Purple Martins Nesting in Low Elevation Transmission Towers in the San Joaquin Valley, California

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The Purple Martin (*Progne subis*) is a species of special concern in California because its geographic range and numbers have declined dramatically (Airola and Williams 2008). It has been eliminated from most formerly occupied areas at lower elevations in the state, except in denser coastal forests or woodlands, presumably due mainly to competition with the non-native European Starling (*Sturnus vulgaris*; Airola and Grantham 2003, Airola and Williams 2008).

Purple Martins nest in a variety of nesting substrates in California, including dead and live trees, wooden poles, bridges and overpasses, underground caves, and nest boxes (Airola and Grantham 2003, Hill et al. 2004, Lindstrand 2008, Elwood et al. 2009). Additionally, Martins have nested in cavities within utility poles of a 60-kilovolt (kV) transmission line in Lake County, California (Woodward and Woodward 2005).

In 2009, we became aware of reports of Purple Martins seen during the nesting season (27 May and 1 June) at transmission towers in the lower foothills of Tulare County in the San Joaquin Valley, California. V. Sylvester surveyed this and adjacent areas in 2010 to determine nesting status and numbers of martins in the area. Here we document nesting by Purple Martins in the utility towers. These observations are notable for their location, elevation, habitat conditions, and the novelty of the nest sites used.

STUDY AREA

Nesting surveys were conducted at accessible towers of the Southern California Edison's Big Creek 3&4 230 kV transmission line at the eastern edge of the San Joaquin Valley in Tulare County, California. The transmission line consists of two parallel transmission lines strung on pairs of adjacent towers spaced an average of 430 m apart. The Dry Creek Road nesting area is 0.5 km east of the junction of State Route (SR) 216 (Lomalita Road) and Dry Creek Road at 200 m elevation. The Yokohl Valley nesting area is 10.25 km WSW of the junction of SR 198 and Yokohl Valley Road at 270 m elevation. The two sites are 15.2 km apart.

METHODS

We became aware of the Dry Creek and Yokohl nesting areas based on records reported by Rob Hansen and Kathy Parker in the Central Valley Birds listserv in 2009. In 2010, Sylvester received directions to the sites from Rob

Hansen, and conducted surveys of the Dry Creek site and other nearby towers along the transmission line to count number of individuals, document nesting behavior and timing, and assess nesting success. Surveys were conducted primarily during mid-morning and evening periods when martins are most active. Ten surveys were conducted between 18 April and 22 July at the Dry Creek site. The Yokohl Valley site was surveyed 8 times between 3 May and 22 July. Nineteen transmission towers in adjacent areas (10 at Dry Creek and 9 at Yokohl Valley) were surveyed at least once during April-July.

Ages and sexes of martins were determined from plumage based on Pyle (1997) and Hill (1999). After-second-year (ASY) males were easily noted by dark plumage. Females could not always be distinguished from potential second-year (SY) males. Therefore, martins in non-ASY male plumage are noted as females only when activity (i.e., close association with an ASY male or nesting activities) indicated that they were likely females. Nesting activity was determined from diagnostic nesting behaviors (Airola and Grantham 2003), including nest building, food delivery flights, and fledgling care. We used Google Earth (earth.google.com) and field observations to characterize habitat conditions at nest sites.

RESULTS

Nesting Observations

Dry Creek

In 2010, John Lockhart reported the first sighting of a martin at the Dry Creek site on 10 April. Sylvester and Lockhart observed a pair of martins at Dry Creek on 18 April. Three ASY males and two females were seen on 3 May, with one female flying within 1 m of the ground as typically occurs only prior to and during nest material collection. Two adult pairs were seen flying in and out of an area around a platform near the top of the tower on 17 May (Figures 1 and 2). On 11 June, only a single pair with an ASY male and a female were seen. They rotated their presence at the tower at 30 minute intervals, a typical pattern for martins that are feeding young in the nest (Airola, personal observation). On 26 June, martins made frequent feeding trips with prey to the towers, indicating feeding of young. On 8 July, an ASY male and female were feeding three fledged young at the tower sites, and no martins remained on 22 July. Most food delivery flights were from the east, where wetland, riparian, and open water habitats occur (see Habitat Conditions at Nesting Areas below).

Four additional martins, including at least one ASY male, were seen 11 June at another pair of towers 1.5 km northwest of the occupied Dry Creek nesting area, but no activity was observed during four subsequent surveys.

Yokohl Valley

No martins were seen during initial surveys on 3 or 17 May. On 11 June,

Figure 1 (above). Tower from the Southern California Edison's Big Creek 3&4 230-kV transmission line used for nesting by Purple Martins in Tulare County, California. Nesting occurs beneath the platform at the top of the tower.

Figure 2 (left). Detail of the top of the transmission tower showing partial cavities formed by the platform and intersecting L-shaped metal supports.

photos by Vic Sylvester

Sylvester observed two apparent nest exchanges among an ASY male and a female. Martins also were seen making frequent food delivery trips to the towers on 26 June and 8 July, and an estimated three fledglings were seen flying with adults around the nest site on 22 July. Checks of eight other adjacent tower pairs on 11 June revealed no other martins.

Nest Site Characteristics

Both nest sites were located near the top of the two metal lattice transmission line towers, approximately 20 m above the ground (Figure 1). The nest site was difficult to observe directly, due to distance and height. Martins at both sites made frequent trips to metal girders beneath a 0.6 x 1.3 m platform near the top of the tower (Figure 2). Although no obvious fully enclosed cavity was present, the structure may provide a partial cavity such as those in buildings and pilings, which have been be used infrequently by martins elsewhere (Brown 1997).

Habitat Conditions at Nesting Areas

The Dry Creek Road nesting area is within annual grassland adjacent to sparse blue oak (*Quercus douglasii*) woodland habitat (as per Mayer and Laudenslayer 1988). Wetland, open water, and riparian woodland habitat within abandoned aggregate mining ponds are 0.4 km to the east, and Lake Kaweah is 2.2 km east of the nest site. Cultivated agricultural lands supporting alfalfa occur within 1 km of the nesting area.

The Yokohl Valley nest area is also within sparse blue oak woodland and annual grassland habitat. Regional characteristics are drier than they are at Dry Creek, supporting only a moderate-sized (2,000 m^2) stock pond and a small, grazed intermittent stream 1.7 km south of the nest site. The stream was mostly dry by July in 2010.

Rainfall during October 2009-July 2010 was 23.8 cm, 65% of the annual averages (based on the nearby National Weather Service Lemon Cove weather station).

DISCUSSION

The Tulare County Purple Martin nesting records are noteworthy because of their geographic location, isolation, elevation, habitat, and nest site location. Lowland areas of the San Joaquin Valley are not known to have ever supported nesting Purple Martins (Airola and Williams 2008). The area is one of only a few interior sites at <300 m elevation occupied by martins in California, most of which are in bridges in urban Sacramento (Airola and Kopp 2009). Upslope areas of the southern Sierra Nevada support only highly localized nesting martins in mid-elevation confer forests (Williams 1998, Airola and Williams 2008), providing a limited source population for colonists of the

low-elevation Tulare sites. The site is approximately 100 km from the nearest known occupied breeding areas in the Tehachapi Mountains (Williams 2002, M. White pers. comm.).

Occurrence of the nesting martins within areas that are dominated by annual grassland is unusual in recent decades (Airola and Williams 2008) because such areas typically support large starling populations (Purcell et al. 2002). Adjacent created wetland and riparian habitats in mined lands and the nearby Kaweah Reservoir may have increased martin attraction to the area. Insect prey populations in the area, such as dragonflies, a common prey species (Brown 1997), were abundant. The rolling topography also may enhance foraging efficiency, as suggested by the pattern of nest site locations elsewhere (Williams 1998, 2002).

Survival and successful breeding in this lowland area, despite the observed presence of starlings, may be a result of nest site characteristics, especially their height in the transmission tower. Martins typically forage at heights above 50 m (Brown 1997), so a high nest site is presumably energetically efficient. Conversely, starlings mainly forage on the ground, so a high nesting cavity would require many energetically costly flights for feeding of nestlings. Therefore, the availability of high cavities may reduce the effects of starling competition on nesting martins.

Nesting use of exposed metal towers in the San Joaquin Valley's hot summer climate would seem to challenge martins, since the metal sites should readily absorb and radiate heat. Because of their heights, it was not easy to view the specific characteristics of nest sites. Martins typically create a loose nest that would appear to convey only moderate insulation from heat. Possibly, martins could be building nests on or within former nest sites of House Finches (*Carpodacus mexicanus*) which appeared to be nesting in close vicinity of the martin nests during 2010. Regardless of the apparent issues, martins appear to have found suitable conditions, as both pairs of martins successfully fledged young.

Documentation of breeding at this site offers several implications for martin populations and detection. Successful breeding at this site suggests that other towers of similar design elsewhere also may be suitable. The lack of general recognition of such sites as suitable suggests that if others are present, they may have been overlooked.

Hundreds of towers of similar design occur as a part of this transmission line, and many appear to be in areas of generally similar habitat conditions. An intriguing possibility, although undocumented, is that martins may have learned to use the transmission line nesting areas within the Tehachapi breeding areas, and have spread north along the transmission line. If so, perhaps more undetected nesting pairs are present in the intervening area.

More thorough surveys of similar sites, especially near wetlands or water bodies that produce high numbers of insect prey, may yield additional nesting pairs. Given the precarious status of martins in other interior lowland areas of California (Airola and Kopp 2009), the Tulare County pairs, and any additional pairs that might occur in similar circumstances, may be of high conservation

value in maintaining regional martin populations.

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