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OBSERVATIONS ON THE BREEDING BIOLOGY OF THE SILKY-TAILED NIGHTJAR (*CAPRIMULGUS SERICOCAUDATUS MENGELI*)

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ABSTRACT.—I found 15 nests of the Silky-tailed Nightjar (*Caprimulgus sericocaudatus mengeli*) from 1994 to 2004 at Cocha Cashu Biological Station, Manu National Park, Perú. Females and males shared incubation and brooding duties with females on the nest during the day and males on at night. Nest relief occurred between 0300–0600 and 1800–2100 hrs. Two-egg clutches were placed on bare ground or on leaf-litter in more mature strands of forest. The semi-precocial young were mobile within 24 hrs of hatching and remained in the area with an adult through the fledgling stage. Both males and females feigned injury during incubation and brooding if disturbed. Three nesting sites were used for 5 years and another for 10 years, suggesting strong site fidelity and possibly a strong pair bond among long-lived individuals. *Received 29 August 2005. Accepted 29 January 2009.*

The behavior and ecology of most nightjars and nighthawks (Family Caprimulgidae) are poorly known resulting from their largely crepuscular and nocturnal habits. They are difficult to locate and monitor, especially in complex habitats (e.g., rainforests) and only limited data about their breeding biology are available.

The Silky-tailed Nightjar (*Caprimulgus sericocaudatus*) is one of 12 neotropical nightjars which breeds in South America and belongs to the largest and most cosmopolitan genus, *Caprimulgus* (Cleere 1998, Holyoak 2001). Adult males and females of the 12 species have been described; however, the young of nine species remain unknown (Cleere 1998, Holyoak 2001). The Silky-tailed Nightjar is one of the least studied members of the genus and current literature is limited to descriptions based on a few museum specimens (Cleere 1998, Holyoak 2001) and range extensions via vocalizations (Madroño N and Esquivel 1997, Alexio et al. 2000).

The known range of this species extends from eastern Perú and Bolivia across Paraguay and southeastern Brazil into northern Argentina (Cleere 1998, Holyoak 2001). Two subspecies (*C. s. sericocaudatus*, *C. s. mengeli*) are recognized and differ in size (Dickerman 1975), vocalizations (Hardy and Straneck 1989), and geographic range. *C. s. mengeli*, is slightly smaller and darker than the nominate race (Dickerman 1975), and is only known from the Amazonian Basin, whereas *C. s. sericocaudatus* is restricted to the Atlantic Forest region of South America (Cleere 1998, Holyoak 2001). I found nests of *C. s. mengeli* in the vicinity of Manu National Park in southeastern Perú. Species identification was confirmed via vocalizations and plumage characteristics, and I use Silky-tailed Nightjar to refer to the *mengeli* subspecies. The objectives of this study were to describe (1) aspects of the breeding biology of Silky-tailed Nightjars, and (2) associated behaviors.

METHODS

Study Area.—Field work was conducted between September and November in 1994, 1995, 1997–1999, and 2004 at Cocha Cashu Biological Station (CCBS) (11° 54′ S, 77° 22′ W, elevation ~380 m), Manu National Park, Department of Madre de Dios, Perú. A network of trails surrounding the research station encompasses ~12 km^2 of undisturbed lowland floodplain and evergreen tropical forest (Terborgh et al. 1984). The trails are relatively close together (~100–400 m) forming forest ''blocks'' surrounding an oxbow lake (Cocha Cashu; Fig. 1). Another oxbow lake (Cocha Totora) borders the trail system to the east. Habitats within the study area were divided using Trail # 12 that is east-west between the two lakes, and which separates mature, high canopy forest to the north and younger forest to the south (J. W. Terborgh, pers. comm.). There are swamps throughout the study area, but most are in the southern portion. Ambient temperature ranged from 10 to 33° C from August to December with a mean of 24° C. Rainfall was concentrated during November to May with an annual total of ~2,000 mm (Terborgh 1990).

Nightjar activity (e.g., calling, nest relief, feeding young) typically began 15 to 30 min

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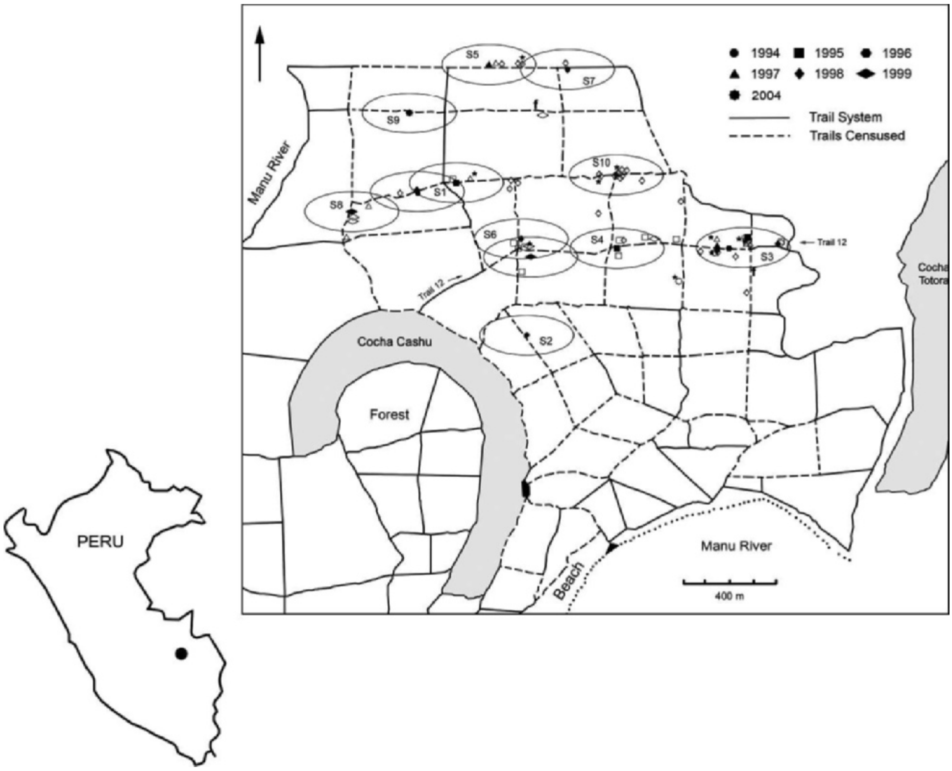

FIG. 1. Nests, sites, and calling activity of Silky-tailed Nightjars at Cocha Cashu Biological Station, Manu National Park, Perú, 1994–1999 and 2004. Solid symbols = nests, open symbols = calling individuals, s = nesting site, f = adult males that flushed during the day, and * = two individual birds calling at the same time from approximately the same location.

prior to sunset and sunrise during the breeding season and lasted from 2 to 60 min, depending on nesting stage (incubation, brooding). Censuses and nest observations occurred from 0300 to 0600 and 1700 to 2100 hrs.

Censuses.—I found several Silky-tailed Nightjar nests between September and November 1994 and 1995 while searching for nests of Ocellated Poorwills (*Nyctiphrynus ocellatus*), which exhibited a strong preference for areas along the trails (FAW, unpubl. data). Six census routes ($\bar{x}$ = 4.14 km, range = 1.5–6.6 km in length) were established in 1997 covering an area of ~5 km^2. Routes were selected based on areas where nests were located and calls were heard most frequently in 1994 and 1995 for both species. Calling nightjars could be heard at least 100 m from trails. Censuses were conducted by walking the trails during selected hours 2–3 times per week per time period. Areas where birds were flushed and/or heard calling outside of the census parameters were visited the following dawn or dusk to check for nightjar activity (nests, calls, etc.) and were sporadically checked throughout the field season.

I detected the birds' orangish red eye shine with a headlamp or a hand-held spotlight during dark periods. Birds nested on the ground and tended to align themselves parallel to the trail; it was necessary to walk trails in both directions to detect eye shine. Nightjars do not build an actual nest structure and I define a ''nest'' as the location of the eggs or nestlings.

Birds were captured by approaching the nest silently and covering them with a hand-held insect net. I attempted to capture adults within 12 to 24 hrs of nest discovery but only made 1–2 attempts per field season to minimize the possibility of nest abandonment. Eggs, nestlings, and adults were weighed using a Pesola spring balance and measurements were taken with calipers. Eggs were handled with a spoon to prevent transfer of human scent and numbered with waterproof ink. I measured right wing chord, tail length, bill length from nostril to tip, length of the right tarsus plus middle toe, and length of the longest right rictal bristle of adults and nestlings. Adults were banded with a color band on each leg and gender was assigned based on plumage characteristics. Males have a prominent white collar and the tips of the outer tail feathers are white; the white is replaced by buff in females (Cleere 1998, Holyoak 2001).

Observations.—Nests were initially monitored within 12 to 24 hrs of discovery and revisited every 3 days alternating between morning and evening hours until the nest was no longer located. One nest with young was observed on two different occasions outside regular observation periods to assess diurnal and nocturnal activities.

Observations were made using 10 × 42 binoculars and/or a Sony Hi-8 video camera from a blind 10 m from the nest. The video camera, coupled with an infrared illuminator, allowed me to observe and record birds in complete darkness. I analyzed 127 min of video footage of nesting behaviors. All nests were checked twice a week outside of the main observation periods during the day and night to verify which adult was on the nest. The nesting adult and nest were observed until the adult returned, if flushed, and resumed nesting duties or for 20 min, after which I left the area to minimize risk of predation and/or abandonment.

Locations of all calling individuals and nests were plotted on a map to estimate population density and site fidelity between years. These points were also used to create a fixed shape to estimate core area use (ha) by breeding pairs and I refer to this area as a nesting site. The elliptical shape was based on site # 3 where a concentration of nightjar activity was recorded for five field seasons, including two nests found in 1998. This shape was centered on each nest site in each year to examine the frequency of use of the surrounding areas between years. The combined areas were considered to be a single site if there was 25% or more overlap.

Habitat Measurements.—I measured habitat characteristics after young fledged, or when nests were abandoned or depredated, using a modified version of James and Schugart's (1970) method of vegetation analysis. Two circular plots (A and B) centered on the original nest site (n = 9) were created to measure ground and canopy cover, and numbers of plants within plot A (1-m diam) were counted in each of three height categories (0.0–0.5, >0.5–1.0, and >1.0–1.5 m). Two perpendicular 10-m transects were established in plot B (10-m diam) with the first in the direction of the bird. The number of woody shrubs and saplings (≤7.5 cm in diameter at breast height [DBH]) for 5 m behind and in front of the nest at arms width (~2 m) was counted along this transect. Ground and canopy cover at 1-m intervals (n = 21) were measured along the two transects. The number of trees, including palms, with DBH ≥10 cm within plot B was recorded. The same parameters were measured at 20 randomly selected (using a random numbers table [Heyer et al. 1994]) nest sites (10 in each of the northern and southern portions of the study area). Transects at these sites were north-south and east-west. I tested for homogeneity of variances (F test) for habitat characteristics and compared means with either a two-sample Student's t-test (equal variances) or Welch's t-test (unequal variances). PAST Version 1.81 (Hammer et al. 2001) was used for all analyses and significance was set at 0.05. Means ± SD are presented.

RESULTS

I captured, measured, and banded four adults. Only mass of females ($\bar{x}$ = 75.25 ± 1.0 g, n = 2) differed from males ($\bar{x}$ = 69.75 ± 1.0 g, n = 2). Ten nests were observed for 73 hrs, 37:15 hrs during incubation and 35:45 hrs during brooding.

Breeding Biology and Behavior.—I found 15 nests between 1994 and 2004. Fourteen were within 5 m of a trail; the other was in an open area 25 m from the nearest trail. Twelve nests contained two eggs, one had one egg and a newly hatched chick, and one had two nestlings >1-week of age. The contents of one nest were unknown, although the injury-feigning behavior of the female indicated the presence of nestlings (Table 1). Nests were on the ground either on bare patches or on leaf-litter.

Eggs were elliptical, smooth, and pale pinkish-orange in color with dark maroon specks concentrated at the blunt end. Color intensity and concentration of specks varied among eggs. Eggs averaged 27.1 ± 2.1 mm in length (range = 21.8–31.0 mm, n = 22) by 21.4 ± 3.1 mm in width (range = 18.0–30.7 mm), and had a mass of 6.68 ± 1.2 g (range = 4.0–8.5 g).

The precise duration of the incubation and brooding periods could not be calculated because

TABLE 1. Site fidelity and nesting activity of Silky-tailed Nightjars at Cocha Cashu Biological Station, Manu National Park, Perú (e = egg, n = nestling, f = fledgling, d = depredated, and u = egg pipped but hatching not successful).

Site #	Year	Nest #	Activity	Beginning status	Ending status
1	1994	1	Nest	2e	2f
	1995	4	Nest/calls	2n[c]	2f
	1997		Calls[a]		
	1998	9	Nest/calls	2e	2d
2	1994	2	Nest	2e	2d
3	1995	3	Nest/calls[a]	2e	2d
	1996		Nest[b]		
	1997	7	Nest/calls[a]	2e	2d
	1998	8	Nest/calls[a]	2e	2d
	1998	12	Nest/calls[a]	2e	2d
	2004		Calls		
4	1995	5	Nest/calls	2e	1u, 1f
	1998		Calls		
	1999		Calls		
5	1997	6	Nest/calls	2e	2d
	1998		Calls[a]		
6	1995		Calls[a]		
	1998	10	Nest	2n	2f
	1999	14	Nest/calls	2e	2f
7	1998	11	Nest/calls	2e	2d
8	1997		Calls		
	1999	13	Nest/calls	1e, 1n	2f
9	2004	15	Nest	2e	?
10	1998		Calls[a]		

[a] Two individuals calling.
[b] Nest located in alternate year.
[c] Assumed 2 nestlings based on behavior.

all nests were active (with eggs or nestlings) when located. The earliest and latest nests with eggs were on 16 September 1998 and 25 October 1994, respectively. A nest found on 21 September 1998 contained nestlings estimated to be ~14 days of age based on size and plumage, suggesting a laying date of ~20 August.

Both adults incubated and brooded young. Females were on the nest during the day at all times. The earliest and latest times a female was observed on a nest during incubation and brooding were 0503 and 1900, and 0328 and 2000 hrs, respectively. Males were only observed incubating or brooding at night. The earliest and latest times a male was on a nest during incubation were 1831 and 0440 hrs and, during brooding, 2030 and 0540 hrs.

Chicks were semi-precocial, hatched on successive days, covered with golden down, weighed 6–7 g ($n = 2$), and were mobile within 24 hrs. Dark brown pin feathers began to appear by day 3. Nestlings could ''hop'' over short distances ($\bar{x}$ distance = 2.7 ± 2.84 m, range = 0.7–6.0 m, $n = 3$) by 3 days of age and up to 3.6 ± 0.8 m (range = 3.0–5.0 m, $n = 6$) at 4/5 days. Nestlings were capable of flying ~6 m by 11 and 12 days of age, and were active during the day. They often emerged from under the female to preen, stretch their wings, and peck at decaying material near the nest. The sheaths of the alar feathers were broken at this stage, displaying brown tips and coverts were grayish brown with distinguishable brown circular markings. Pin feathers along the capital and caudal tracts continued to develop making the nestlings more cryptic. The light colored tips of the outer tail feathers were visible in flight. Nestlings at nest # 10 flushed from the same area in the early morning every few days until about 24 days of age; an adult was present at times.

Eight of 13 nests with eggs were depredated (Table 1), but only after the nests had been abandoned. Seven of eight failed nests were depredated within 12 hrs of the adult not returning after flushing in response to natural disturbance or a capture attempt. The female from the eighth nest consistently flushed whenever there was movement nearby. She flushed at day 9, and did not return; the eggs disappeared 1 week later. Presumably, 11 young from six nests fledged successfully. One other egg pipped but hatching was unsuccessful and the fate of nest # 15 was uncertain as the female was incubating when I left the study area. I recorded no instances of predation on adults or chicks.

Nesting adults faced parallel to the trail and tended to flush when I approached within 10 m (range = 1–10 m, n = 11) or if an intruder remained stationary near the nest for 5–10 min. Incubating females, when flushed, typically flew 5–20 m to an open area on the ground (usually the trail) or a branch (2–10 m high), positioning themselves perpendicular to it. Regardless of where the female flushed, she remained still or drooped one wing and quietly flapped it, or flapped both wings several times prior to flying behind nearby vegetation. Females resumed the same position as prior flushing upon returning to the nest.

Injury-feigning was more intense during the brooding period. A female at one nest flushed to the middle of the trail, revealing two newly hatched nestlings. As I approached the nest, she quietly but rapidly flapped her wings up and down against the ground and then flew straight at me circling around my head within 1 m, before returning to the trail where she continued flapping her wings. When I moved toward her, she flew short distances (2–3 m) from the nest, and continued to display. The amount of injury-feigning decreased as the distance from the nest increased. On two occasions at another nest, when nestlings were ~3 and then 6 days of age, the male flushed and flew 5 m to an open area in the trail. He then vigorously flapped his wings hard against the ground before flying while calling several times. Brooding adults, after being flushed, would settle within 1–1.5 m of the nest and call to the young by making short, guttural sounds. Nestlings would either approach the adult with short hops prior to burrowing underneath or would hop to a new location and wait for the adult to join them. Adults returned to the young within 10–30 min.

Nest relief occurred just prior to daybreak (0300–0600 hrs) or in complete darkness at night (1800–2100 hrs). The nesting adult during incubation typically bobbed its head up and down while looking from side to side, and quietly flew straight up from the eggs as the mate approached. The mate quietly flew to the vicinity, looked around and, at times, rolled the eggs prior to settling on the nest. I heard an adult Silky-tailed Nightjar calling at nest # 6 in the early evening near the incubating female for about 14 min (1756–1809 hrs) and, following the last call, this adult, presumably the male, flew over my head to a nearby area. The female then rocked back and forth and looked around for the next 40 min. She flushed straight up from the nest at 1900 hrs making two loud short, sharp clicking sounds that sounded mechanical rather than vocal.

Twice I heard counter-calling between males and females at nest sites prior to morning nest relief (once during incubation and again during brooding). On a separate occasion, a brooding male called 16 times from the nest during the morning and, after feeding the young via regurgitation, stopped, intently looked around and then gave a different one-note high pitched ''sweet'' call six times before flying. Almost immediately, both adults gave this one-note call three times each.

Individuals called between dusk and dawn during the breeding season; calling activity was greatest in October. Calling occurred in the early evening between 1740 and 2038 hrs, peaking at ~1815 hrs and, in the morning, between 0400 and 0550 hrs peaking at 0453 hrs. Only one or two calls were usually given. However, on three separate occasions (twice in Oct 1995, once in Sep 1999) at site # 6, an adult was heard calling continuously between 0420 and 0525 hrs for 6 min, 45 min, and 14 min, respectively.

It is uncertain where the mate of the nesting pair roosts. Two males flushed from the ground during the day in October 1997 from areas relatively near active nests (site # 3, 200 m; site # 5, 275 m). They did not display any distinctive behaviors (e.g., injury-feigning), but flew low and parallel to the forest floor, further into the forest block toward the incubating females.

I found no evidence of double brooding but the birds likely renested when the first attempt was unsuccessful. Two nests were found in 1998 within site # 3 at locations 210 m apart, and I assumed they were from the same breeding pair. Nest # 8 was located on 16 September and depredated on 22 September. The following day a pair of nightjars was heard counter-calling at 0511 hrs about 100 m east of nest # 8; the male was seen calling from a perch about 5 m above ground level along the trail's edge. No other calls were heard in the vicinity and it is possible the male incubating two eggs at nest # 12, 21 days later, was the one I saw earlier.

Nest Site and Habitat.—I found 14 nests in the northern section of the study area, including those along or near Trail # 12 (Fig. 1), while one was in the southern section. The 15 nests were at nine different sites, three of which included two or more nests. The mean distances between nests within these sites were: 115 m (site # 1, range = 5–170 m, $n = 3$); 140 (site # 3, range = 5–210 m, $n = 6$); and 125 m (site # 6, $n = 2$). A tenth site was delineated based on calls of two individuals consistently heard from 8 October to 4 November 1998.

Six sites were used in several years and, although nests were not located in all years, site # 8 may have been used for 3 years while sites #'s 1, 4, and 6 may have been used for 5 years (Table 1). A Silky-tailed Nightjar nest was located during my absence in 1996 within site # 3 (D. J. Brightsmith, pers. comm.) confirming this site was used for 4 consecutive years. Calls heard during the 2004 census suggest that nightjars may have occupied this area for 10 years. The core area used at this site was ~5.84 ha. Core area estimations for sites that overlapped by at least 25% were ~9.33 ha (site # 6) and ~10.60 ha (site # 1).

Distances between used sites and nearest neighbors were: 750 m (1994, $n = 1$), 450 ± 71 m (1995, range = 400–550 m, $n = 4$), 750 ± 446 m (1997, range = 400–1325 m, $n = 4$), 418 ± 94 m (1998, range = 325–575, $n = 7$), and 550 ± 248 m (1999, range = 375–725 m, $n = 3$), and 1600 m (2004, $n = 1$).

Only the number of trees with DBH ≥10 cm differed significantly between nest and random sites (Table 2). The average number of trees within plot B near the northern nest sites ($\bar{x} = 9.11 \pm 6.27$, $n = 9$) was greater ($P = 0.02$) than number of trees in the northern random sites ($\bar{x} = 3.00 \pm 2.16$, $n = 10$), and greater ($P = 0.03$) than all random sites combined ($\bar{x} = 3.65 \pm 2.37$, $n = 20$). There was no significant difference between canopy and ground cover among all sites; however, 80% of nests ($n = 12$) were >20 m from areas that periodically flooded (low areas consisting of streams or small swamps). The remaining three were within 15 m of small, depressed areas ~3–10 m in length dominated by small patches of broadleaf monocots including *Heliconia* sp. (Family Heliconiaceae) and *Renealmia* sp. (Family Zingiberaceae).

DISCUSSION

An August to December breeding period for the Silky-tailed Nightjar coincides with the latter half of the dry season through the beginning of the rainy season. This is similar to the breeding period for the Ocellated Poorwill (FAW, unpubl. data) and for Blackish Nightjars (*Caprimulgus nigrescens*) in western Brazil (Roth 1985).

Adult nightjars have been documented to share incubation and brooding duties with the female attending the nest during the day and the male at night (Jackson 1985, Hustler and Mitchell 1997). The Silky-tailed Nightjar followed this pattern but these observations contrast to those for Blackish (Roth 1985) and Puerto Rican (*C. noctitherus*; Vilella 1995) nightjars where males were most frequently observed incubating and brooding during the day.

Young nightjars are mobile and able to move short distances within 24 hrs of hatching (Raynor 1941, Ingels et al. 1984). Their mobility increases and young are capable of flying short distances as they became older. European Nightjars (*C. europaeus*) can fly up to 16 m by 18 days of age (Lack 1957). Nightjars may leave the nesting area (Roth 1985) at about this age, or remain near the nest site with or without adults (Longstaff and Jourdain 1926). The young at nest # 10 regularly flushed from the same site, but remained within the area until 24 days of age. They were not located thereafter and it is possible they either fledged or still occupied the area. Young European Nightjars have been reported to occupy their nest site until 45–46 days of age with both adults nearby (Tutt 1955).

Nightjars eat a variety of insects and young are fed by their parents via regurgitation (Raynor 1941, Cleere 1998). Nestlings may also forage for ground insects around the nest-site (Vilella 1995) or pick up small soil granules to aid in digestion (Jenkinson and Mengel 1970). This was most likely the case for the young I observed pecking at decaying material, a behavior also observed for young Puerto Rican Nightjars (Vilella 1995), Ocellated Poorwills (FAW, unpubl. data), and adult Whip-poor-wills (*C. vociferous*; Jones 1933).

The sharp clicking sounds made by the female at nest # 11 may have been produced by wing-clapping or other mechanical means associated with being disturbed prior to nest relief. There isn't a particular behavior associated with these

TABLE 2. Habitat characteristics (mean ± SD) of nest sites of Silky-tailed Nightjars (STNJ) ($n = 9$) and random sites in both the northern ($n = 10$) and southern ($n = 10$) sections of the study area at Cocha Cashu Biological Station, Manu Park, Perú, 1994–1999 and 2004.

Variable	STNJ	Northern	Southern
Plot A, 1-m diam			
Seedlings, 0–0.5 m	6.44 ± 2.65	3.9 ± 2.81	4.4 ± 3.41
Seedlings, >0.5–1.0 m	0.89 ± 1.69	0.10 ± 0.31	0.20 ± 0.42
Seedlings, >1.0–1.5 m	0.44 ± 1.01	0.20 ± 0.63	0.20 ± 0.42
Canopy cover, %	100	100	90 ± 31.62
Ground cover, %	0	30 ± 48.30	10 ± 31.62
Plot B, 10-m diam			
Woody stems, ≤7.5 cm in front	2.89 ± 3.26		
Woody stems, ≤7.5 cm behind	3.56 ± 2.40		
Trees, ≥10 cm dbh	9.11 ± 6.27	3.00 ± 2.16	4.3 ± 2.50
Canopy cover, %	95 ± 7.53	98 ± 6.02	83 ± 23.25
Ground cover, %	45 ± 23.22	32 ± 15.23	35 ± 17.25

noises but similar sounds have been reported for several caprimulgid species while in flight (Sick 1993), when disturbed from rest (Coward 1928), while defending territories (Mengel et al. 1972), during display flights (Hilty and Brown 1986, Clay et. al. 2000), and courtship (Lack 1932, Mengel et al. 1972).

Injury-feigning is a common anti-predator behavior used by caprimulgids during nesting and intensity of the display varies by gender and nesting stage. Exaggerated injury-feigning has been reported for male Swamp Nightjars (*C. natalensis*) during incubation (Hustler and Mitchell 1997) and for brooding Freckled Nightjars (*C. tristigma*; Steyn 1971) with more intense displays at night. I observed similar intensity displayed by a brooding male Silky-tailed Nightjar in contrast to Lack's (1932) observation that this behavior is poorly developed and less intense during the night.

Both males and females readily flushed from nests when approached. Adults are extremely cryptic but eggs are relatively conspicuous. Nest success may be negatively correlated with adults' flushing behavior during incubation, length of time they were away from the nest, and age of the eggs. Adults repositioned themselves when they returned to the nest after being flushed, facing the same way and parallel to the trail. The direction birds faced was towards open areas which potentially provided a larger area to escape from predators.

Nightjars re-use nest sites between years (Berry 1979, Jackson 1985, Vilella 1995). Repeated use of certain areas at CCBS indicates Silky-tailed Nightjars exhibit site fidelity. Nests within sites #'s 1, 3, and 6 were within 5–170 m of one another in different years. The two nests in site # 1 were 170 m apart (1994–1995); 3 years later a nest was found directly across the trail (5 m) from the nest in 1994. Nests of banded pairs of Ocellated Poorwills were 0 to 140 m apart between years (FAW, unpubl. data).

Nightjar density, territory size, and home range cannot be accurately measured without marking and radio-tracking individuals. However, an estimate of 8.59 ha ($n = 3$, range = 5.84–10.60 ha) indicates breeding pairs occupy a relatively large area. This estimate is larger than those reported for areas of primary use (e.g., territory, home range) for Puerto Rican Nightjars (5.2 ha; Villella 1995), Fiery-necked Nightjars (*C. pectoralis*) (5.8 ha; Jackson 1985), and five species (6.5 ha) in Zimbabwe (Jackson 1984), but within the range for European Nightjars (5.87–25.20 ha; Lack 1932, Berry 1979, Cadbury 1981).

Use of nest sites in areas with increased numbers of large trees (DBH ≥10 cm) may indicate a preference for older forest, which corresponds to areas less likely to flood. Birds at CCBS appeared to nest away from areas commonly inundated, perhaps to prevent flooding of nests during heavy rains. The closed canopy in these areas also makes for a more open understory which may facilitate feeding. Ocellated Poorwills, the most common nightjar species at CCBS, in contrast nested close to swampy areas, primarily south of Trail # 12 (FAW, unpubl. data). Both species used Trail # 12 every year of the study and

I have no evidence suggesting conflict for space, food, or other resources.

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