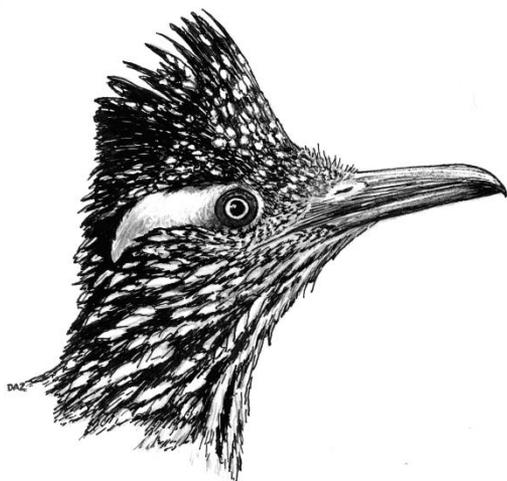


NMOS BULLETIN



New Mexico
Ornithological
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POPULATION TRENDS OF COLUMBIDAE ON THE ALBUQUERQUE CHRISTMAS BIRD COUNT

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INTRODUCTION

The annual Christmas Bird Count (CBC) is the longest-running citizen science project relating to counting wild birds in the Western Hemisphere (Dunn et al. 2005). The Albuquerque CBC is the longest running one in New Mexico; the first one was held in 1902, not long after the initial establishment of the CBC in 1900; was held again in the years from 1935 to 1939; 1947; and then annually since 1961 (with the exception of 1970). These over 60 years of CBC data provide invaluable insights into the status and trends of birds in early winter across the country and in the Albuquerque area; these data have been used in many publications (see Dunn et al. 2005, www.audubon.org/christmas-bird-count-bibliography).

The species of the family Columbidae are well suited for analysis as they are generally easily seen, identified, and counted during the CBC and have shown well documented changes in populations over time in response to changes in habitat, urbanization, and climate in areas in which they occur. Furthermore, several species have either been introduced into the United States during the time period of the CBC and/or have well documented range expansions, such as Eurasian Collared-Dove (*Streptopelia decaocto*) and White-winged Dove (*Zenaida asiatica*). In this paper, I summarize the species of Columbidae found on the Albuquerque CBC between 1961 and 2019; document their changes in population status and trends over time; and explore the effects of the introduction of new species of Columbidae into the Albuquerque avifauna on existing and native Columbidae.

METHODS

CBC methodology is well-documented elsewhere and is summarized here (see www.audubon.org/conservation/science/christmas-bird-count). The Albuquerque CBC is located in Bernalillo and Sandoval Counties, New Mexico, and consists of a 15-mile diameter circle centered at coordinates N 35.18°, W 106.62° (in the North Valley on 2nd Street between Alameda Blvd and Ortega Rd NW). The goal of any CBC is to count as many individual birds of as many species as possible in a 24-hour period on one calendar day. The count is conducted during the annual “Christmas count period” which is currently designated as December 14 of a year to the following January 5. Therefore, although the annual count could actually occur in one of two months in consecutive calendar years, the count year used in this paper is referred to by the year of December of that count period. Species recorded during the three days before and after the actual

count day are recorded as occurring during “count week;” those species are recorded, but numbers are not considered. During count day, observers track the effort spent counting birds by measuring party hours: the amount of time a group of observers spends together counting different birds. Over the years, different strategies have been employed on the Albuquerque CBC to split the entire circle into sectors of varying shapes and sizes to help ensure adequate coverage of the area and to divide effort into roughly equivalent sections; however, no information is available on these subdivisions from previous counts so the data used in this analysis consists of the combined counts for all sectors included in each count.

Data from the Albuquerque CBC through 2015 were downloaded from the central CBC database (National Audubon Society 2010). Data for 2016 through 2019 were obtained from the files of the author, who is presently the compiler of the Albuquerque CBC. To determine temporal trends, the number of birds per party hour for a species was computed by dividing total birds counted for a year of that species by total party hours reported for that year and then the birds per party hour was used in a linear regression against year. Potential competition between selected pairs of Columbids was explored with the Pearson product-moment correlation between birds per party hour of each set of species. All statistical analyses were performed with the R statistical package, version 4.0.3 (R Core Team 2020).

RESULTS

The Albuquerque CBC has changed over the years as the population of the urban area and state have grown, bird-watching has become more popular, and involvement in the CBC increased. Participation and counting effort on the Albuquerque CBC are shown in Figure 1, ranging from a minimum of 6 participants in 1969 to 86 in 2013. The long-term average number of participants was 34.4, but recent counts (last 20 years) have averaged 55.6 participants. Similarly, counting effort (as measured by number of party hours) has steadily increased (Figure 1), ranging from a minimum of 21.8 in 1978 to 173.3 in 2014. The long-term average number of party hours was 76.8 and recent counts (last 20 years) have averaged 122.9 party hours. To account for this variation in effort, the variable analyzed for any species in this report is the total number of individuals counted during a count divided by the number of party hours during the same count. While number of participants and party hours are highly correlated, party hours provide a more realistic metric of effort per count (since many birders count in groups of variable sizes) and is the variable typically used to account for variation in effort when analyzing CBC data (e.g., Bock and Root 1981, Sauer et al. 2004). A cumulative total of six species of Columbidae have been recorded on the Albuquerque CBC from 1961 to 2019. Each species is discussed separately below.

Rock Pigeon (*Columba livia*).—This species is considered introduced in North America (Lowther and Johnston 2020) and is now abundantly found in various human-associated habitats. As a result of methodological changes concerning counting, Rock Pigeons were only counted starting in 1973; therefore, though undoubtedly present in

the Albuquerque CBC area long prior to that time, I only include data from 1974 onward in this analysis, a total of 46 years.

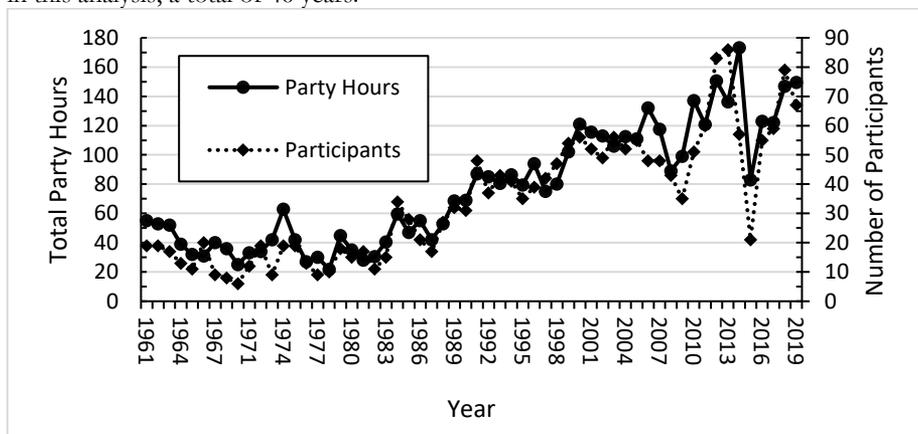


Figure 1. Total number of party hours (left axis) and number of participants (right axis) recorded by year from 1961 to 2019 on the Albuquerque Christmas Bird Count.

Rock Pigeon was reported on the first year it was eligible to be counted and has been in every year since (Figure 2). The average number of individuals counted over 46 years was 1205.7 with a maximum of 3970 in 2012. The number of Rock Pigeons per party hour steadily and significantly increased over the 46-year period at a rate of about 0.5 Rock Pigeons per party hour per year (Figure 2; $P < 0.001$, $r^2 = 0.76$). Although Rock Pigeon has always been the most frequently encountered Columbidae on the Albuquerque CBC, the proportion of Rock Pigeon of all Columbidae counted has declined over time as other Columbidae species have become more common, particularly from the 2000's to the present. The 46-year average was 82.2% Rock Pigeon of all Columbids counted, with an average of 94.8% between 1974–1990 and 70.1% between 2000–2019.

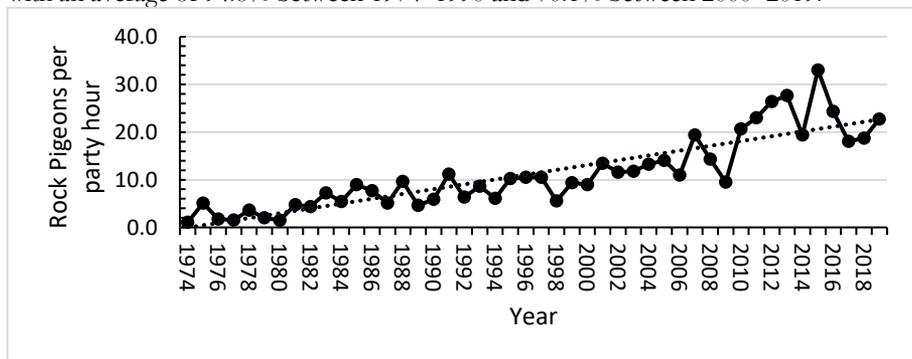


Figure 2. Number of Rock Pigeons counted per party hour from 1974 to 2019 on the Albuquerque Christmas Bird Count. Dotted line indicates best fit linear trend during this time period.

Eurasian Collared-Dove.—Eurasian Collared-Dove is another introduction to the North American avifauna, having been released in the Bahamas in the mid-1970’s and spread across the continent since then (Romagosa 2020). The species was first reported in New Mexico in 1995 (S. Williams, pers. comm.) and first counted (a single bird) on the Albuquerque CBC in 1999. Due to this species’ occurrence pattern, analyses were conducted on count data from 1999 to 2019, a period of 21 years.

Eurasian Collared-Dove has been counted every year since 1999 in generally increasing numbers with a rapid increase in numbers between 2009 and 2010, 11 years after being first found, a peak in 2015, followed by recent stabilization (Figure 3). The average number of individuals counted over the 21 years was 55.5 with a maximum of 369 counted in 2015. The linear regression of Eurasian Collared-Doves per party hour during this time period (Figure 3) is highly significant with an increase of about 0.13 doves per party hour per year ($P = 0.000159$, $r^2 = 0.54$).

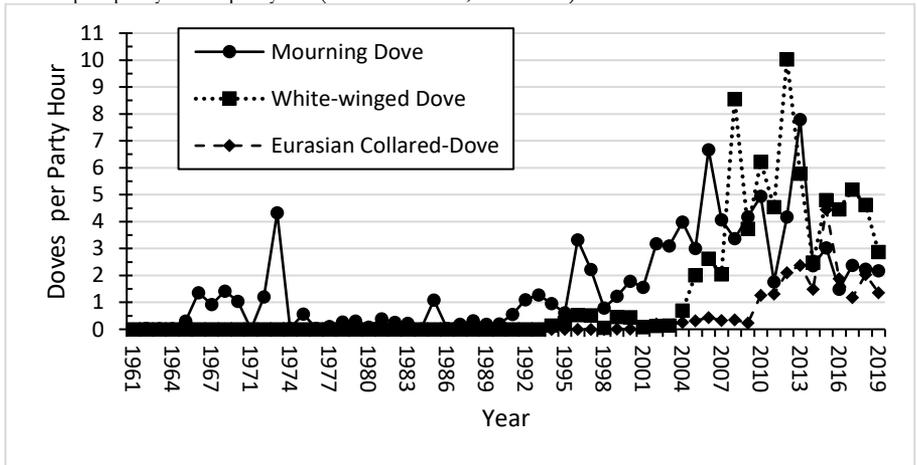


Figure 3. Number of Mourning Doves, White-winged Doves, and Eurasian Collared Doves counted per party hour from 1962 to 2019 on the Albuquerque Christmas Bird Count.

Inca Dove (*Columbina inca*).—Inca Dove is a native species whose stronghold in New Mexico was in the southwest part of the state; it has expanded its distribution both in the state and in the United States in the late 20th century (Phillips 1968, Hubbard 1978, Mueller 2004). Inca Dove has only been found on the Albuquerque CBC on nine years (15.5% of the total of 58, including on count week in one year), the first time in 1998 and the last time in 2007 (Figure 4). The maximum number ever counted was 6 birds in 2005.

Ruddy Ground Dove (*Columbina talpacoti*).—Ruddy Ground-Dove is considered a very rare species in New Mexico and requires detailed documentation when found (NMOS 2020). This species has only been reported on the Albuquerque CBC once,

during count week in 2002. This record was verified and was part of an invasion that fall and early winter (*North Am. Birds* 57(2):236, *NMOS Field Notes* 42(1):7).

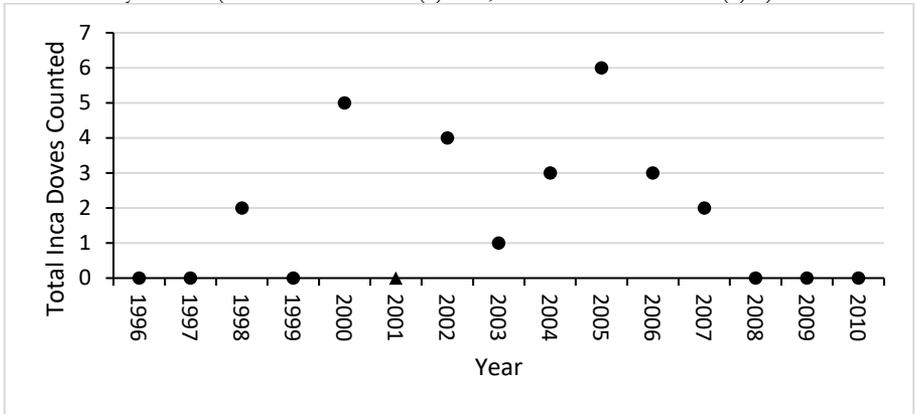


Figure 4. Number of Inca Doves counted between 1996 and 2010 on the Albuquerque Christmas Bird Count. No Inca Doves were found before 1998 or after 2007; the triangle indicates that it was found on count week.

White-winged Dove.—White-winged Dove is a native species to New Mexico, formerly considered resident or a summering species in southern New Mexico (Hubbard 1978). However, it has experienced a notable northward range expansion since the 1980’s, perhaps associated with increased human density and human-associated agriculture and ornamental trees in the southwest (Schwertner et al. 2002). This dove was first found on the Albuquerque CBC in 1994 and has been encountered every year since for a total of 26 years; therefore, analyses were conducted on count data from 1994 to 2019, a period of 26 years.

White-winged Dove counts have increased over this time period, starting with an initial relatively stable period from 1994 to 2004, then dramatic increases with fluctuations until 2013, followed by an apparent stabilization between 2014 and 2019 (Figure 3). The average count over the 26 years was 350.3 individuals (2.8 doves per party hour) with a maximum of 1,509 counted in 2012. The linear regression of White-winged Doves per party hour during this time period was highly significant with an increase of about 0.26 doves per party hour per year ($P < 0.001$, $r^2 = 0.49$).

Mourning Dove (*Zenaida macroura*).—One of the most abundant terrestrial native bird species in North America (Otis et al. 2008), the Mourning Dove has been the most regularly encountered Columbidae on the Albuquerque CBC, found in almost every year since 1961, with the exception of 2 years (1961, when it was found on count week, and 1971, when none were counted). The average count over the 58 years between 1962 and 2019 was 174.2 birds (1.65 birds per party hour) with a maximum of 1,061 birds counted (7.79 birds per party hour) in 2013.

Mourning Dove, like most of the other species discussed, generally increased in abundance over time (Figure 3) with lower numbers until the mid-1990's, at which point counts noticeably increased until 2013 with an apparent reduction in very recent years. The average for the most recent 20 years was 415.3 birds (3.36 birds per party hour), considerably higher than the long-term average of 174.2. The linear regression of Mourning Doves per party hour during this time period was highly significant with an increase of about 0.067 doves per party hour per year ($P < 0.001$, $r^2 = 0.39$).

Interspecific Interactions.—It has been suggested that the effects of newly introduced or expanding species on existing species could or should be negative; this is particularly true for the Eurasian Collared-Dove (e.g., Romagosa and McEneaney 1999). The Albuquerque CBC provides the opportunity to examine this topic with several species of Columbids that have changed their population status over time, the expectation being that as a new species increases over time, then the existing species would decrease correspondingly if there were competitive interactions.

When numbers of birds counted per party hour were compared pairwise across three species of Columbids there was little evidence of a negative effect of the newer species on the previously existing species. Rather, the effects were all positive, two of the three significantly so, for all three possible species interactions during years in which they were counted: White-winged Dove on Mourning Dove ($r = 0.423$, $P = 0.031$, $N = 26$ years), Eurasian Collared-Dove on Mourning Dove ($r = 0.119$, $P = 0.606$, $N = 21$ years), and Eurasian Collared-Dove on White-winged Dove ($r = 0.543$, $P = 0.011$, $N = 21$ years).

DISCUSSION

Albuquerque CBC data clearly document substantial changes in species composition and numbers of Columbidae in the local area over the past several decades. Rock Pigeon, an introduced and ubiquitous bird species on the entire continent, has steadily increased in abundance since it was first counted in the mid-1970's (Figure 2) and continues to the present day to be the most abundant Columbid on the Albuquerque CBC. Mourning Dove, a familiar native species found throughout the area, was the most frequently encountered Columbid on the Albuquerque CBC, counted on 98% of count years. It, too, increased in abundance over the past three decades (Figure 3), albeit in a non-linear fashion, with a noticeable increase in birds counted since the mid-1990's. The two most-recent additions to the local Columbid fauna, White-winged Dove in 1994 and Eurasian Collared-Dove in 1999, also showed noticeable increases in abundance during their time since appearance (Figure 3). Interestingly, both species showed a lag time of about 10 years since first appearance before abundance began to increase markedly. Inca Dove was only counted or found on count week in nine years between and including 1997 and 2008 (Figure 4). Apparently, this species' appearance in the area in the late 1990's did not result in long-term, sustainable population increases as in the other species. A final Columbid, Ruddy Ground-Dove, is extremely rare in the state and was recorded during only one Albuquerque CBC.

Despite these noticeable changes in abundance of various Columbids over time, there was no evidence of any competitive (negative) effect of a newly occurring species on

those previously found on the count. In fact, abundances of White-winged Dove (the new species) and Mourning Dove (the previously occurring species) were significantly positively correlated with each other as were abundances of Eurasian Collared-Dove (the new species) and White-winged Dove (the previously occurring species). This suggests that rather than any displacement or competition between the new and previously occurring species, there was an increase in Columbidae in general in the region. This was supported by the regression of total number of Columbidae counted (without Rock Pigeon) per party hour against year, which was highly significant with an increase of about 0.194 doves per party hour per year ($P < 0.001$, $r^2 = 0.56$). Although it makes intuitive sense that taxonomically and ecologically similar species such as the Mourning and White-winged Dove and Eurasian Collared-Dove should compete with each other as their respective abundances change through time, this is primarily an anecdotally reported effect (Romagosa and McEneaney 1999, Romagosa and Labisky 2000, Romagosa 2020) and is not supported by data from the Albuquerque CBC nor by other studies (Poling and Hayslette 2006).

It seems reasonable to hypothesize that these consistent increases in the abundance of Columbidae in early winter the Albuquerque area were due to a combination of more and better quality Columbidae habitat as the urban/suburban area has grown, more bird feeding stations, and continuing increases in temperature (Gonzalez et al. 2018, Frankson et al. 2019). All these hypotheses represent areas for future research and analysis. Interestingly, all three of the dove species regularly counted showed a decline and relative stabilization of numbers starting in the mid-2010's after a period of continuous increase (Figure 3). Since the factors presumably driving Columbidae increases have undoubtedly continued in recent years, other explanations for this apparent stabilization at lower numbers could include predation by the growing urban population of Cooper's Hawks (*Accipiter cooperii*), which is known to feed substantially on doves in the Albuquerque area (Millsap 2018, Rosenfield 2020) and shows steadily increasing populations on the Albuquerque CBC (Mehlman unpubl. analysis), some undetected disease, or a functional limit on the population size. Scheidt and Hurlbert (2014) found a decline after rapid growth in older populations of Eurasian Collared-Dove at sites in the U.S. and suggested it may be an indication of local carrying capacity being reached. All these hypotheses, as well as alternative explanations, require further investigation; the Columbidae species discussed show low susceptibility to viral and other diseases (LaDeau et al. 2007, Mueller 2004, Otis et al. 2008, Romagosa 2020, Schwertner et al. 2002). The case of Columbidae on the Albuquerque CBC provides a very interesting study of changing bird populations over decadal time scales and at local spatial extents. The CBC also demonstrates the value of citizen science projects for documenting trends as well as posing numerous interesting questions for those studying changing environmental variables and their interactions in central New Mexico.

ACKNOWLEDGEMENTS

These analyses are only possible due to the substantial effort put in over decades by participants in the Albuquerque CBC (almost 2,000 people have participated since

1961!), sector leaders, and count compilers. The National Audubon Society collects, reviews, and maintains the CBC database from which these data were extracted. I thank Sandy Williams for asking me the question that stimulated the preparation of this paper and for reviewing an initial draft and Will Jaremko-Wright and Michael McCloy for helpful comments and revisions.

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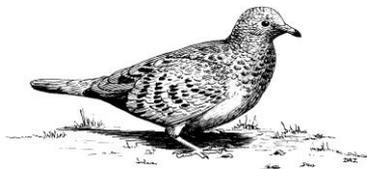
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* * *



NOTE FROM THE PRESIDENT

I hope everyone is weathering this crazy pandemic as best you can. If you are like me, birds and birding have made it much more bearable. I suspect many of us have found new places to bird within short distances of home. I also hope that you've been documenting your birding in eBird and reporting rare birds to Sandy Williams.

And now for a gentle reminder to please pay your annual membership dues. Visit www.nmbirds.org to download a membership form or to pay via PayPal. You are all important parts of the network that serves to promote understanding and interest in the bird life of New Mexico. Whether you are someone who has previously shared and contributed to our state's collective understanding of the distribution and status of birds in New Mexico, or if you are an active follower of this information for conservation or other purposes, you can be a vital contributor to this network. Please renew your membership and continue the commitment. New members will receive a Dale Zimmerman print, so please encourage others you know to join.

"The Annotated Checklist of the Birds of the Village of Corrales and the Corrales Bosque Preserve" by Janet Ruth and David Krueper is available as a special publication on www.nmbirds.org. Downloadable free of charge, this 125-page publication is in PDF format and includes many beautiful photos. Special thanks to Janet Ruth and Dave Krueper for persevering with this effort despite the pandemic as well as David Mehlman for editing this volume.

Through the past year, we continued working on the latest edition of the NM Bird Finding Guide. It will be in production soon and available in Spring 2021. Check www.nmbirds.org and our Facebook page for updates on availability.

As always, we encourage you to contribute to NMOS publications through submission of manuscripts to NMOS Bulletin and sightings information to NMOS Field Notes. Submission information can be found on our website.

When you visit the website please be sure to check out the merchandise – ball caps are available in several colors and the 3rd edition Bird Finding Guide is available for the reduced price of \$10. If you are on Facebook, please LIKE and FOLLOW the NMOS Facebook page. Many thanks to Nancy Hetrick for managing the website and Matt Baumann and Megan Ruehmann for managing the Facebook page.

Thank you all and I look forward to "seeing" you at the annual meeting!

— Kathy Granillo, NMOS President

* * *

REVIEWERS FOR NMOS BULLETIN VOLUME 48

The New Mexico Ornithological Society and the Editor of the *Bulletin* thank the following individuals who served as reviewers for manuscripts that appeared in Volume 48 of the *Bulletin*: Bill Howe, Will Jaremko-Wright, and Michael McCloy.

**NEW MEXICO ORNITHOLOGICAL SOCIETY
FINANCIAL STATEMENT FOR 2020**

Combined Balance as of 1/1/20:

Total \$25,436.41

Net Transactions from 1/1/20 through 12/31/20:

Membership Dues*	1,948.22
NM Bird Finding Guide Sales*	419.27
NM Field Checklist Sales	0.00
NMOS t-shirts	-415.00
Zimmerman Print Sales	0.00
Annual Meeting (meeting not held)	-500.00
Donations and Deposits	4,000.00
Miscellaneous Income	30.93
Interest	3.06
Printing, Postage, and Shipping	-777.10
Grants	0.00
Database/Bird Finding Guide	0.00
Storage Unit Rental (two years)	-643.00
P.O. Box Rental	-288.00
Internet Services	-117.00
Miscellaneous Expenses	0.00
Simple 990 Payment	0.00
Total Transactions (net)	\$3,661.38

Total 2020 Ending Balance \$29,097.79

Balance as of 12/31/20:

Checking Account Balance	\$8,605.41
Savings Account Balance	\$20,492.38

12/31/20 Balance (combined) **\$29,097.79**

*indicates total net income for PayPal transactions (service fee has been deducted from the total)

Date: January 30, 2021

Submitted by:
David J. Krueper, Treasurer

NMOS 58TH ANNUAL MEETING ANNOUNCEMENT

The previously scheduled 58th Annual Meeting for Saturday, March 28, 2020, was cancelled as our state shut down all but essential businesses and we were asked to stay home. Therefore, **we will have the 2021 annual meeting on March 26 and 27, 2021, as a virtual meeting, to be held over Zoom.** It will consist of two afternoons of presentations and opportunities to interact. It will be free of charge with an opportunity to donate to NMOS to support our student scholarships. If you would like to present a paper (from the comfort of your home!), please submit an abstract to Chuck Hayes clhayes@unm.edu as soon as possible. Information on this annual meeting will be available at www.nmbirds.org.

* * *

NMOS FUNDRAISING TRIPS

The previously announced NMOS Fundraising Trips have been postponed and tentatively rescheduled to 2021 and beyond due to the coronavirus/COVID-19 health crisis and ongoing travel restrictions. Please check our website (www.nmbirds.org) and Facebook page for updates.

Tour Schedule:

- Belize, October 2021
- Caribbean: Greater Antilles Megatour, February, 2022
- Colombia, Fall/Winter, 2022/2023
- Trinidad & Tobago, Fall/Winter, 2023/2024

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MEMBERSHIP DUES REMINDER

Please take the opportunity now to pay your 2021 NMOS membership dues. To join or renew your membership, go to our website (www.nmbirds.org/membership) and pay using PayPal (save a stamp, pay online!) or download the membership form, fill out, and mail to the following address, providing a check made out to “NMOS.” Thank you!

New Mexico Ornithological Society
P.O. Box 3068
Albuquerque, NM 87190-3068

New Mexico Ornithological Society
— Founded 1962 —

The New Mexico Ornithological Society was organized to gather and disseminate accurate information concerning the bird life of New Mexico; to promote interest in and appreciation of the value of birds, both aesthetic and economic; to further effective conservation of the state's avifauna; to facilitate opportunity for acquaintance and fellowship among those interested in birds and nature; and to issue publications as a means of furthering these ends.

Membership and Subscriptions: Membership in the New Mexico Ornithological Society is open to anyone with an interest in birds. Memberships are for a calendar year and annual dues are payable 1 January. Dues are: Regular Membership \$20; Family \$30; Student \$10; Supporting \$50; Life \$500. Address for the New Mexico Ornithological Society: Post Office Box 3068, Albuquerque, NM 87190-3068.

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The *Bulletin* is published quarterly; subscription is by membership in NMOS. The *Bulletin* serves two primary purposes: (1) to publish articles of scientific merit concerning the distribution, abundance, status, behavior, and ecology of the avifauna of New Mexico and its contiguous regions; and (2) to publish news and announcements deemed of interest to the New Mexico ornithological community.

NMOS members are encouraged to submit articles and news. Articles received are subject to review and editing. Published articles are noted in major abstracting services. Please submit articles in double-spaced electronic format, such as a Microsoft Word document, by e-mail to the Editor (see inside front cover). Refer to recent issues of the *Bulletin* for examples of style. News items may be submitted to the Editor by way of e-mail.

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