

*The Blue-chested Parakeet survives in scattered Atlantic Forest fragments from southern Bahia south to Rio de Janeiro, Brazil and, although sometimes fairly common where it occurs, faces extinction from the continuing clearance of its lowland habitat: preservation of key sites and possibly a study of its ability to survive in cacao plantations are needed.*

**DISTRIBUTION** The Blue-chested Parakeet is endemic to the Atlantic Forest region of south-eastern Brazil from Bahia south of Salvador and south-eastern Minas Gerais south through Espírito Santo to Rio de Janeiro state.

*Bahia* Older records are from as far north as Jequié (Serra do Palhão), November 1932; Boa Nova, 790 m, June 1928; rio Gongogi, Cajazeiras, 300 m, June 1928, and at the confluence of the rio Novo, December 1932; and Ilhéus, February and July 1944 and January 1945 (specimens in AMNH, MCZ, MZUSP; also Pinto 1935); moreover, Wied (1831-1833) encountered the species as far north as Ilhéus, reporting it as much rarer in the hinterland of the state, where he obtained it on the rio Catolé and on the Ilha Cachoeirinha in the rio Jequitinhonha (Wied 1820-1821). It is not known if any populations persist in these areas today, but ones currently exist in the small CEPLAC experimental stations either side of the Jequitinhonha at Canavieiras and Barrolândia, where birds were seen in October 1987 (LPG), and in the CVRD Porto Seguro Reserve, where birds were seen in October 1986 (Gonzaga *et al.* 1987), all three sites being north of the anticipated northern limit of the species, Monte Pascoal National Park (Ridgely 1981a). Between this park and the border with Espírito Santo records are from the rio Jucurucú (Cachoeira Grande do Sul), March/April 1933 (Pinto 1935, and in MCZ), and rio Mucuri (Wied 1831-1833).

*Minas Gerais* Older records (north to south) are from the eastern part of the state at Salto da Divisa, undated; Machacalis, December 1954; Teófilo Otoni, September/October 1908; lower rio Piracicaba at the confluence with rio Doce, August 1940; 35 km to the north of Raúl Soares, July 1957; and Matipó, June 1919 and January and July 1936 (Pinto 1937, 1938, 1952, and specimens in LACM, MZUSP and MZUFV). Of these, the Piracicaba confluence and the Raúl Soares site are close to or in the Rio Doce State Park where the species persists (G. T. de Mattos *in litt.* 1987; also Pinto 1945), although this is not the only site for it in the state (*contra* speculation in Ridgely 1981a), while at rio Matipó an observation was made in 1979 (A. Brandt *in litt.* 1987). Four further localities are the Caratinga Reserve (Fazenda Montes Claros, near Raúl Soares) (Mittermeier *et al.* 1982), where the species was common in October/November 1986 (L. C. Marigo verbally 1986) and in September 1987 (A. Brandt *in litt.* 1987); Fazenda Ramaiana, Joaima (in the north-east, near Machacalis), where a female was collected in March 1970 (in MNRJ); Almenara, Serra da Mombuca (rio Jequitinhonha) also in the north-east, where a female (presumably that labelled as from Fazenda Gangogi, Divisópolis, in CGTM) was collected in October 1975 (G. T. de Mattos *in litt.*, verbally 1987), and Mantena, recently (de Mattos and de Andrade 1988). The locality Pirapora is almost certainly an error (see Remarks 1).

*Espírito Santo* Older records are (north to south) from the rio Itaúnas, September 1950; rio São José, September 1942; São Domingos, August 1940; rio Doce, December 1905 to April 1906; Baixo Guandu (in one case precisely Fazenda da Serra), October 1925 and December 1929; Linhares (also precisely rio Pequeno and rio Juparanã), October 1939, November 1940 and February 1952; Lagoa Juparanã (in one case precisely Santana), October 1925 and November 1929; (córrego) Cupido, August 1939 (this now within the Sooretama Reserve); Rancho Fundo, Colatina, August 1940; Pau Gigante (now Ibirapu) (in one case precisely Lauro Muller), August to November 1940; Agua Boa, Santa Cruz, October 1940 (specimens in AMNH, MCZ, MNRJ, MZUSP and USNM; also Pinto 1938). The key site for the species in the state (and indeed anywhere) is Sooretama Biological Reserve (Ridgely 1981a) and the adjacent CVRD Linhares Reserve (see Population), on the rio Barra Seca (whence two specimens, August 1939; Aguirre and Aldrighi 1983). Other recent records (all to the north or north-west of Sooretama) are from Pedro Canário, four birds collected in February 1973 (in MNRJ), and Córrego do Veado Biological Reserve (Gonzaga *et al.* 1987) (both are close to rio Itaúnas), Córrego Grande (Fazenda Klabin) Biological Reserve (Gonzaga *et al.* 1987) and Córrego das Queixadas, Barra de São Francisco (G. T. de Mattos *in litt.*, verbally 1987).

*Rio de Janeiro* Nineteenth-century records are from Lagoa de Maricá; Gurapina; Fazenda Tiririca; Serra de Inoa; and the rio Paraíba (Wied 1820-1821, 1831-1833; see Remarks 2); Registo do Sai, April 1818 (von Pelzeln 1868-1871); (Serra das) Araras (i.e. Piraí), November 1818 (von Pelzeln 1868-

1871; see Remarks 3); Nova Friburgo (Burmeister 1856); and Cantagalo (Cabanis 1874, von Ihering and von Ihering 1907); records from Rio de Janeiro (von Spix 1824, von Ihering and von Ihering 1907, and seven skins in AMNH, BMNH, MCZ and USNM) cannot be attributed to the city itself but refer to the state. However, in 1969 and 1970 a total of 66 Blue-chested Parakeets were claimed to have been “reintroduced” (in fact this was an introduction) successfully (breeding confirmed through the presence of offspring) into Tijuca National Park above Rio city (Coimbra-Filho and Aldrighi 1971, 1972, Coimbra Filho *et al.* 1973), although no further records are known, despite much observer coverage of the area, other than a report in Silva (1989a) (certainly in error) that the species “remains rather common and is perfectly established there”. During 1987 the species was rediscovered in the state near the Desengano State Park (São Julião, 50-110 m; rio Mocotó, near Sossego; Serra da Penação), with small flocks of birds (up to 15; 23 in 1988) being seen (J. F. Pacheco *in litt.* 1987, verbally 1988); and in August 1989 and September and November 1990 the species was recorded at Fazenda União, Rocha Leão, in the municipality of Casimiro de Abreu (J. F. Pacheco verbally 1991).

**São Paulo** The only records for the state are from Araras in the north-east in November 1818, which is considered here in error (see Remarks 3), and (by report) from the lower rio Tietê in the far west (von Ihering 1898), which is sufficiently anomalous to be probably also in error. Nevertheless, von Ihering (1898) thought the species could occur near Bananal, just inside the São Paulo border from Rio, Ridgely (1981a) identified coastal north-east São Paulo as the most likely place where birds might survive in the southern part of their range, and Silva (1989a) followed Sick (1985) in including the north-east of the state as part of the range; but there seems to be no evidence, fresh or otherwise, for any of this.

**POPULATION** The Blue-chested Parakeet was common in the states of Bahia and Rio de Janeiro in the 1890s (von Ihering 1898). Over half a century ago it was recognized that while the species's habitat is restricted it nevertheless generally remains common where present (Pinto 1935), and this perception persists in modern assessments (e.g. Ridgely 1981a, Scott and Brooke 1985). At present the species's stronghold is the Sooretama Reserve and the adjacent CVRD Linhares Reserve in northern Espírito Santo, where a large population is found (Ridgely 1981a): thus flocks of up to 20 were seen almost daily in Sooretama from 30 December to 21 January 1980/1981 (Scott and Brooke 1985), while in the CVRD Linhares Reserve in October 1985 flocks of up to 20 were seen (Collar and Gonzaga 1985), with similar values in December 1986 (flocks varying in size from as few as six to as many as about 20, 8-12 seeming commonest), yielding an estimated daily total of at least 40 birds (B. M. Whitney *in litt.* 1987) and in 1988 30 per day (D. F. Stotz *in litt.* 1988). Numbers in the much smaller reserves listed under Distribution cannot be high, but in the comparably large Monte Pascoal National Park the species seems relatively less abundant (Ridgely 1981a) and it was not found there by Gonzaga *et al.* (1987). However, it was common at the CVRD Porto Seguro Reserve, January 1988 (B. M. Whitney *in litt.* 1988).

**ECOLOGY** The Blue-chested Parakeet inhabits humid primary forest and forest edge and, to a lesser extent, small clearings and thinned forest, remaining hidden in the canopy of the trees (Wied 1831-1833, Ridgely 1981a, Scott and Brooke 1985, Sick 1985); it also persists or at least persisted (see Threats), albeit apparently in smaller numbers, in agricultural regions where many forest trees are retained, e.g. to shade cacao (Ridgely 1981a). It is never seen in either dry forest or cerrado, only in primary moist evergreen forest (G. T. de Mattos *in litt.* 1987). Ridgely's (1981a) altitudinal limit of around 400 m is too low, given the records from Boa Nova (Bahia) at 790 m and various sites in Minas Gerais up to 960 m, but these make the species's absence from certain areas, such as Augusto Ruschi (Nova Lombardia) Biological Reserve in Espírito Santo or the higher parts of Desengano State Park, difficult to explain unless in terms of its replacement there by Maroon-bellied Parakeet *Pyrrhura frontalis*.

It feeds on fruits of secondary growth trees (e.g. *Trema micrantha*, *Cecropia*) in forest edges along tracks (LPG). Stomach contents of specimens in MNRJ are given as seeds, red berries, fruit. In a study in Minas Gerais, birds ate pitomba *Talisia esculenta* in June/July, folha-do-balo *Alchornea iricurana* in September, plus canudo-de-pito *Mabea fistulifera* and an unidentified Myrtaceae at unspecified times; foraging was done chiefly in the canopy and birds never fed outside the forest, although they cross open areas between forest patches (de Mattos and de Andrade 1988). Twenty-three individuals were once seen perched in an isolated flowering tree in pasture adjacent to forest (J. F. Pacheco verbally 1991), and birds will associate with other parrots in a fruiting tree, e.g. Golden-capped Parakeet *Aratinga auricapilla* at Fazenda Ramaiama (de Mattos and de Andrade 1988). Corn seeds are mentioned as food taken by this

species (Moojen *et al.* 1941), but feeding on agricultural crops has not been observed in the wild.

A female collected in Minas Gerais, October, had an egg in the oviduct, and a nest of the species was found 10 m up in a hollow tree in December (G. T. de Mattos *in litt.* 1987). Of the five specimens collected in November and December whose gonad condition was recorded, none was developed, whereas of the five such from June, two were slightly developed (specimens in AMNH); a bird collected in August had testes slightly enlarged; one in September had them fully enlarged (in MNRJ). Two to four eggs are laid in holes in trees, incubation lasting 22-25 days, and the fledging period is 45 days (de Mattos and de Andrade 1988). In captivity, birds became adult at two years and bred at three; 7-8 eggs were laid, incubation lasted 24 days and the fledging period was two months (Spengelink-van Schaik 1984, Silva 1989a). Independent young appear to form flocks in December and January (de Mattos and de Andrade 1988).

Descourtilz (1854-1856) referred to the species's presence in Minas Gerais and Espírito Santo only between April and September, which is certainly incorrect; there is no evidence for any migration.

**THREATS** Forest clearance throughout the species's range is clearly culpable for its highly patchy modern distribution (King 1978-1979, Ridgely 1981a, Forshaw 1989). The southern part of this range (Espírito Santo and Rio de Janeiro) has been heavily inhabited for a century or more, and virtually all lowland forest has long since been cut (Ridgely 1981a); yet even now forest at the lower levels in Desengano State Park is being steadily cleared by the private owners of the land (J. F. Pacheco verbally 1991). Although found in the late 1970s in cacao plantations (see Ecology), modern developments provide little hope for the long-term utilization of such habitat: older shade trees are not replaced, new (1980s) shading techniques involve the use of banana and *Erythrina* trees (and hence the clearance of standing forest), and in any case unstable prices have driven many farmers to convert their land to pasture (LPG). Forest at the privately owned Fazenda São Joaquim (Fazenda Klabin), although now an IBAMA-run biological reserve (Córrego Grande), has been reduced over the past two decades from 4,000 ha to only 1,200 ha (Gonzaga *et al.* 1987). Monte Pascoal National Park is under severe pressure (Redford 1989).

In the 1810s, when a common species, it was apparently little persecuted because a poor talker and hard to maintain (Wied 1831-1833). However, recently in Sooretama the species has been under pressure from trapping in numbers for the cagebird trade (R. Wirth *in litt.* 1984), although it remains rare in the illegal markets within Brazil (C. E. Carvalho *in litt.* 1987) and in captivity in general (Ridgely 1981a, Spengelink-van Schaik 1984); over 70 have been bred by one U.K. collector (Low 1991e).

**MEASURES TAKEN** The species is protected by Brazilian law (Bernardes *et al.* 1990), placed on Appendix I of CITES, and listed as endangered under the U.S. Endangered Species Act (King 1978-1979). Some of its present remnant populations should persist if the protected areas where they are found continue to be preserved (Ridgely 1981a; also King 1978-1979); but see Threats. On the basis of the evidence under Population, the two critical areas for the species are the CVRD Porto Seguro Reserve in Bahia and the Sooretama Biological Reserve and adjacent CVRD Linhares Reserve in Espírito Santo, although Desengano State Park (possibly: no records yet inside the boundaries) and Fazenda União in Rio de Janeiro and Rio Doce State Park and Fazenda Montes Claros (Caratinga Reserve) in Minas Gerais are clearly important (see Remarks 4). Ridgely's (1981a) urging that the few remaining forest patches should be surveyed in the southern part of the species's range has largely been fulfilled in the past decade.

**MEASURES PROPOSED** Reservation of such additional forest tracts as still exist in southern Bahia and elsewhere would also be very worthwhile (Ridgely 1981a). The few remaining patches of forest within the northern part of the species's range (southern Bahia, north-eastern Minas Gerais) could still harbour small and so far undetected populations, and merit being identified and searched. Support for existing key sites is clearly imperative, and CVRD must be urged to maintain the full extent of forest cover at its Porto Seguro Reserve. Research is possibly needed to test whether the species anywhere survives and breeds successfully in cacao plantations, as hoped in King (1978-1979) and Ridgely (1981a); but in any case see Threats. A proposal to reforest three million hectares in the valleys of the rios Doce and Jequitinhonha in Minas Gerais, involving CVRD (*Brasil Environment* no.7, August 1991), is an opportunity to integrate the revitalizing of the regional economy with the conservation of various Atlantic Forest bird species such as this and the Red-browed Amazon *Amazona rhodocorytha* (see relevant account).

**REMARKS** (1) Pinto (1952) gave Pirapora as the source of a specimen, without comment, despite its being so far west, out of the Atlantic Forest region, that some error seems likely; in fact his source, Moojen (1943), simply listed the species as “Matipó Pirapora” (Moojen was the collector of the Matipó specimens in MZUFV), and is of such poor typographic quality that some error here seems certain. (2) Bokermann (1957) provided the localities of Wied's explorations; from this it is worth noting that Wied only went up the Paraíba as far as São Fidelis. (3) The record from Araras (von Pelzeln 1868-1871) was originally (and evidently correctly) attributed by von Ihering (1898) to Rio de Janeiro but, possibly through confusion with Areias in the extreme north-east of São Paulo state, the species was listed for that region by (e.g.) Pinto (1935) and many subsequent authorities. An analysis of J. Natterer's itinerary and collecting dates (as given in von Pelzeln 1868-1871) indicates that in fact the true locality was the Serra das Araras as given in Distribution: Rio de Janeiro (J. F. Pacheco verbally 1991). (4) The nominate form of White-eared Parakeet *P. leucotis leucotis* is very similar in distribution and, apparently, ecological requirements to Blue-chested Parakeet, and is likewise becoming rare and in need of protection (King 1978-1979, Ridgely 1981a); it is listed as threatened under Brazilian law (Bernardes *et al.* 1990).