

WINTER NOCTURNAL ROOST SITES AND BEHAVIOR OF SOME DESERT PASSERINES IN WESTERN TEXAS

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During the nonbreeding season passerine birds may spend more than half their day roosting (Skutch 1989). Nocturnal roost sites are potentially important resources, serving primarily to reduce risk of predation and reduce costs associated with energetic and physiological constraints during inactive periods (Walsberg 1986, Skutch 1989). Vulnerability and low nighttime temperatures during winter are probably strong selective forces in avian life history; a safe roost site increases a bird's chances of survival in the same way that a safe nest site increases chances of fledging. Despite this apparent importance, little is known of intra- and interspecific patterns of passerine roosting behavior.

Climate, restricted roosting habitat, and potential predators mean that suitable winter roost sites are a scarce resource for passerines in the Chihuahuan Desert. Winter temperatures in this habitat average 8.7° C during the coldest month (January) and reach average minimums of 1.4° C (30-year average; NCDN Cooperative Station Data, Panther Junction, 1140 m above sea level, Brewster Co., Texas). Furthermore, strong winter winds in the open desert may also contribute to challenging conditions for roosting birds (see Buttemer et al. 1987), and dense vegetation in the Chihuahuan Desert is generally scarce, confined to arroyos (desert washes) dominated by Honey Mesquite (*Prosopis glandulosa*). Potential nocturnal predators on winter roosting passerines include the Western Screech-Owl (*Otus kennicottii*) and various nocturnal mammals, including the Coyote (*Canis latrans*), Gray Fox (*Urocyon cinereoargenteus*), and Ringtail (*Bassariscus astutus*).

We describe the winter nocturnal roost sites and pre-roosting (i.e., settlement) behavior of four passerine species in the Chihuahuan Desert of Big Bend National Park, Brewster Co., Texas. From 26 to 29 January 1997, we observed roosting behavior in a thick patch (approximately 25 × 30 m in area) of woody scrub in an arroyo near Croton Spring (29° 20' N, 103° 20' W; 1036 m above sea level). The patch was located adjacent to spring-fed puddles of standing water in an otherwise arid landscape and was composed primarily of Honey Mesquite and Spiny Hackberry (*Celtis pallida*) that formed a leafless canopy 4–5 m tall. Typical Chihuahuan Desert vegetation, which included Creosotebush (*Larrea tridentata*), Lotebush (*Ziziphus obtusifolia*), Mexican Walnut (*Juglans microcarpa*), various cacti (including *Opuntia* spp.) and *Yucca* spp., sagelike bushes (*Leucophyllum* spp.), and bunchgrasses (*Bouteloua*, *Muhlenbergia* spp.), surrounded the patch and adjacent spring.

On four consecutive evenings we crawled through small lanes, created by Collared Peccaries (*Dicotyles tajacu*), in the thick vegetation to reach the interior of the patch 10–20 minutes prior to sunset (about 18:15 CST). Once in the center of the patch, we lay on our backs looking up in order to view the vegetation against the lighter backdrop of the sky. Pre-settlement, settlement, and roosting behaviors, including movements, vocalizations, interactions, self-maintenance, and timing of activities were recorded for all visible birds that could be identified. To minimize disturbance to roosting birds, we used flashlights after observations were complete to confirm identifications and describe roost sites' characteristics. Measurements were estimated with the aid of a metric ruler. Occasionally, roosting birds were flushed during our exit from the roost patch; effects on behavior during subsequent evenings are unknown.

NOTES

We observed four species roosting within the mesquite-hackberry thicket at Croton Spring: the Cactus Wren (*Campylorhynchus brunneicapillus*), Green-tailed Towhee (*Pipilo chlorurus*), White-crowned Sparrow (*Zonotrichia leucophrys*), and Pyrrhuloxia (*Cardinalis sinuatus*). Except for the Cactus Wren, one or two individuals of each species were observed nightly within a 10-m radius of the center of the patch, with White-crowned Sparrows moving through the area but observed roosting only at the perimeter of the patch. Other common desert species present in the area were not observed roosting in the thicket, although 300–500 White-winged (*Zenaida asiatica*) and Mourning (*Z. macroura*) doves and single Song (*Melospiza melodia*) and Lincoln's (*M. lincolni*) sparrows were observed settling to roost in a dense, spring-fed reed bed that was approximately 15 × 15 m in area and adjacent to the mesquite-hackberry thicket.

Pyrrhuloxia. Over four evenings we recorded the nocturnal roosting behavior of six individuals, one male, one female, and four of unknown sex. Birds moved into the patch 5–12 minutes before actual settlement, at approximately 25 minutes following sunset. Settlement times ranged from 30 to 36 minutes after sunset, immediately preceding total darkness. Birds appeared to fight over roost sites on two of four nights. During one fight, one bird displaced another from its chosen roost perch and closely chased it 10–15 m, but not out of the patch. One of the birds eventually settled at the original site, while the other moved about in darkness, audibly hitting branches with its wings, and eventually settling 3–5 minutes after all other birds in the area. Birds often called during pre-settlement activity, giving both high-pitched sharp call notes and lower-frequency versions. During aggressive interactions or when roosting birds flushed, *Pyrrhuloxias* frequently gave rapid series of high-pitched sharp “chip” notes. After settlement, birds rarely called unless flushed. Once settled at a roost site, *Pyrrhuloxias* fluffed out body feathers and retracted their heads towards their shoulders, so that they resembled a round ball with a protruding tail.

Pyrrhuloxia roost trees included Honey Mesquite (one male, one sex unknown), Spiny Hackberry (one sex unknown), mixed branches of these two species (two sex unknown), and an unidentified plant having willowlike leaves (one female). Roost sites were located at a mean distance of 8.8 m (5.0–13.0 m; $n = 6$) from the edge of the patch. Mean roost height was 2.1 m (1.5–3.0 m; $n = 6$) above the ground, while mean distance below the top of the canopy was 1.2 m (1.0–1.5 m; $n = 6$). Mean diameter of roost perches was 2.4 cm (1.0–3.0 cm; $n = 4$). One roost site was reused on consecutive nights, probably by the same female. During any one night, the nearest distance observed between conspecifics' roost sites was 3.5–4.0 m, which separated a female and an individual of unknown sex. Similarly, the nearest heterospecific roost site was 5.0–6.0 m, between a female *Pyrrhuloxia* and a Green-tailed Towhee.

Green-tailed Towhee. We observed two to four towhees during each of the four evenings. Settlement occurred 31–37 minutes after sunset, at approximately the same time as *Pyrrhuloxia* settlement. We did not observe any physical interactions during the 5–12-minute pre-settlement period, while towhees moved through the roost patch low in the vegetation, frequently exchanging “mew” calls. Towhees did not vocalize after settlement or upon flushing after dark. After settlement we located only one individual of unknown sex, which roosted in a dense thicket of thin, leafless mesquite branches, on a branch 5.0 mm in diameter, 1.7 m above the ground, 1.0 m below the top of the canopy, and 7.0 m from edge of the patch. The nearest heterospecific roost site was of a female *Pyrrhuloxia* 5.0–6.0 m away (see above). We could not locate roost sites of other Green-tailed Towhees within the patch. Towhees presumably left roost sites after first light but well before sunrise; first vocalizations were heard under well-lit conditions, up to 47 minutes prior to sunrise.

White-crowned Sparrow. We observed six to ten sparrows over three evenings. They were observed close to the center of the roost patch prior to settlement, but no roost sites were recorded there. Several roosting birds, however, were flushed after dark from perches 1.5 m high in unidentified shrubs 2.0–2.5 m tall near the patch's edge. Birds gave high-pitched typical alarm calls upon being flushed.

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Cactus Wren. One evening, one bird of unknown sex roosted in a Cactus Wren dormitory, entering it 13 minutes after sunset, 22 minutes prior to any other bird's settling to roost. The wren did not vocalize or exhibit other activity prior to or following settlement. The dormitory was located approximately 3.0 m above the ground in mesquite, 1.0 m below the top of the canopy, and 4.0 m from the edge of the patch. Because the dormitory was out of view on other evenings, we do not know whether the wren used the dormitory regularly.

The roost sites of the four species observed differed qualitatively. None of the birds that we observed on roosts were close enough to gain any thermal benefit from each other. Aggressive interactions between *Pyrrhuloxias* suggest that not all sites within the mesquite-hackberry thicket were suitable roost sites and that good roost sites within the patch may be limiting (see Weatherhead and Hoysak 1984, Skutch 1989). During our visit, high winds and nighttime low temperatures of 0° C suggest that thermoregulatory costs during this period could be high (see also Anderson and Anderson 1957, Buttemer et al. 1987). We observed no mortality or predation, however.

Despite the potential importance of nocturnal roosting behavior in birds, very little information is available for most species (Skutch 1989). Roost sites for three of the species discussed here were previously undescribed (*Pyrrhuloxia* and Green-tailed Towhee; cf. Austin 1968, Skutch 1989) or incompletely described (White-crowned Sparrow; cf. Chilton et al. 1995); Dobbs et al. (1998) briefly reported the towhee observations discussed here. Cactus Wren roosting behavior is well known (Anderson and Anderson 1957, 1973) and consistent with our observations, although dormitories are typically situated in cholla cacti (*Opuntia* spp.). More detailed study of winter roosting behavior in these species is needed to elucidate the importance of roost sites for wintering birds in the Chihuahuan Desert.

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