

Sacramento Purple Martin Nesting Population in 2017: First Increase in 12 Years

Daniel A. Airola, Northwest Hydraulic Consultants, 2600 Capitol Ave Suite 140,
Sacramento, CA 95816. dairola@nhcweb.com

Dan Kopp, California Department of Parks and Recreation, One Capital Mall,
Suite 410, Sacramento, CA 95814. dan.kopp@parks.ca.gov

The Sacramento area population of the western Purple Martin (*Progne subis aboricola*) is the last sizable breeding population in California's Central Valley, where it was once widespread. The Sacramento population declined by 81% from 2004 to 2016 and is highly imperiled (Airola and Kopp 2017). The Purple Martin is considered a species of special concern by the California Department of Fish and Wildlife due to declines in the extent of its geographic range and numbers (Airola and Williams 2008).

We report results of the 2017 breeding season, our 16th consecutive year monitoring the Sacramento martin breeding population.

STUDY AREA

As since 2002, we surveyed for nesting Purple Martins at longer overpasses and elevated freeway sections ("bridges") in the Sacramento area that were occupied or suitable for nesting use by the species. In 2017, we surveyed all 14 sites where martins have nested over the last decade (Table 1), and 10 additional suitable sites that have not been previously occupied (See RESULTS AND DISCUSSION). For colony locations see Airola and Grantham (2003), Leeman et al. (2003) and records in eBird (www.ebird.org)

METHODS

As in previous years, we conducted at least seven visits per colony with >1 pair and at least five visits to colonies with one pair, except at Arden, which was found late in the season and surveyed only three times. We mapped martin entry into "weep" holes in the undersides of bridges and recorded diagnostic breeding behaviors (i.e., carrying food to nests, removing fecal sacs, begging by nestlings, and nestlings perched at hole entrances; Airola and Grantham 2003). We confirmed diagnostic breeding behaviors for all 2017 pairs except two that likely failed during the incubation or early nestling stage.

To evaluate potential effects of rainfall on breeding populations, we summarized rainfall data using records for the *Sacramento WB City* weather station (<http://cdec.water.ca.gov/>) for October to June, the period prior to and during each nesting season.

Table 1. Number of breeding pairs of Purple Martins in the Sacramento region, California, 2002-2017.

Colony	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
I Street	37	29	35	32	17	11	6	5	4	5	7	5	7	11	7	4
20 th Street	14	21	23	23	16	15	6	5	1	3	2					
Sutterville	4	6	8	5	6	6	5	6	8	10	10	10	1			1
Broadway	8	7	7	7	7	5	1	1								
S Street	14	14	16	14	14	18	9	7	6	7	7	3	4	6	5	6
35 th Street	29	19	15	14	14	6	3	3	1	2	3	1	2	1	1	4
Redding Rd.	0	3	12	10	14	14	14	15	17	16	20	20	13	10	9	12
Arden	ns ^a		3	6	13	9	11	12	9	3						1
El Camino	ns	15	23	21	21	20	11	5	10	7	7	3			1	1
Marconi	ns	1	4	3												1
Roseville Rd.	29	39	27	24	24	17	17	13	11	12	9	10	7	10	7	9
Airbase	ns			1	1											
Hwy 65/ Taylor	ns	ns	ns	ns	ns	ns	1	1			1					
Pole Line	ns	2														
Total	135	156	173	160	141	106	83	70	68	70	64	46	30	36	33	34

^ans = not surveyed; blanks = surveyed and no pairs were present

RESULTS AND DISCUSSION

Nesting Population Status and Colony Occupancy

A total of 34 Purple Martin pairs nested at Sacramento colonies in 2017. This number is an increase by 1 pair (3%) from 2016 and represents the first real increase in the nesting population since 2004 (Table 1, Figure 1). An apparent increase in nesting pairs in 2015 was not a true increase in the size of the population, but rather was a result of our method of counting only active nesting pairs. Predation by American Kestrels (*Falco sparverious*) caused adults to abandon the Sutterville colony so that nesting did not occur in 2014; this reduction then created an artificial increase in 2015, as displaced birds relocated to other colonies (Airola and Kopp 2013, 2015).

With the small 2017 population increase, the Sacramento martin nesting population has declined by 80% from its high of 173 pairs in 2004 (Figure 1). Numbers of nesting pairs decreased substantially in 2017 at the I St. colony site (by 3 pairs; 43%) and at Redding Ave. (by 5 pairs; 42%) and increased substantially (by 3 pairs; 300%) at 35th St. (Table 1). The changes in use of these colony sites in 2017 were not associated with observable changes in habitat conditions.

Purple Martins nested at nine colony sites in Sacramento during 2017 (Table 1), which represents an increase by three colonies from 2016 and by five colonies from 2015. All newly occupied 2017 sites had been occupied in past years, when the martin population was substantially more abundant (Table 1). Recolonization was by single pairs at Marconi (last used in 2005), Arden, (2011), and Sutterville (2014).

The recolonization of sites that had been long abandoned is consistent with the view that a specific set of conditions define suitable habitat for Purple Martins in urban Sacramento. Recolonists at all three 2017 sites likely were not hatched at these colonies. Rather the colonists appeared to have selected the sites because of the conditions we previously described as determining suitable habitat: long (>85 m;) box-girder type overpasses and elevated roadways (usually associated with railroad or light rail tracks) with adequate flight access, low traffic, and at least 6 m of unobstructed airspace below (Airola and Grantham 2003).

Colonists at two of the three recolonized sites were pairs with after-second-year (ASY) males, while one (Sutterville) had a second-year (SY) male. (We could not reliably determine age of females in the field.) Combined with the two sites recolonized in 2016 (Airola and Kopp 2017), only 3 of 5 recent recolonizations were by ASY males and 2 were SY males. This pattern differs from what we previously described during a period of rapid population growth, when most colonists were SY birds (Airola et al. 2004), as has been described generally for the species (Brown and Tarof 2013).

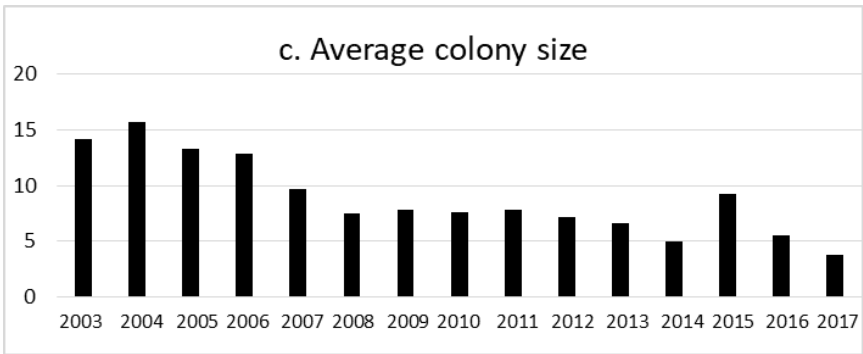
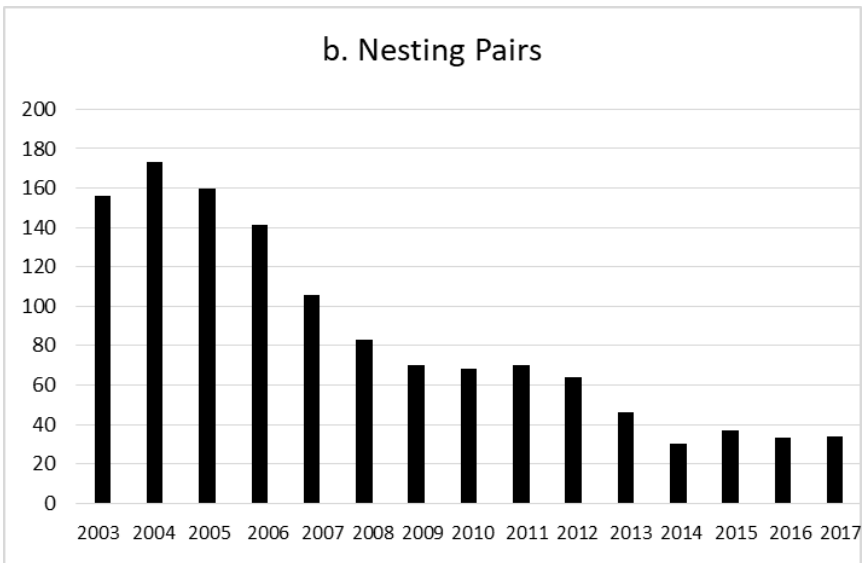
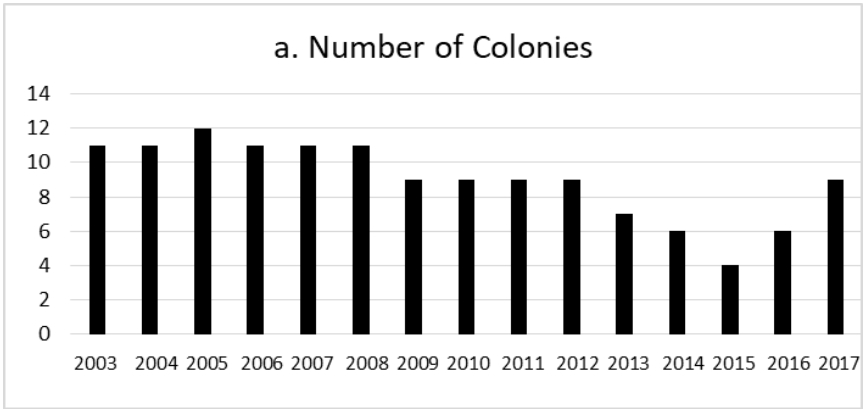


Figure 1. Changes in the number of Purple Martin nesting colonies, nesting pairs and average number of nesting pairs per colony in Sacramento 2003-2017.

The recolonization at the Sutterville overpass site occurred in the second breeding season that American Kestrels were absent from the site. Predation by Kestrels had caused abandonment of that site over 2014 and 2015 (Airola et al. 2014). Kestrel absence in 2017 may have been related to the colonization of the adjacent Sacramento City College by a pair of Peregrine Falcons (*Falco peregrinus*).

Other than the absence of kestrels at Sutterville, no obvious changes occurred at either continuing colony sites or at recolonized sites that would explain why some adult birds apparently abandoned existing colony sites and recolonized former sites. Our past color-banding studies have shown adults to have high fidelity to colony sites that they have bred at in the past (Airola, unpub. data). Perhaps there were predation threats that we did not detect in our visits or localized foraging conditions became more favorable at certain sites as a result of higher rainfall in 2017.

The average size of the colonies in 2017 (3.8 pairs/colony) declined to the lowest number since continuous monitoring began in 2003 (Figure 1). This low number resulted from both declines at several sizable colonies and recolonization of sites by single pairs. The 2017 nesting season was the first year in which no colony exceeded 8 pairs during the 23 years that monitoring has occurred since 1992 (Table 1; Airola and Grantham 2003).

The 2017 precipitation in Sacramento was 95 cm (37.5 in.), nearly double the 20-year average (Figure 2). The 2016 precipitation was 22% above the average, 2014 was average, and 2013 and 2015 were about one-third of average.

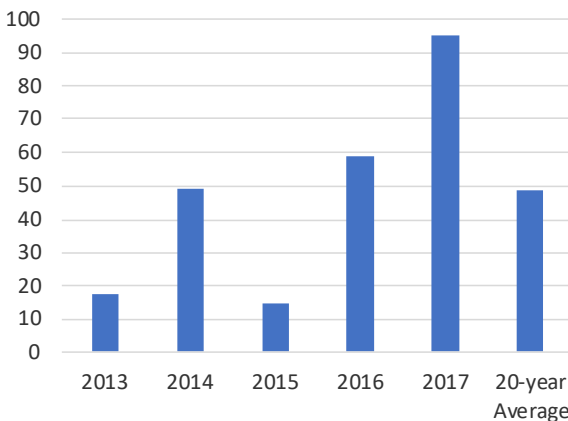


Figure 2. Annual rainfall (cm) in Sacramento prior to and during the 2013-17 Purple Martin nesting seasons (October-June) and the 20-year average.

Possible Causes for Population Increase

The 2017 nesting population increase, although modest, is nonetheless noteworthy as the first in 12 years. The increase in nesting pairs is proximately attributable to increased nesting by SY birds. Six (18%) of 34 nesting pairs in 2017 included SY males. This number is substantially higher than occurred in the previous four years (i.e., 6% in 2013 and 2016 and 0% in 2014 and 2015).

We can't exclude the possibility that the small increase in 2017 population, and the proportion of pairs with SY males, could be a random event with no single immediate cause. Nonetheless, the coincidence of these increases with the substantial increase in rainfall in 2017 suggests it may be an ultimate explanation for the increase in SY breeders and total breeding pairs. Rainfall was substantially below average in 2013 and 2015, average in 2014, and 22% above average in 2016, but was nearly double (+97%) the average in 2017 (Figure 2). Increased rainfall could have affected nesting by SY birds by increasing aquatic habitat and resulting flying insect food supply. It is also possible that increased rainfall diluted pesticides and their effects on insect populations (see Airola et al. 2014).

Conservation Challenges

Several in-fill construction projects affected habitat conditions adjacent to the Redding Ave. colony site in 2017. The 225-unit housing project "The Crossings" began construction this year immediately southeast of the colony, removing a grassland area adjacent that produced many insects. A second, long-vacant site 130 m (400 ft) west of the Redding Ave. colony also was under development as a hotel during the 2017 nesting season. The martins, as well as White-throated Swifts (*Aeronautes saxatalis*) and Cliff Swallows (*Petrochelidon pyrrhonota*), have foraged over the grassland site for many years. Effects of the food supply loss on the colony are unknown, but other fully urbanized sites have persisted in Sacramento (Airola and Grantham 2003, Leeman et al. 2003, Airola and Kopp 2017). Both sites also have served as a foraging area for the resident American Kestrels, whose nest is in a nearby building. Effects of development on kestrel predation on martins, which has been a long-term issue (Airola and Kopp 2013), is unknown. Loss of open space could cause kestrels to abandon the site, but if they persist and populations of Cliff Swallows and swifts decrease, it could intensify predation on martins.

Although the Purple Martin nesting population declined at Redding Ave. in 2017, it is not clear that construction caused it. Declines have occurred over the years at other sites that were not disturbed, and previous, intensive studies of development directly beneath a colony during the height of the nesting season showed a negligible effect on martin nesting populations or nesting success (Airola et al. 2009).

No major changes in on-the-ground conditions occurred at other colony sites in 2017, and we are not aware of any newly proposed land use proposals that could pose issues for Purple Martins in Sacramento. The number of nesting pairs at S St., where we previously expressed concerns about construction of a grocery store next to the colony (Airola and Kopp 2017), increased by one pair and all appeared to have fledged young, suggesting that the martins have successfully adjusted to the change. We are not aware of any changes in the status of the proposed project to replace the I St. bridge, the on-ramps to which house the I St martin colony.

In summary, the modest 2017 increase in the Sacramento Purple Martin breeding population is encouraging after so many years of decline, but hardly reassuring. Continued vigilance in monitoring and protecting this imperiled population continues to be warranted.

ACKNOWLEDGMENTS

We thank the staff of the California State Rail Museum for their continued cooperation during our surveys, Jimmy Pan for summarizing rainfall records, and Stan Kostka for useful discussion.

LITERATURE CITED

- Airola, D.A., B. Cousens, and D. Kopp. 2014. Accelerating decline of the Sacramento Purple Martin breeding population in 2014: What are the possible causes? *Central Valley Bird Club Bulletin* 17:12-22.
- Airola, D.A., and J. Grantham. 2003. Purple Martin population status, nesting habitat characteristics, and management in Sacramento. *Western Birds* 34:235-251.
- Airola, D.A. and D. Kopp. 2013. Sacramento Purple Martin nesting population: decline continues and a new predation threat emerges. *Central Valley Bird Club Bulletin* 16:39-49.
- Airola, D.A. and D. Kopp. 2015. Sacramento Purple Martins in 2015: when a population increase can be misleading. *Central Valley Bird Club Bulletin* 18:69-75.
- Airola, D.A. and D. Kopp. 2017. Status of the Sacramento Purple Martin breeding population in 2016: yet more decline. *Central Valley Bird Club Bulletin* 20:18-23.
- Airola, D.A., D. Kopp, and S. Kostka. 2004. Purple Martin population status and colonization patterns in the Sacramento region in 2014. *Central Valley Bird Club Bulletin* 7:71-77.
- Airola, D.A., D. Kopp, K. Thomas, and S. Kostka. 2009. Effects of construction activities on a Purple Martin nesting colony in Sacramento, California. *Central Valley Bird Club Bulletin* 12:8-16.

Airola, D.A. and B.D.C. Williams 2008. Purple Martin (*Progne subis*). In: California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. W.D. Shuford and T. Gardali (editors). Studies of Western Birds 1. Western Field Ornithologists, Camarillo, CA and California Department of Fish and Game, Sacramento, CA.

Brown, C.R. and S. Tarof. 2013. Purple Martin (*Progne subis*), in: The Birds of North America (P.G. Rodewald, Ed.) Ithaca: Cornell Lab of Ornithology; retrieved from the Bird of North America: <https://birdsna.org/Species-Account/bna/species/purmar> DOI: 10.2173/bna/bna.287.

Leeman, T.S., D.A. Airola, and D. Kopp. 2003. 2003 status of breeding Purple Martins in Sacramento. Central Valley Bird Club Bulletin 6:61-68. http://www.cvbirds.org/CVBC_Bull/V.6no.4/V6.no.4pp61-68.pdf.



Common Raven (*Corvus corax*). 23 September 2014. Marin Co., California.

Photo © Daniel A. Brown