NOTES

WEATHER-RELATED MORTALITY IN SWALLOWS IN THE SACRAMENTO VALLEY OF CALIFORNIA

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Heavy rains, cold temperatures and fog persisted throughout the winter and early spring of 1981-82 in the Sacramento Valley of California. Total rainfall in Chico, Butte County, California, for the period 1 March-15 April 1982 was 21.08 cm, 7.06 cm (50.4%) above normal for the entire months of March and April. Mean daily temperature during March was 11.1°C, a 0.2°C decrease from normal, and during April was 12.6°C, a decrease of 1.4°C (NOAA 1982a,b). During spring, 1982, we observed several incidents of mortality in swallows (Hirundinidae) which we believe were weather related.

On 24 April 1982 we observed over 100 dead swallows (Barn Swallow, *Hirundo rustica*; Cliff Swallow, *H. pyrrhonota*; Tree Swallow, *Tachycineta bicolor*; and Violet-green Swallow, *T. thalassina*) on the floors of two open-sided buildings at Gray Lodge Wildlife Area, Butte County, California. From the locations of the birds, it was apparent that they had fallen from perches at or near death. Most of the birds were in a deteriorated condition, but the few that could be examined were emaciated and thin. Swallows usually return to the Sacramento area in late February or early March (Gaines 1972); the 1982 migration was delayed for a few weeks, but we observed that most swallows had returned by mid-March. During the period 29 March-4 April, Chico received 8.33 cm of rain with 5.08 cm falling on 31 March alone. Mean low temperature for these seven days was 3.8 ± 1.6 (SD)°C, and mean high temperature was 10.4 ± 2.4°C. Mean low temperature recorded in Colusa, Colusa County, a nearby weather recording station, for this same period was 1.7 ± 1.8°C (NOAA 1982a,b). During this period we noted an absence of flying insects; apparently the birds had starved to death. There was no reason to suspect pesticide poisoning as the adverse weather delayed planting and spraying until late spring. Similar phenomena were observed in southern Germany and Switzerland where a freak autumn storm caused a reduction in the available insect prey and resulted in the death of hundreds of Barn Swallows and Common House-Martins (*Delichon urbica*) (Ruge 1974) and in North Carolina where several Purple Martins (*Progne subis*) died during a spring snowstorm (Stewart 1972).

We noted additional cases of weather-induced mortality in swallows during May 1982. Six Cliff Swallow nests were discovered with the tails and rumps of dead birds protruding from them. Three of the nests were located under a highway bridge along County Road 102 about 2 km north of Davis, Yolo County, California; two were located under the Interstate 80 bridge over Putah Creek southwest of Davis; and the remaining nest was located under the eaves of a building on the University of California campus in Davis. Two of the nests at the first location were collected and, upon examination, were found to contain the decomposed bodies of as many adult Cliff Swallows as the volume of the nests permitted, six in one and seven in the other. The arrangement of the bodies inside the nests suggested that the last bird to enter became

caught in the narrow opening of the nest when another bird tried to force its way out, thereby trapping the other birds inside.

Huddling has been reported in Purple Martins in martin houses in Texas during periods of prolonged cold weather (below 6°C) (Brown 1976). Chaplin (1982) has demonstrated that huddling behavior may be an effective means of reducing nocturnal metabolic rate in Bushtits (*Psaltriparus minimus*), with pairs huddled together reducing their individual metabolic costs by over 20%. Presumably, this mechanism has evolved to help small insectivorous species survive cold periods with diminished food supplies. It seems reasonable to suppose that the mass-deaths of swallows observed in the buildings at Gray Lodge Wildlife Area and in the nests around Davis were the result of a similar, but in these cases insufficient, behavioral adaptation.

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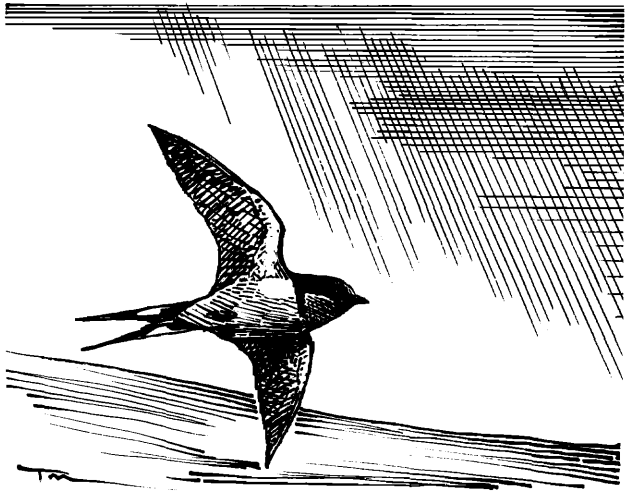

Barn Swallow *Sketch by Tim Manolis*