

The Decline in the Sacramento Purple Martin Nesting Population Slows During 2010-2012

Daniel A. Airola, Northwest Hydraulic Consultants, 3950 Industrial Blvd #100c, West Sacramento, CA 95691

Dan Kopp, 8295 La Riviera Drive, Sacramento, California 95826

We have monitored the nesting population of the Purple Martin (*Progne subis*) in the Sacramento area annually since 2002 (Airola and Kopp 2009). The Sacramento area martin population is a remnant of a population once more widespread in California's Central Valley (Airola and Williams 2008). Reductions in the species' geographic range and numbers have resulted in its designation by the California Department of Fish and Game as a species of special concern (Airola and Williams 2008).

We last summarized population status as of 2009 and showed that from 2004 through 2009 the population declined by 60% (from 173 to 70 pairs), prompting substantial concern regarding the future of this population (Airola and Kopp 2009). Here, we report the population's status during 2010 through 2012 and implications of recent trends for conservation of the species.

STUDY AREA AND METHODS

We surveyed Purple Martins at bridges in the Sacramento region (Sacramento, Yolo, and western Placer counties) previously identified as occupied or suitable for use by the species. Locations of colonies and other suitable sites, and the criteria used to define them, were described by Airola and Grantham (2003), Leeman et al. (2003), and Kopp and Airola (2007).

Survey methods included mapping of holes in which martins nested, recording diagnostic nesting behaviors (i.e., carrying food to nests, removal of fecal sacs, juvenile begging, or nestlings visible in holes; Airola and Grantham 2003, Leeman et al. 2003). These methods provide a consistent and repeatable basis for estimating numbers.

We confirmed breeding through observation of diagnostic nesting behaviors of >97% pairs in 2010 and 2011 and 89% in 2012. Nesting by the other pairs (one in 2010, two in 2011, seven in 2012) was inferred based frequent hole entry by pairs over the nesting season (see Airola and Grantham 2003).

RESULTS

In 2010 and 2011, Purple Martins bred in the same 9 colony sites they used in 2009 (Table 1). In 2012, martins abandoned one colony site (Arden), apparently as a result of consolidating at the nearby El Camino site where numbers increased. Also in 2012, a single pair of Purple Martins that included a second-year male recolonized the Highway 65 site in Roseville (Kopp and Airola 2007), which had not been used since 2008 (Table 1).

Purple Martins did not reoccupy several formerly used sites including Broadway, Marconi, and Airbase (Sacramento County), or Pole Line (Yolo County), nor did they colonize any previously unoccupied sites that had been considered suitable. (See Leeman et al. 2003 and Kopp and Airola 2007 for locations of former colonies and other suitable sites.)

The number of pairs of Purple Martins nesting in the Sacramento region declined from 70 pairs in 2009 by 2 pairs (2.8%) in 2010, recovered to 70 pairs in 2011, and then declined by 8.6% to 64 pairs in 2012 (Table 1). The 8.6% rate of decline over the three year period (= 2.9% average annual rate of decline) was lower than the annual declines of 8-25% (average = 16%) during 2004-2009 (Airola and Kopp 2009). Nonetheless, the 2012 population reached the all-time low of 64 pairs, a decline by 63% since the high population in 2004 (Table 1).

Patterns of breeding population changes between 2009 and 2012 varied at different colonies. Numbers at six colonies increased, one remained the same, and three declined; Table 1). The largest change was at the Arden colony, which declined from 12 to zero pairs over the period. None of these changes were associated with any obvious change in site condition or human disturbance levels. In contrast to previous patterns of substantially sharper declines in the nesting population at colonies in denser urban areas (I St, 20th, S St. 35th St), than in less dense colonies on the urban periphery (Airola and Kopp 2009), over 2010-2012 populations remained the same at urban colonies and decreased more rapidly (by 11%) in peripheral colonies (Table 1). This difference, however, was not significantly different from a uniform pattern across all sites ($\chi^2_{1 \text{ d.f.}} = 0.185, p = 0.67$).

The moderate increase in nesting pairs at the I St. colony (from 4 to 7 nesting pairs between 2010 and 2012), located between the California Railroad Museum and Downtown Railyards project is encouraging, in that it occurred while major construction occurred as part of the Downtown Railyards project. Construction here included removal of electrical wires that served as the primary perch site for martins at this colony prior to the 2012 nesting season and relocation of the adjacent railroad tracks during the 2012 nesting period. Martins readily adopted a replacement perching wire installed at our recommendation in 2011 as mitigation for removal of the electrical wires.

DISCUSSION

Causes for recent more moderate population declines in the Sacramento Purple Martin population, as well as the previous more severe decline over 2004-2009, are not well-understood. Determining the proximate and ultimate causes for the decline are complicated by the multiple potential influencing factors and difficulty of acquiring data on reproduction and mortality rates.

Although not rigorously examined, results of color-banding studies during 2003-2008 suggested that adult mortality rates in the Sacramento population were higher than at other studied populations, potentially implicating vehicle collisions as a cause of population depression (Airola and Kopp 2009). Vehicle traffic, however, presumably did not change substantially during 2010-2012. Therefore moderation of the decline suggests that other factors may be important, including previous years' reproduction (as influenced by a variety of factors potentially including weather and resulting prey productivity) and mortality during migratory and wintering periods. The accumulated 11-year record of population monitoring may permit future evaluation of effects of temperature and seasonal rainfall on subsequent years' breeding populations.

Although the rates of decline in the nesting population of Purple Martins moderated in 2010-2012, this small population nonetheless continues to decline and remains at severe risk of future extirpation. Several active and approved projects to widen highways at overpasses that currently or formerly support Purple Martin nesting colonies, and proposals to develop adjacent lands, have potential to directly disturb nesting birds and degrade habitat conditions (Airola and Kopp 2009). As the last sizable Central Valley population, the Sacramento Purple Martin nesting population remains both a challenge and priority for conservation.

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Table 1 Number of breeding pairs of Purple Martins in the Sacramento region, California, 2002–2012

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

^ans = not surveyed.

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