

*This uncommon hummingbird is endemic to the Pacific coast of Costa Rica, in areas with a predominance of the Pacific mangrove: it is the indiscriminate destruction of this mangrove habitat that has led to the bird's decline.*

**DISTRIBUTION** The Mangrove Hummingbird is endemic to Costa Rica and distributed along the length of the Pacific coast from the head of Golfo de Nicoya to Golfo Dulce, in effect, virtually anywhere along this coast where Pacific mangrove *Pelliciera rhizophorae* grows abundantly (F. G. Stiles *in litt.* 1991). Localities are treated in order from west to east (all being traced from Slud 1964), and are as follows: Palo Verde (on the río Tempisque, but still tidal and with mangroves), where a male (in BMNH) was collected in June 1906 (Carriker 1910; see Remarks 1); Chomes, where a male and female (in LACM) were taken in January 1928; Tambor (on Península de Nicoya), where a male (in LACM) was taken in November 1928; Puntarenas, whence come a number of specimens (in BMNH; see also Boucard 1878a, Carriker 1910 and Remarks 2) and recent records (Taylor 1990, A. J. Goodwin *in litt.* 1989, M. Pearman *in litt.* 1990, G. J. Speight *in litt.* 1990) from the base of the peninsula and on the north side of the estuary; Zapotal (inland from the base of the Puntarenas peninsula), where a female (in AMNH) was taken in January 1922; Tivives, a locality mentioned by F. G. Stiles (*in litt.* 1989); Pigres, where five males and four females (in USNM: see Carriker 1910), were collected in February and March 1905, with birds recorded nearby between the río La Pita and río Grande de Tárcoles (Taylor 1990), near the Carara Biological Reserve (at Playa Azul near the mouth of the río Grande de Tárcoles: G. J. Speight *in litt.* 1990) and at Estero Guacalillos (ca.5 km from the Carara Biological Reserve, where 12 birds were mist-netted; F. G. Stiles *in litt.* 1989), all these localities being near the mouth of the río Grande de Tárcoles in the same extensive mangrove area (the best developed part of which is in the Pigres–Estero Guacalillos sector: F. G. Stiles *in litt.* 1991); Las Trojas de Puntarenas, where three birds (in BMNH) were taken in July 1933; near Parrita, where Slud (1964) recorded the species, and where a nest was found in January 1985 at the mouth of the river (F. G. Stiles *in litt.* 1989, 1991); Palo Seco, a locality mentioned by F. G. Stiles *in litt.* (1989); Quepos, where D. A. Scott (*in litt.* 1985) found the species in December 1983; Dominical, a locality mentioned by Taylor (1990); Coronado (at the mouth of the río Grande de Térraba), where at least 10 males and 11 females (in AMNH, ANSP, BMNH, CM) were taken in early July 1907 (see also Carriker 1910), with a male (in FMNH) taken in June 1917; Rincón de Osa, where a male and female (in WFVZ) were collected in July 1964, and 1.5 km south-east of Rincón, where a female (in WFVZ) was taken in April 1971; Puerto Jiménez (on Península de Osa), where specimens were taken in September and October 1926 (12 specimens in FMNH, YPM), December 1929 (four males and four females in FMNH, MLZ), and 2 km east of Puerto Jiménez, where nests (in WFVZ) were collected in November 1977 and February 1978 (see Ecology); and Golfito Refuge, a locality mentioned by Taylor (1990), especially in relation to the mangroves along the road to the airport (to the north of town), where at least three birds were seen in March 1983 (B. M. Whitney *in litt.* 1991).

**POPULATION** This species is generally considered to be a locally common resident of mangroves (Stiles and Skutch 1989), although Carriker (1910) suggested that it was exceedingly rare and local. The bird is apparently common at Puntarenas (Taylor 1990), although most records (see Boucard 1878a, Carriker 1910; also A. J. Goodwin *in litt.* 1989, G. J. Speight *in litt.* 1990) are of just 1-2 birds, and it seems that owing to pollution and deforestation it is less common now; however, the species occurs in several other areas in the Golfo de Nicoya, especially on the east and north-west sides (F. G. Stiles *in litt.* 1991). Carriker (1910) searched for this species at Puntarenas in 1907 but found none. At least nine birds (“about a dozen” in Carriker 1910) were taken at Pigres in February and March 1905, with several localities frequented nearby (see Distribution), and near Parrita (Slud 1964) several individuals were seen every day for an unknown period (on the sandbar: see Ecology), with a pair found nesting there (at the mouth of the river) in 1985 (see Distribution).

The largest series of specimens was taken at Coronado (at the mouth of río Grande de Térraba), where 21 birds were collected over 3-9 July 1907, Carriker (1910) referring to the bird there as being “fairly abundant at one small spot in the mangroves” (see Ecology) and claiming that the region of greatest

abundance was likely to be the río Grande de Térraba delta. Birds are still locally common there, although the distribution of *Pelliciera* is patchy, and the hummingbird is similarly localized (F. G. Stiles *in litt.* 1991). At Puerto Jiménez 12 specimens (including an immature male: see Distribution) were taken in September and October 1926, eight birds in December 1929, with two nests found in November 1977 and one in February 1978, suggesting that the species is locally common in the immediate area, this possibly being explained by the lack of tall *Rhizophora* mangroves (due to logging) which often shade out the *Pelliciera* (F. G. Stiles *in litt.* 1991).

**ECOLOGY** The Mangrove Hummingbird is, as its name suggests, restricted to mangroves on the Pacific coast, where although locally abundant, it is absent from many mangrove areas within its small range (F. G. Stiles *in litt.* 1986). This appears to be explained by its preference for an abundance of Pacific mangrove *Pelliciera rhizophorae* flowers (Stiles and Skutch 1989). It will tolerate much disturbance so long as *Pelliciera* remains common and flowering (e.g. at Puerto Jiménez: see Population), which this species does more or less year round, peaking in September or October–February or March (F. G. Stiles *in litt.* 1989, 1991); however, flowers of other trees (e.g. *Lonchocarpus* sp.), vines, and epiphytes, in and adjoining the mangroves, are also visited (Stiles and Skutch 1989; see also Carriker 1910). The bird taken inland at Palo Verde (see Distribution) was also found in mangroves (the river still being tidal at this point), although the species has been recorded from other habitats (albeit very close or adjacent to mangroves), for example near Parrita where several birds were seen daily on the sandbar that faced the ocean on one side and a mangrove-lined estuary on the other, the vegetation comprising a coconut-palm grove, bushy areas and scattered small trees (Slud 1964). Birds have been seen feeding on mosquitoes (at Pigres) at low tide (Slud 1964), but also at the various flowers mentioned above, where males have been noted to be aggressive but not territorial (Stiles and Skutch 1989). Stiles and Skutch (1989) recorded nesting from October to February, the nests being built on mangrove twigs c.1-4 m up and usually overhanging water. Three nests (in WFVZ) at Puerto Jiménez were collected (all with two eggs in) in mid-November 1977 and at the end of February 1978, the February nest being 1 m above the high-tide line near the tip of a branch (*Laguncularia* sp.) overhanging a channel within the mangroves. Other breeding records include a female at the nest (Puntarenas) in December (A. J. Goodwin *in litt.* 1989), a nest with eggs near the mouth of the río Parrita in January 1985, a bird with young at Chomes in November 1988, and a bird with young at Tivives in January 1988 (all three records from F. G. Stiles *in litt.* 1991); a female (in AMNH) had enlarged ovaries in January 1922 at Zapotal, and nearby (at Puntarenas) an immature male (in BMNH) was taken in June of the same year. Elsewhere, an immature (in BMNH) was collected at Las Trojas in July 1933, with an immature male (in YPM) taken at Puerto Jiménez at the end of September 1926.

**THREATS** This species is almost totally reliant on mangroves for breeding and feeding (although adjacent habitats may be used when conditions are favourable: see Ecology), and as such is under considerable threat from habitat destruction. Although it will tolerate much disturbance (see Ecology), mangroves are consistently being cleared to make room for salt extraction (salinas) and shrimp ponds (e.g. large areas of mangrove were destroyed for the 405 ha shrimp pond at Chomes), the wood being cut to fuel the stoves that evaporate water from the salinas and to make high-quality mangrove charcoal (Scott and Carbonell 1986, Stiles and Skutch 1989); however, the wood of *Pelliciera* is evidently less desirable than that of *Rhizophora* (F. G. Stiles *in litt.* 1991). Other threats include illegal cutting, dyke and road construction (which have affected the hydrology in a number of places), and pollution (Scott and Carbonell 1986).

**MEASURES TAKEN** The Mangrove Hummingbird is inadequately protected (F. G. Stiles *in litt.* 1989), although there is a general law (obviously not adhered to) which prohibits the cutting of mangroves (Scott and Carbonell 1986). Tivives (at the mouth of the río Jesús María) is currently (since 1990) protected as a Biological Reserve, although the amount of *Pelliciera* and hence hummingbird habitat there is relatively small (F. G. Stiles *in litt.* 1991).

**MEASURES PROPOSED** It is essential that a protected area be set up in which a viable population of the Mangrove Hummingbird can survive. The population at Estero Guacalillos (c.5 km from the Carara Biological Reserve, and containing very well developed mangroves) has been suggested as holding a “good protectable population” (F. G. Stiles *in litt.* 1989, 1991). The extension of Carara Biological Reserve to incorporate this area would facilitate the protection of this species, the Yellow-billed Cotinga *Carpodectes antoniae* (see relevant account), and the regionally threatened Scarlet Macaw *Ara macao* (the Carara population of which roosts in the mangroves: F. G. Stiles *in litt.* 1991) without the creation of a new park. Other suitable places for protected areas in which both species occur are Parrita, Palo Seco (although the large tourist population would make protecting particular areas difficult), and possibly Puerto Jiménez (which holds a large population of the species) (F. G. Stiles *in litt.* 1989, 1991), although the status of the hummingbird needs to be determined in the extensive mangroves around Golfo Dulce before suitable areas can be identified. Mangroves around and north of Puntarenas would also appear to support a viable population of this species, which should be considered for protection.

An ecological study is urgently needed to determine the area of mangrove required to sustain a viable population of this species, and indeed to determine where viable populations exist. Once this has been undertaken, areas (where the species is present) with a suitable expanse or a high enough density of *Pelliciera* can be chosen as priority sites. A survey around the mangrove areas of Golfo Dulce (e.g. río Coto and Rincón) is especially needed to determine the species's current status in this area. All measures outlined above should (where appropriate) be integrated with those outlined for Yellow-billed Cotinga.

**REMARKS** (1) Carriker (1910) mentioned a male specimen taken at Palo Verde in June 1906, although what is presumably the same bird (a male taken at Palo Verde) in BMNH is dated 11 May 1906. (2) Carriker (1910) suggested that this species was discovered at Puntarenas “probably in January 1877” when a few specimens were taken near town. Boucard (1878a) reported that a male and female were collected from Puntarenas in May.