

## Status of breeding Purple Martins in Sacramento in 2003



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The Purple Martin (*Progne subis*) is recognized by the California Department of Fish and Game (DFG) as a First Priority Species of Special Concern as a result of substantial declines in range and population in the state (Remsen 1978, Williams 1998). This species formerly nested in tree cavities and buildings throughout California's Central Valley, but following the arrival of the European Starling (*Sturnus vulgaris*), has virtually disappeared from the region except for a small population that has persisted in Sacramento (Airola and Grantham *in press*). This paper reports on results of habitat surveys, population monitoring, color banding, and blood sampling, and other management actions conducted and evaluated in 2003.

Martins have nested in weep holes in freeway and street overpasses in Sacramento since the mid-1960s (Airola and Grantham *in press*), and in bridges along Highway 1 in several coastal counties since the 1980s (Williams 1998, Roberson 2002). Weep holes are vertical holes constructed into the underside of some hollow box girder elevated freeways, overpasses and bridges to relieve air pressure and drain condensation (Kostka et al. 2003). Regular monitoring of Sacramento colonies began in the early 1990s. Grantham and Airola monitored known breeding colonies in 1991 and 1992, and Grantham continued to monitor one of these sites until 1997; Williams (1998) monitored Sacramento colonies from 1993 to 1995. No systematic monitoring occurred after these dates until 2002.

In 2002, Airola reinitiated monitoring efforts and coordinated a group of volunteers to systematically survey potential habitat in the Sacramento area and to document breeding population sizes at all known colonies in 2002. A summary of work conducted on the biology of Purple Martins breeding in Sacramento through 2002, including trends in colony number and sizes, habitat characteristics, and evaluation of management actions will be published elsewhere (Airola and Grantham, *in press*). The 2002 survey identified 7 nesting colonies, up from 4 known colonies in the early-mid 1990s (Airola and Grantham, *in press*). These discoveries prompted us to undertake more systematic survey of potential nesting habitat in the Sacramento area in 2003.

## Surveys of Potential Nesting Habitat

Airola and Kopp subjectively evaluated bridge sites in the Sacramento area to estimate their suitability as potential martin nesting sites based on the characteristics of the 7 previously used sites. Characteristics used in estimating suitability included: bridge design (i.e., box girder construction), bridge length >80 m, availability of >6 m of unobstructed vertical airspace beneath the site, relatively low traffic volumes, and adequate unobstructed martin flight access (see Airola and Grantham, *in press*). Suitability of visited sites was characterized as high, low, and unsuitable; high- and low-suitability sites were surveyed for martins, and if martins were found, the sites were surveyed more intensively to estimate numbers of breeding pairs.

Of 101 bridge sites visited (including 7 previously identified colonies), Airola and Kopp considered 67 unsuitable for martin use, 9 of low suitability, and 25 of high suitability. Most of the unsuitable sites consisted of standard freeway overpasses that were too short and supported substantial traffic volumes beneath them; no such sites have been found to support nesting martins in Sacramento. Of high suitability sites, 10 were active (nesting occurred, see subsequent section), 2 were occupied but not active (martins were seen at the site but no nesting documented) and 13 were not occupied (no martins observed). We consider the inactive and unoccupied sites ranked as highly suitable (Table 1) as priority sites for future monitoring to determine if colonization occurs.

## Nesting Population Estimates at Occupied Colonies

As described in more detail in Airola and Grantham (*in press*), trained volunteers visited each occupied colony every 4-8 days through the breeding season (mid-May to early August). Because nest sites are inaccessible for direct observation, monitors plotted martin use of weep holes on site maps. Data collected included number of hole visits observed, age and sex of birds using each hole (recorded as after-second-year [ASY] males, non-ASY-males, or unknown) and breeding behaviors. A hole was considered to support a breeding pair based on the observation of:

- young within nest holes,
- diagnostic nesting behaviors (i.e., adults observed carrying food to, or fecal sacs from the hole), or
- a combination of frequency and duration of hole use, observation of nest building, presence of dead young, or accumulations of fecal material beneath holes.

During the 2003 breeding season, we documented 154 nesting pairs of Purple Martins breeding at 10 locations in the Sacramento area (Figure 1, Table 2).

Table 1. Suitable bridge sites not actively used by nesting Purple Martins in the Sacramento area in 2003.

Bridge Site	Specific Location	Suitability		Occupied — Not active
		Low	High	
Interstate 80	I-50 interchange	X		
	Reed Avenue	X		
	Northgate Blvd.	X		
	Natomas East Main Drain		X	
Union Pacific Railroad and Auburn Blvd.—Roseville Road Overpasses	Arden Way			X
	Airbase Drive			X
	Walerga Road	X		
	Elkhorn Blvd.		X	
Capital City Freeway	Antelope Blvd.		X	
	6 <sup>th</sup> to 15 <sup>th</sup> Streets	X		
	21 <sup>st</sup> to 26 <sup>th</sup> Streets M to Q streets		X	
Interstate 50	Folsom Blvd. <sup>A</sup>		X	
	Mayhew Road	X		
	Folsom Blvd. <sup>B</sup>		X	
American River	Howe Ave. Bridge		X	
	Sunrise Blvd. Bridge	X		
	Havel Ave. Bridge		X	
Natomas East Main Drain	Hwy. 160/Northgate	X		
	Arden-Garden connector/Bannon Slough		X	
	Discovery Park Freepoint Blvd.		X	
Interstate 5	Discovery Park Freepoint Blvd.		X	
	Freepoint Blvd.		X	
Other sites	San Juan Rd. overpass of Union Pacific Railroad and Natomas Main Drain		X	
	Union Pacific overpass of Laguna Blvd.	X		
<b>TOTALS</b>		9	13	2

A = Folsom Blvd. between Bradshaw Road and Watt Avenue; B = Folsom Blvd. near Ironpoint Road.

Three new breeding locations were documented in the Sacramento area in 2003: the El Camino overpass of the Union Pacific Railroad (UPRR) tracks (15 pairs), Marconi Way at the UPRR tracks (1 pair), at Highway 50 at Redding Rd (3 pairs). The El Camino colony is assumed to have been occupied but not detected prior to 2003, based on the presence of a high proportion (>90%) of pairs with ASY males. Second year male martins were observed exclusively or in high proportion at the new Redding Road and Marconi colonies, consistent with typical pioneering behavior of second

Figure 1. Purple Martin nesting locations in Sacramento, Sacramento County, in 2003.

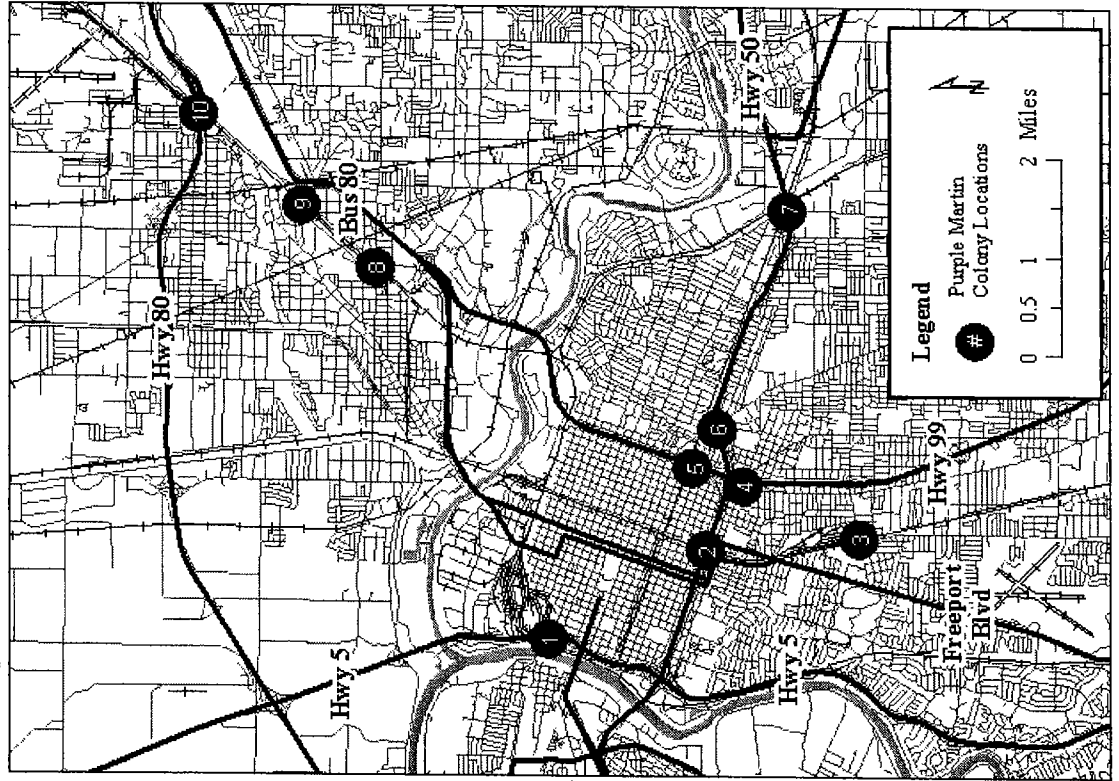


Table 2. Purple Martin breeding colony locations and population sizes in the Sacramento Region, 2003

Map #	Colony	Location	Nesting Pairs
1	I Street	I-5 at I Street and I St. Bridge Ramp above California State Rail Museum parking lot	29
2	20th Street	I-50 at 18th to 20th Street	21
3	Sutterville	Sutterville Road over Union Pacific (UP) Rail Yard	6
4	Broadway	I-50 west offramp from west to Route (SR) 99 south and SR 99 north offramp to I-50 east at Broadway	7
5	5th Street	Capital City Freeway between R and S Streets	14
6	35th Street	I-50 at 34 Street to Stockton Blvd	19
7	Redding Rd.	I-50 at Redding Road and UP and RT Light Rail tracks (near 65th Street)	3
8	El Camino	El Camino overpass of UP and Light Rail tracks	15
9	Marconi	Marconi Avenue overpass of Auburn Road and UP and Light Rail tracks	1
10	Roseville Rd.	I-80 and Light Rail access ramp at Roseville Road and UP tracks	39
<b>Total</b>			<b>154</b>

year birds. These sites, and a new colony of 2 pairs found in the City of Davis (J. R. King et al. in prep.), warrant continued monitoring to see if colonies become established and grow in size.

### Competitor Interactions

We also documented use of weep holes by European Starlings, White-throated Swifts (*Aeronautes saxatalis*), Northern Rough-winged Swallows (*Stelgidopteryx serripennis*), and House Sparrows (*Passer domesticus*) within martin colony sites. Initial analysis of starling and martin nest hole selection within colonies indicates that starlings may prefer to use the outside (edge) holes of freeways, and that interior (i.e., non-edge) holes could thereby provide martins with a refuge from starling competition (Airola, unpub. data). This limited use by starlings of available nest holes

within bridges may explain the persistence of martins at these sites and warrants further study.

### **Management Actions and Evaluation**

Several management activities have been implemented to protect and enhance breeding sites. In 2003, we secured agreement from Caltrans to protect lands beneath colony sites from leased uses that would impinge on airspace needed by martins. (The first known bridge colony known in Sacramento, in the Capital City Freeway at L St., was eliminated by construction of a 2-story parking garage in the 1970s). We and other cooperators also have initiated a program of installing wire sleeves (nest guards) into weep holes at active colonies. Nestling fallout and inability of fledged young to re-enter holes to roost have been identified as potential mortality factors at weep holes (Kostka et al. 2003, Airola and Grantham *in press*). The nest guards are intended to reduce the incidence of nestling fall-out from holes and to enhance hatching-year birds' abilities to return to roost in nest holes after fledging. The use of nest guards as a management tool initially showed indications of positive results; however their effectiveness at preventing nestling fall-out requires further study.

### **Genetic and Disease Sampling**

In 2003, we also cooperated with an on-going study of western Purple Martin genetics and avian-borne diseases. Laura Darling, a researcher with the British Columbia Ministry of Water, Land and Air Protection, has been collecting blood samples from Purple Martin colonies in Canada, Washington, and Oregon, to assess the relatedness and genetic diversity of western and eastern Purple Martins. We captured and took blood samples from 20 adults and one nestling at four Sacramento colonies to contribute to the genetics study. Results from the genetic analysis are not yet available. We also collaborated with Stan Wright, of the Sacramento-Yolo Vector Control District, who routinely collects avian blood samples to test for bird-borne zoonotic diseases (i.e., diseases transmissible to humans), such as encephalitis and West Nile virus. Wright collected samples from 13 martins captured for the genetics study; none of these samples tested positive for any zoonotic diseases (Wright, pers. comm.).

### **Color Banding to Assess Movements and Dispersal**

With cooperator Stan Kostka, a martin biologist from Washington, we also color-banded 20 adults with a metal band on the right leg and a purple color band on the left leg and collected measurements as part of a larger study to clarify the systematic status of martins in Pacific Coast states and provinces. The band color has been uniquely assigned for use in California

and is inscribed with the white characters "CA" oriented vertically, and a four-digit alphanumeric code oriented horizontally. Bands are best read from behind and below perched birds. Color bands are being used extensively in the Pacific Northwest where banded birds are being successfully tracked within breeding areas; one of these banded martins was found in Sunnyvale, CA during migration (Oregon/Washington Partners in Flight 2000).

We plan to continue monitoring color-banded birds and cooperate in future efforts to band and measure martins in 2004. We are interested in studying movements of adults between established colonies and expansion of breeding to new colonies, and we hope to band hatching year birds to document dispersal from natal colonies to subsequent breeding sites.

### **Future Work and Opportunities for Involvement**

Many opportunities exist to continue monitoring and management activities described here, including surveying for new colonies, monitoring existing colonies, assessing effectiveness of nest guards, and further documenting competitive interactions. We are particularly interested in acquiring new data on nest success through direct monitoring (using remote camera technology), testing our indirect method for population estimation, and monitoring movements of color-banded birds. There is ample opportunity for interested individuals to make meaningful contributions, with efforts ranging from little time commitment (i.e., reading and reporting color-banded birds) to leading independent or integrated studies. We welcome contacts from individuals with interest in contributing to the study and management of Sacramento's Purple Martins.

### **ACKNOWLEDGEMENTS**

We especially thank Stan Kostka, Stan Wright, and Brian Williams for assistance in capturing, measuring, and banding martins and thank volunteer site monitors included Mike Rushton, Ed West, Stephanie Parsons, Rachel Barnett, and Margaret and Bud Widdowson. Stan Kostka also reviewed the manuscript. Laura Darling provided training and coordination on blood sampling. Jon King provided his independent observations at several sites. Julie Mentzer, Gene Moir, Robert Rosas, and Mark Hada supported management activities and access to study sites via Sacramento Regional Transit, Caltrans, and the California State Railroad Museum. Ron Schlorff facilitated receipt of DFG permits for capture. Environmental Sciences Associates and Jones & Stokes provided logistical and production support.

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