

**First record of predation by coachwhip snakes (*Mastocophis flagellum*)
on Phainopepla (*Phainopepla nitens*) nests in southern Nevada**

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INTRODUCTION

Phainopeplas (*Phainopepla nitens*) are frugivorous birds of the American Southwest and Mexico that live in the region's deserts from October-May, where they breed before returning to their summer habitat. During this time, their principal food is the berries of desert mistletoe, *Phoradendron californicum* (Crouch 1943, Walsberg 1977, Anderson and Ohmart 1978), which they also feed to nestlings.

In Nevada, Phainopepla populations apparently are declining (Sauer et al. 2001), likely as a result of habitat loss (Chu and Walsberg 1999). With the rapid growth of urban centers like Las Vegas, Henderson, and Pahrump, more of their habitat is destroyed or fragmented daily. Furthermore, in southern Nevada, Phainopeplas reach the northern edge of their desert range and, due to periods of extreme cold or drought, may experience more dramatic population fluctuations than Phainopeplas further south in their range. As Phainopeplas in southern Nevada increasingly are restricted to small, potentially poor-quality, habitat patches, their likelihood of persistence may decline dramatically. For these reasons, Phainopeplas are listed as a "Covered" species in the Clark County Multiple Species Habitat Conservation Plan.

Phainopeplas may fare more poorly in fragmented habitat due to decreased food availability (Burke and Nol 1998, Zanette et al. 2000), as mistletoe is often less abundant in habitat fragments (Norton et al. 1995). Furthermore, predation on nests may increase with decreasing patch size, as has been demonstrated for other passerines (e.g. Wilcove 1985, Yahner 1988, Zanette and Jenkins 2000, Patten and Bolger 2003). Nest predation is considered by some authors (Ricklefs 1969, Martin 1993, 1995) to be the primary cause of nest failure and thus an important determinant of reproductive success, especially of open-cup nesters like Phainopeplas. In southern Nevada, where Phainopepla nest success

is approximately 50 percent, nest predation accounts for at least 65 percent of all nest failures (Crampton 2004).

Unfortunately, little is known about the predators of Phainopepla nests or about patterns of nest predation across the landscape. However, as part of a larger study aimed at investigating the determinants of Phainopepla breeding success in the region (Crampton 2004), we witnessed one actual and one putative (see below) events of predation by coachwhip snakes (*Mastocophis flagellum*) on Phainopepla nests. This is the first record of predation on Phainopepla nests by this species. The object of this article is to document and describe these events.

METHODS

We examined Phainopepla reproductive success by nest searching and monitoring in study plots at eight sites in southern Nevada and one site eastern California accord to the methods outlined in Martin and Geupel (1993). Three of these study plots were dominated by catclaw acacia and six by honey mesquite (see Crampton 2004). We found and monitored 27 nests at four sites in southern Nevada in 2001 and 213 nests in nine sites in 2002-2003. Once a nest was found, every four days until failure or fledging, we watched it for 10 - 15 minutes and checked its contents. Once the nest had failed or fledged, we looked for fledglings and examined the nest for signs of disturbance or fecal material so that we could determine its fate.

In 2003, we also conducted behavioral observations at 22 nests in two catclaw acacia sites to quantify parental behavior (e.g. time spent incubating, number of trips to nests). Each nest was observed with binoculars from a distance of 30-50 m once a week for at least 20 minutes, or until the parents had made two trips to the nest, whichever was longer. Meanwhile, a second observer tracked the movements and behavior of one of the parents. The actual predation event we witnessed occurred during one of these observation periods; the putative event occurred during regular nest monitoring.

OBSERVATIONS OF PREDATION

Actual predation event. On 1 April 2003, in Roman Wash, NV, one of us (LG) was conducting behavioral observations from 50 m away on a Phainopepla nest containing two nestlings about ten days old (wing feathers just breaking out of the sheath), while another observer (HYTL) watched the male. We began the observation period (0:00 minutes) when the male brought food to the chicks and fed them for 30 seconds. At this time, the chicks were very quiet. Nine minutes later, the male returned to the nest and again fed the chicks for 45 seconds. At twelve minutes, the chick(s) started to call and move in the nest. Two minutes later, the chick(s) stopped moving and became quiet. Neither the male nor the female parent was seen during this time. At about 14:30 minutes, a nestling appeared to fall down to a lower branch from the nest. Thirty seconds later,

the female returned to the nest tree and started to call shrilly and hop around the nest tree. Shortly thereafter, the male returned and also started calling and flapping its wings in the vicinity of the nestling.

At this point (16:00 minutes), we decided to stop the observation period and one of us (LHC) moved closer to the nest tree (~20 m away). A coachwhip snake was hanging over the lower branch with the head and shoulders of one of the chicks in its mouth. The male flew to within 1 m of the snake, but did not actually attack it. When we went to the actual nest tree, the parents made Phainopepla alarm calls and imitated Verdin alarm calls, as is characteristic of distressed Phainopeplas (Chu 2001). As we watched the snake, it retreated into a mistletoe plant at the base of the nest tree, still holding the chick.

We observed the nest from a distance for another 25 minutes (total 45 minutes from 0:00). The parents continued to call and hop about the nest tree and the female checked the nest several times quickly before leaving again. Later in the day, we observed the female sitting on the remaining chick. The chick was still there during our regular nest check four days later. On the next nest check, however, the nest was empty.

Putative predation event. We are calling this observation a putative attempt as we did not actually see the snake eating chicks, but it was curled 0.3-0.5 m above the nest. The nest was empty at the next nest check, four days later.

On this occasion, 18 April 2001, one of us (LHC) was attempting to find a Phainopepla nest at the Las Vegas Springs, NV site. Several times during an observation period that morning (10:00 am), we observed a female Phainopepla carrying insects into a tree (i.e. apparently feeding chicks), but were unable to locate the actual nest. We returned to the area around 1:00 pm and watched the female from ~30 m away. The female flew into the suspected nest tree, but she immediately emerged from the tree and began hopping and fluttering on a branch, calling as described above. We approached the tree to investigate this unusual behavior, and we finally spotted the nest and the coachwhip snake curled up on a branch 0.3-0.5 m above it. Not wanting to draw any more attention to the nest or interfere with the female's attempts at nest defense, we moved away from the nest tree, with the result that we were unable to monitor the actual nest. However, the fact that the nest was empty at the next visit and the similarities in the behavior of this female and the above parents suggest that the snake did in fact prey on nestlings in this nest.

Characteristics of nests and nest trees in which nest predation occurred.

Both nest trees were catclaw acacia trees, 3.2 m high, and both nests were built in mistletoe plants. The Roman Wash nest was 92 cm off the ground and 78 cm from the trunk (horizontal distance), and the total concealment of the nest (from mistletoe and branches around the nest viewed from 0.5 m away in all directions) was about 57 percent. The Las Vegas Springs nest was 190 cm off the ground and 80 cm from the trunk, and it was 70 percent concealed. Mean height of Phainopepla nests in acacias was 158.0 ± 23.6 cm (Crampton 2004).

DISCUSSION

Snakes are well-known predators of avian nests. Nest cameras have demonstrated that they prey on nests of Song Sparrows in British Columbia (M. Clinchy, pers. comm.) and several grassland passerines in Wisconsin (Renfrew and Ribic 2003). They are the major predator of Black-capped Vireo nests in Texas (Stake and Cimprich 2003) resulting in 18 percent of all failures, and of Field Sparrows and Indigo Buntings in Missouri (Thompson et al. 1999). Gopher snakes (*Pituophis melanoleucus*) have been observed to prey on Phainopepla eggs but not on nestlings (Chu and Walsberg 1999).

It is not clear how commonly snakes prey on Phainopepla nests; of the 240 nests we monitored and observed during this study, we only observed snake predation at two nests. On the other hand, 50 percent of the Phainopepla nests we monitored failed, mostly due to predation. Snakes were the only predators we documented, which would suggest that perhaps they are one of the more common predators on Phainopepla nests.

Coachwhip snakes frequent scrub habitats of the American southwest and are often active by day, even in hot weather (Stebbins 1985). They often hide on the branches of shrubs, and, three of the four times we have seen them, curl up in mistletoe plants in acacia shrubs (L. Crampton, pers. obs.). They are known predators of birds and eggs (Stebbins 1985), but this is the first record of their predation on Phainopepla nests and on nestlings.

In contrast to observed gopher snake predation on Phainopepla nests, both of the coachwhip predation events we observed occurred on nests that (apparently) contained nestlings. This is not surprising given that most nest predation in our system occurred during the nestling phase (Crampton 2004). Furthermore, Stake and Cimprich (2003) found that snakes are more likely to prey on nestlings than eggs.

While nest predation on open-cup passerine nests is common (Rickleffs 1969), the actual identity of nest predators is rarely known. In the past, researchers have assumed that certain patterns of nest failure were indicative of various classes of nest predators, but recently, Williams and Wood (2002) demonstrated with nest cameras that these patterns are not reliable indicators. Nest cameras are one of the best methods currently available for documenting the identity of nest predators, but they are expensive and not feasible in all studies. In their absence, observations such as ours are important steps to understanding nest predation and may, in the long run, help us to identify management strategies for increasing nest success in this population.

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