

The Status, Habitat and Nest of the Satanic Nightjar *Eurostopodus diabolicus*

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Summary The Satanic Nightjar *Eurostopodus diabolicus* a little-known, putatively threatened species endemic to Sulawesi, Indonesia was recently observed in two protected areas in North Sulawesi. Presently classified as Vulnerable to extinction, these new records suggest a more widespread geographical distribution and greater tolerance of disturbed habitats than was previously thought. Consequently, we recommend that this species be downgraded to Near Threatened. Descriptions of plumage characters (which differ from the type specimen in some respects), nesting, and behaviour are presented. Morphological and ecological evidence suggests *E. diabolicus* is most closely related to the Archbold's Nightjar *E. archboldi* and Papuan Nightjar *E. papuensis*, both endemic to New Guinea.

Status, Habitat dan Perilaku Perkembangbiakan Taktarau iblis *Eurostopodus diabolicus* di Sulawesi

Ringkasan Taktarau iblis *Eurostopodus diabolicus* spesies yang sedikit diketahui keberadaannya, dan diduga sebagai spesies endemik terancam di Sulawesi, Indonesia - baru-baru ini diamati di dua kawasan yang dilindungi di Sulawesi Utara. Di sini dibahas pertelaan karakter bulu (termasuk dimorfisme seksual), persarangan, dan perilaku. Spesies ini mendiami habitat hutan primer dan pinggiran hutan serta tampak toleran terhadap berbagai gangguan habitat. Bukti morfologis dan ekologis menyatakan *E. diabolicus* paling dekat hubungannya dengan Taktarau jayawijaya *E. archboldi* dan Taktarau irian *E. Papuensis*, kedua jenis ini endemik di Papua. Adanya kejelasan luas penyebaran Taktarau iblis, dan toleransinya pada perubahan habitat, maka kami merekomendasikan statusnya diturunkan menjadi kategori Resiko Rendah.

Introduction

Sulawesi is the largest island in the biogeographical subregion of Wallacea, the transition zone between Asian and Australian plants and animals. Partly due to its size, geographic isolation and history of plate tectonics, Sulawesi is characterized by high levels of bird species endemism (Whitmore 1987; White & Bruce 1986). Sulawesi is one of the most important Endemic Bird Areas in Indonesia; of approximately 328 bird species known from the island, 88 (27%) are unique (Coates & Bishop 1997; Stattersfield *et al.* 1998).

Habitat loss is currently the greatest pressure facing threatened bird species' populations on the island (Stattersfield *et al.* 1998). Whilst large tracts of undisturbed forest remain on Sulawesi total forest cover was estimated to have been 56.4% in 1988 (Collins *et al.* 1991) forest cover has declined by 20% in the last ten years (Holmes 2000) and forest loss is particularly acute in the lowlands (Whitten *et al.* 1987; Holmes 2000). As a result, 15 lowland forest specialists make up the majority (58%) of the resident Threatened and Near Threatened bird species on Sulawesi (Coates & Bishop 1997; IUCN 2000).

Amongst the ten Threatened bird species occurring on Sulawesi, five species are members of elusive and/or difficult to study families: Snoring Rail *Aramidopsis plateni*,

Blue-faced Rail *Gymnocrex rosenbergi*, Sulawesi Masked Owl *Tyto inexpectata*, Cinnabar Hawk Owl *Ninox ios* and Satanic Nightjar *Eurostopodus diabolicus*. All five species are listed as Vulnerable to extinction because their estimated populations are perceived to be small and in decline (IUCN 2000; BirdLife International 2001). Yet, whilst recent research has provided important distributional information (summarized in BirdLife International 2001), their population status and ecology remain poorly known.

Eurostopodus diabolicus is one of the least-studied of Sulawesi's endemic species. For over 60 years the nightjar was known only from the unique type specimen collected in 1931 (Stresemann 1931). However, sightings since its rediscovery in 1997 (Bishop & Diamond 1997) suggest that *E. diabolicus* might be more widespread than previous thought (BirdLife International 2001).

In May 2000 we recorded *E. diabolicus* in two protected areas in North Sulawesi. This paper presents the first information about the species' ecology and reconsiders its status and conservation in the light of these observations.

Historical records

The type, and to date only, specimen of Satanic Nightjar *E. diabolicus* was collected by the German naturalist Gerd Heinrich in March 1931 near the village of Kumaresot, Minahasa, North Sulawesi. The bird, a female, was flushed from a thicket of rattans in forest on the lower slopes of Mount Klabat (1,995 m) at an altitude of approximately 250 m (Stresemann 1931).

Heinrich was an experienced and skilled collector who spent nearly two years working on Sulawesi (Heinrich 1932). However neither he, nor other collectors who worked on the island, obtained any further specimens (Stresemann 1940; White & Bruce 1986). Indeed, there were no confirmed records of the species for another 65 years despite an increased number of birdwatchers visiting the island (e.g. Escott & Holmes 1980; Watling 1983; White & Bruce 1986).

Holmes and Wood (1980), and J. MacKinnon (in White & Bruce 1986) speculated that unidentified calls at night at Lake Matano, Central Sulawesi, and Tangkoko-Duasaudara Nature Reserve, North Sulawesi, respectively, were from *E. diabolicus*. However, the descriptions of these vocalisations most closely resemble the calls of another endemic Caprimulgid, the Sulawesi Nightjar *Caprimulgus celebensis*, that was treated as a subspecies of Large-tailed Nightjar *C. macrurus* at the time of the records (White & Bruce 1986; Rozendaal 1990; Coates & Bishop 1997).

There were no further observations until Ben King recorded a single nightjar, possibly *E. diabolicus*, at the edge of a road at c. 1,700 m in Lore Lindu National Park, Central Sulawesi (King 1994). Whilst this record was published as unconfirmed, we note that the description provided appears to be consistent with plumage features exhibited by *E. diabolicus* as observed by us.

The next records of the species were claimed by M. Catterall (in BirdLife International 2001), who identified nightjars observed in hills above Maligano, Buton, South-east Sulawesi between 1994 and 1996 as *E. diabolicus*. However, the birds in question were subsequently thought more likely to have been female *C. macrurus* (Baltzer in BirdLife International 2001), overlooking the treatment of *C. celebensis* as a full species.

The rediscovery of *E. diabolicus* in Lore Lindu occurred in May 1996 when four sight records of nightjars were made from two nearby forest sites at 1,000 m and 1,735 m, respectively (Bishop & Diamond 1997). The birds frequented the vicinity of small

openings or breaks in primary and selectively logged montane forest. These observations extended the Nightjar's known range by some 750 km (Bishop & Diamond 1997) and suggested that the species was less seriously threatened than previously thought (e.g. Collar *et al.* 1994).

Recent sightings

Confirmation that *E. diabolicus* occurs on Mount Rorekatimbu in the Lore Lindu National Park derives from a number of observations in sub-montane habitats in the national park, listed by Birdlife International (2001). This 229,000 ha park covers an altitudinal range of 300 m to 2,610 m and a wide variety of forest habitats, and its avifauna is one of the best known in Sulawesi (e.g. Watling 1983; van den Berg & Bosman 1986; Ekstrom *et al.* 1998). No sightings had occurred outside this area until *E. diabolicus* was seen by us and our colleagues at two sites in north Sulawesi on four dates in May 2000.

Our first observations of *E. diabolicus* were made within the Panua Nature Reserve, located on the south coast of the northern arm of Sulawesi. This 45,000 ha reserve is located close to Marisa (0°28'N, 121°56'E) in Boalemo regency, and covers five major habitat types – lowland evergreen rainforest, lower montane rainforest, dry coastal forest, mangroves and secondary vegetation – from sea level to 1,625 m asl (Lee *et al.* 2000b). Between February and June 2000 a Wildlife Conservation Society survey led by John Riley spent a total of seven weeks at four locations in the southern half of the reserve. In May 2000 surveys north of Kalimas village on the River Lelenggela (0°40'N, 121°54'E) led to sightings of *E. diabolicus* on three consecutive days (see Riley *et al.* in this volume).

At 1640 hrs, 11 May 2000, an all dark, medium-sized nightjar, with no white in the wings, was flushed from a thicket of rattans in selectively logged forest at 345 m asl (M. F. Wangko *pers. comm.*). At 0900 hrs on the following day presumably the same bird was observed at the same location (0°40'N, 121°55'E) and was identified as *E. diabolicus*. Close examination of the site revealed that the nightjar was incubating a single egg. The nest site was revisited at 1400 hrs and the nightjar observed for 45 min at distances down to 6 m, allowing detailed plumage notes to be made. On 13 May the nightjar was flushed from its nest at 0650 hrs and was not seen again, the nest scrape and egg being abandoned.

At 0710 hrs, 25 May 2000, *E. diabolicus* was observed at Gunung Ambang Nature Reserve, an 8,638 ha reserve centred on the Ambang mountain ridge in Bolaang Mongondow regency. This reserve supports lowland evergreen rainforest and hill forest from 700 m to 1,760 m asl at the summit of Mount Moyayat (Lee *et al.* 2000a; Riley & Mole 2001) and is located c. 270 km to the east of the Panua Nature Reserve. In a forest clearing created by tree felling, at c. 800 m asl above the village of Manembo (0°45'N, 124°21'E), JCW (with T. Nando, I. A. Wardill and O. Lumasuge) discovered an all-dark nightjar with a cream-yellow throat band roosting close to the ground on thin dead branches. The bird was observed for two hours at distances of 2-4 m. Despite being disturbed a number of times the bird remained in the vicinity of the clearing. From 1645 to 1720 hrs on the same date, what was thought to be the same nightjar was observed approximately 50 m further up the slope. The bird was again approachable, keeping to open habitat in a tree fall and on a woodcutter's path.

Description

Published descriptions of the *E. diabolicus* type specimen have been made by Stresemann (1931), White & Bruce (1986), Coates & Bishop (1997) and Cleere & Nurney (1998).

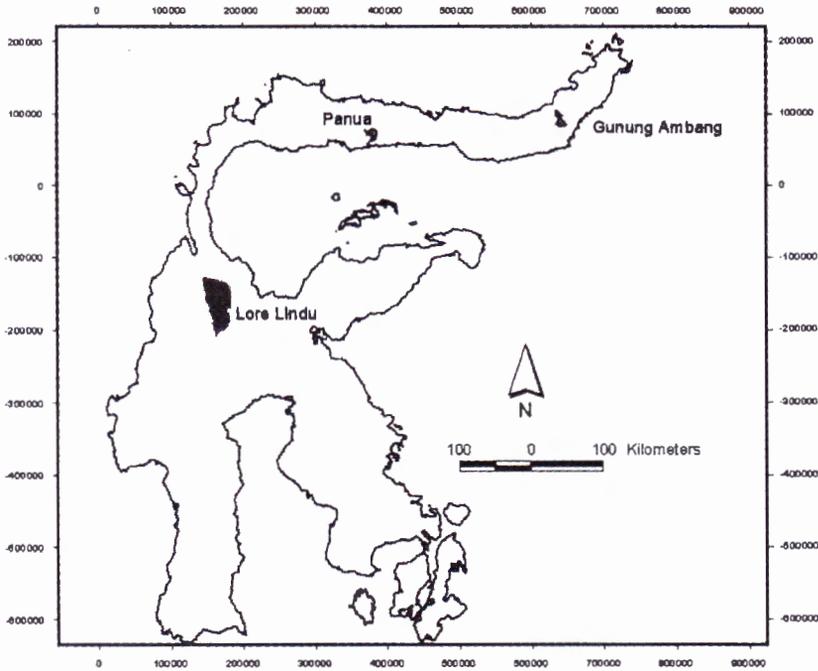


Figure 1. Locations of sightings of *E. diabolicus* on Sulawesi

Based on this female specimen, all authors characterize this species as an entirely dark, medium-sized nightjar, with a rusty-buff throat, an inconspicuous small white mark on the fourth primary (counting from the outermost feather), and no white in the tail.

Our observations of this species indicated that some individuals exhibited significant plumage differences to the type specimen, namely the amount of white in the primaries, the degree of white spotting on the underparts and the colour of the cheeks (Table 1). It seems likely that this species exhibits a degree of sexual dimorphism (with males showing more white on the primaries), or that the plumage differences are age-related. However, the possibility that two very similar *Eurostopodus* species occur on Sulawesi cannot be discounted.

Habitat

The lowland forest within the Panua reserve, where we observed *E. diabolicus*, was characterized by *Pometia pinnata*, *Palaquium* spp, *Eugenia* spp, *Drypetes* spp and *Canarium asperum*, with the canopy at c. 17-25 m, and few emergent trees. There was a dense understorey of rattan *Calamus* spp, and palms *Areca* spp were common. The site had been harvested by rattan collectors leaving a patchwork of small open areas within the forest.

At Mount Ambang, habitat was heavily disturbed lowland evergreen rainforest. All tall, emergent trees had been recently felled creating numerous small clearings with tangles of branches and dead wood, connected by a network of woodcutters' tracks. The few large trees were up to 20 m tall, but the forest was dominated by trees less than 10 m in height and *Areca* palms with a relatively thick understorey of bamboo, rattan and small

shrubs. The canopy was at c. 17-25 m. Common medium to large girth trees include *Calophyllum* spp, *Eugenia* spp, *Knema* sp, *Litsea* sp, *Sterculia insularis*, *Acalypha caturus*, and *Cryptocarya celebicum*, whilst very large girth, often emergent, trees include *Pometia pinnata*, *Endospermum peltatum* and *Canarium asperum* (Lee *et al.* 2000a).

In summary, *E. diabolicus* apparently favours disturbed areas (such as tree fall clearings) within forest, and more open, scrubby areas close to the edge of primary forest. Their habitat tends to have a low canopy of less than 25 m and a dense understorey characterized by rattans and palms. This nightjar appears to be able to tolerate considerable habitat disturbance, although observations may be biased towards such habitat.

We have observed the endemic Sulawesi Nightjar *C. celebensis* in open areas near forest below 500 m asl in the Tangkoko-Duasaudara Nature Reserve, and on the lower slopes of Mount Klabat in North Sulawesi. From our observations, it appears *E. diabolicus* prefers areas with more trees, however, it is possible that these two species overlap in some habitats.

Breeding

The nest site found at Panua in May 2000, the start of the dry season (Lee *et al.* 2001), was typical for nightjars. It was located on the crown of a forested ridge, in a small clearing surrounded by rattan thickets. The nest was approximately 2 m from the edge of the clearing, entirely in the open, and unshaded when the sun was directly overhead. The single egg was laid on top of two dried leaves lying over a shallow depression in the ground and was partly protected by a fallen log on one side and a rattan pole on the other. The egg weighed 10 g and measured 33.5 x 22.7 mm. Its colour was creamy white, faintly marked with light brown streaks.

The nest was attended by a single female bird which remained concealed until approached to approximately 4 m. If disturbed the nightjar flushed and flew almost vertically out of the clearing into the surrounding forest understorey.

Having eventually been abandoned, the egg was collected. Although the egg had coagulated and could not be preserved in its entirety, its fragments have been deposited at the Bogor Zoological Museum, Cibinong, Java.

Behaviour

Detailed observations were made of one *E. diabolicus* at Mount Ambang. The nightjar was first seen in the morning perched on a thin, dead branch approximately 10 cm from the ground in a small clearing. The bird seemed unconcerned by the observers' presence, but if approached to within a metre it immediately lifted its body from the horizontal, raised its wings, outstretched, to an angle of 45° and opened its bill wide to expose its pink gape. The wings were angled forward, displaying the white flashes on the black primaries in a very striking fashion and the bird appeared to be leaning toward the observer. The nightjar remained frozen in this position for a number of minutes, before taking flight to a new perch a few metres distant. Five separate approaches all elicited the same response. The bird seemed reluctant to leave the clearing, but eventually flew into a rattan thicket on the clearing's edge and was left alone. The nightjar remained silent.

The same presumed individual was located again in the late afternoon some 50 m from the first location. The bird initially flushed from the middle of a narrow path on the edge of a small treefall clearing. It flew about 3 m before alighting on a fallen log by the edge of the

path. Upon close approach the bird again adopted the distinctive raised wings and open bill posture, before flying off the path to perch on the forest floor. Again, it remained silent.

Similar behaviour is described as a defence mechanism employed by nightjars when they have eggs or young (del Hoyo *et al.* 1999). Although no nest was found at Ambang, given that the Panua bird was nesting in May, it is possible that the Ambang bird was about to lay, or its eggs had recently been depredated. However, if this behaviour is indeed related to nest protection, it seems strange that the Panua bird did not act in a similar manner.

English name

The name Eared-nightjar has been inappropriately applied to *E. diabolicus* (e.g. King 1994) as it has no ear tufts. Considerable confusion has arisen over the English name of this species, and at least seven different names have been used (listed by del Hoyo *et al.* 1999). 'Sulawesi Nightjar' (and its historical equivalent, 'Celebes Nightjar') is now applied to *Caprimulgus celebensis* (Rozendaal 1990). 'Kalabat Nightjar' (in del Hoyo *et al.* 1999) is inappropriate (and mis-spelled) given that the species is now known from several localities across the island. 'Diabolical Nightjar' was first coined by King (1994), apparently because it would remove the undesirable negative connotations of 'Satanic Nightjar!' 'Devilish Nightjar' (in del Hoyo *et al.* 1999) seems an unnecessary synonym of 'Satanic Nightjar'.

The two names which are most frequently applied to the species are 'Satanic Nightjar' and 'Heinrich's Nightjar', with the latter enjoying favour at present (e.g. Coates & Bishop 1997; del Hoyo *et al.* 1999). Whilst not doubting the worthiness and suitability of naming the species after its discoverer, we feel the enigmatic circumstances that surround *E. diabolicus* are best served by preserving the name 'Satanic'. As a recent book reviewer commented *diabolicus* "has a name that conjures up a haunting image of.....many of the [nightjar] species" (Rosenberg 1999). We feel that anything that attracts conservationists, birdwatchers, and the general public to study this mysterious species and the increasingly threatened forests it inhabits should be encouraged and for this reason alone we recommend that the English name of the species be maintained as 'Satanic Nightjar'. A further reason is that 'Satanic' was the first widely used English name, introduced by White & Bruce (1986).

Discussion

Species in the genus *Eurostopodus* may be separated into three species-groups (Cleere & Nurney 1998; del Hoyo *et al.* 1999). Firstly, the small, forest-dwelling species of Sulawesi and New Guinea (*E. diabolicus*, Archbold's Nightjar *E. archboldi* and Papuan Nightjar *E. papuensis*). Secondly, the two large, eared species with whistled call-notes, Great Eared Nightjar *E. macrotis* and Malaysian Eared Nightjar *E. temminckii*, that have sometimes been separated in the genus *Lyncornis*. Thirdly, the two species with distributions centred on Australia, Spotted Nightjar *E. argus* and White-throated Nightjar *E. mystacalis*, that share a number of morphological, vocal and ecological characteristics (del Hoyo *et al.* 1999).

We agree that *diabolicus* is taxonomically closer to *archboldi* and *papuensis* than other nightjars (see also Bishop & Diamond 1997). All three species are small, generally dark brown birds with little white in the plumage and no nuchal collar (Cleere & Nurney 1998; del Hoyo *et al.* 1999). Given the apparent close affinity of the species in New Guinea and

Sulawesi, the absence of *Eurostopodus* nightjars from the Moluccas (Coates & Bishop 1997) is peculiar.

The differences in plumage between the type specimen and the bird observed on Mount Ambang are most interesting. Whilst many species of *Caprimulgus*, or typical nightjars, are sexually dimorphic, with males having white wing and tail markings, which in females are buffy coloured or absent, *Eurostopodus* nightjars typically lack sexual dimorphism (Cleere & Nurney 1998; del Hoyo *et al.* 1999). Many nightjar species have an immature plumage, which is characterized by a lack of the adult's white patches in the wing and tail (del Hoyo *et al.* 1999). Considering this, it seems possible that the type specimen of *E. diabolicus* was an immature bird, and that observed on Mount Ambang an adult. However, if this is the case, Heinrich, who collected the type, failed to note this fact (Stresemann 1931). Clearly, further detailed field observations and perhaps collection of specimens are needed to satisfactorily explain these plumage differences.

The Satanic Nightjar is now known to range between 250 m and at least 2,000 m asl and to utilize degraded forest habitats. Therefore the pressures facing the species, notably from deforestation, are possibly significantly lower than was previously assumed (BirdLife International 2001). The species is currently known from four widely separated localities: Mount Klabat at the extreme north-eastern tip of North Sulawesi, Mount Rorekatimbu in the Lore Lindu National Park, northern -Central Sulawesi, and two intermediate localities on the northern peninsula, Mount Ambang and Panua. In view of its presumably nocturnal habits, *E. diabolicus* is probably overlooked rather than rare, and may prove to be locally common. Clearly, further surveys of Sulawesi's endemic night birds are required to elucidate their status and distribution.

Given the geographical position of the four localities and the lack of detailed ornithological surveys over much of Sulawesi, it is likely that *E. diabolicus* is continuously distributed in remaining suitable forest habitat across the northern peninsula and southwards at least as far as Mount Rorekatimbu. It seems likely that *diabolicus* also occurs at other localities in Central Sulawesi, very possibly extending into the ornithologically neglected southern and south-eastern peninsulas of the island. A clear lack of dependence on forest habitat would justify treating the species as not threatened. However, this is not the case as all observations of *E. diabolicus* have been made within, or in close proximity to primary or disturbed secondary forest. As this species is now thought to range over a wide geographical area, is known to inhabit a wide elevational range and can tolerate disturbed forest, we recommend that *E. diabolicus* be downgraded to Near Threatened.

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Table 1. Comparison of plumage and bare part colouration of the Satanic Nightjar *Eurostopodus diabolicus* type specimen and an individual observed at Mount Ambang, 25 May 2000.

	Type specimen (female) ¹	Mount Ambang bird (unsexed)
Bill	black with pink base	black with pink gape
Eye	Black	black
Feet	[brownish from specimen]	off-white
Lores	Rufous	rufous
Ear coverts	Brown	black
Cheeks	Rufous	brown
Supercilium	grey-brown	grey-brown
Crown	dark brown with lighter brown fringes	grey or brown with dark and paler brown fringes
Nape and mantle	dark brown, black feather Centres, with paler buff fringes and spotting	dark brown with black streaks
Chin	black-brown	black
Throat	buff or rusty-orange	creamy buff
Breast	blackish-brown with buff-chestnut spots	black-brown with orange or buff streaks
Belly	black-brown	dark brown with white spots
Vent	brown	dark brown with white spots
Scapulars	dark brown, showing paler buff fringes and spotting	grey or dark brown with buff tips
Wing coverts	dark- to grey-brown with black centres and ginger tips	dark brown with ginger tips
Primaries	sandy- to blackish-brown, outermost 3 rd and 4 th primary with small white spot	black with white spots on 2 nd , 3 rd , 4 th and 5 th outermost feathers
Tail	sandy-brown to black-brown with black vermiculations	dark brown or black with buff tip

¹based on published descriptions of type specimen (Stresemann 1931, del Hoyo *et al.* 2000) and field observations at Panua