may be us3ed but only between 2 numbers that are not interrupted by words, mathematical operators, or symbols.
Yielded −0.3 to +1.2 differences not −0.3−+1.2 differences 5 July to 20 July or 5-20 July not 5 July-20 July 1-12 m not 1 m – 12 m

(2) When the word from precedes a range, do not substitute the en dash for to. From 3 to 4 nests not from 3-4 nests

(3) The en dash represents only the word "to", when between precedes a range, use "and" between the numbers.
between 5 and 18 March not between 5-18 March

(4) When the range includes numbers of several digits, do not omit the leading digits from the second number in the range.
between 2001 and 2012 not between 2001 and 12 nor 2001-12   1587-1612 m not 1587-12 m

(5) A range of numbers and the accompanying unit can be expressed with a single unit symbol after the second number of the range, except when the symbol must be closed up to the number (i.e., percent symbol) or the unit symbol may be presented with both numbers of the range.
5 to 12 cm or 5 cm to 12 cm   5 to 10 °C or 5 °C to 10 °C   20% to 30% or 20-30% not 20 to 30%

(6) If a range begins a sentence, spell out the first number and present the second as a numeral; however if a nonalphabetic symbol (%), write out both units.
Twelve to 15 ha not twelve to fifteen ha   Ten percent to 20 percent of samples not Ten percent to 20% of samples

(7) To prevent misunderstanding, avoid using "by" before a range; this may imply an amount change from an original value, rather than a range of values. growth increased 0.5 to 0.8 g/d (a range) or growth increased 0.5-0.8 g/d not growth increased by 0.5-0.8 g/d

(8) To prevent a wrong conclusion by a reader, do not express 2 numbers preceded by words like "increase", "decrease", or "change". A range may be intended but the reader may conclude the first value as an initial value and the second as a new value.

increased from 2 cm/wk to 5 cm/ wk (Was the increase 2-5 cm or was the increase 3 cm?)
When changes are from one range to a new range, en dashes within each range is a better statement.
increased from 10-20 m to 15-30 m

(9) For dimensions, use a mathematical symbol (not a lower case "x") or the word "by" to separate the measurements.
5 X 10 X 20 cm   5 cm X 10 cm X 20 cm   5 by 10 by 20 cm

(10) For a series of numbers, present the unit after the last numeral only, except if the unit symbol must be set close to the number.
5, 8, 12, and 20 m   diameters of 6 and 8 mm   12%, 15%, and 25%   categories of <2, 2-4, and > 6 km

Descriptive Statistics

Variables are often reported in the text: the units and variability term should be unambiguous.
mean (SD) = 20% (2) or Mean of 20% (SD 2)   mean of 32 m (SD 5.3) not mean of 32 ± 5.3 m
mean of 5 g (SD ± 0.33)   mean (SE) = 25 m (0.24)

MANUSCRIPT

Assemble a manuscript for Major Articles in this sequence: title page, abstract, text (introduction, methods, results, and discussion), acknowledgments, literature cited, tables, figure captions, and figures. Short Communications need not be subdivided into sections (optional).

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Addresses of author(s) should be in italics and arranged from first to last at the time of the study. The current address (if different from above) of each author (first to last), any special essential information (i. e., deceased), and the corresponding author and e-mail address should be in a footnote. Use two-letter postal codes (i. e., TX) for U.S. states and Canadian provinces. Spell out countries except USA. Consult a recent issue if in doubt.

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American Ornithologists' Union. 1998. Check-list of North American birds, 7th Edition. American Ornithologists' Union, Washington, D.C.

Oberholser, H. C. 1938. The bird life of Louisiana. Bulletin 28. Louisiana Department of Conservation, New Orleans.

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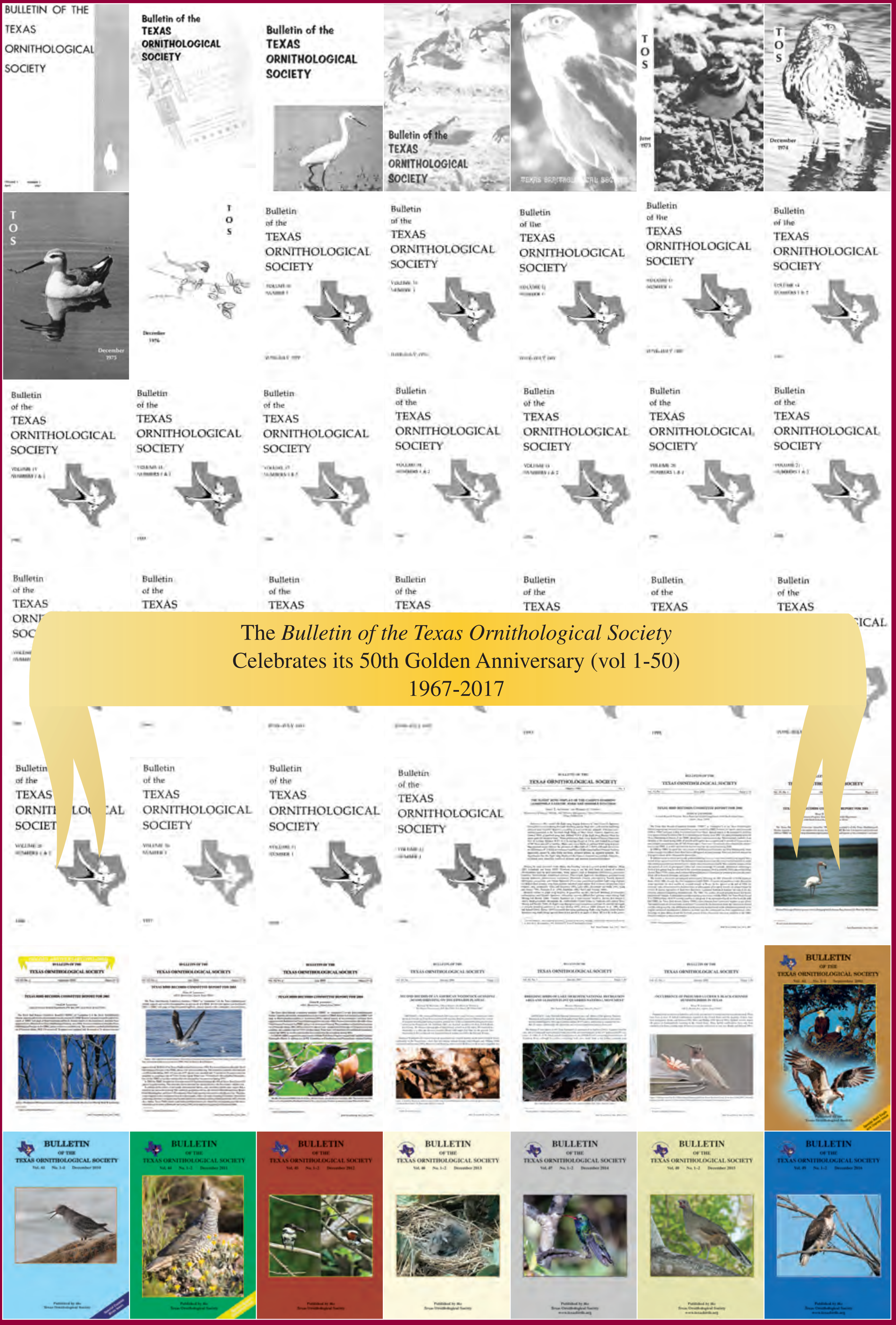
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