RED-SPECTACLED AMAZON *Amazona pretrei* **V/R**[10]

This parrot has a small range in south-east Brazil, apparently breeding in Rio Grande do Sul, the more southerly birds migrating to the north of the state, with tiny numbers once occurring in neighbouring Misiones province, north-east Argentina, and possibly eastern Paraguay. Formerly abundant, it is partially dependent on araucaria forest as a food source and roosting cover for much of the year, and its decline is related to habitat fragmentation and trade.

DISTRIBUTION The Red-spectacled Amazon (see Remarks 1) now appears to be confined to the state of Rio Grande do Sul in south-east Brazil, although it has occurred seasonally in very small numbers in Argentina and possibly Paraguay, with no good evidence from Uruguay (see Remarks 2).

Brazil Outside Rio Grande do Sul the species is believed formerly to have ranged north as far as the state of São Paulo, whence there is a single specimen collected at Piracicaba plus reports from Apiahy (Apiaí) in the last decade of the century (von Ihering 1898; also von Ihering and von Ihering 1907, Pinto 1938), although it no longer occurs there (Pinto 1946, 1978; see Remarks 3). Its occurrence in the state of Santa Catarina (Sick and Teixeira 1979, Sick *et al.* 1981, Belton 1984-1985, Nores and Yzurieta 1986) has been affirmed but remains unsubstantiated (its at least seasonal presence just inside Rio Grande do Sul at Espigão Alto State Park indicates the probability that it does), and during several years of searching for it in São Paulo, Paraná and northern Santa Catarina, Diefenback and Goldhammer (1986) only found the Vinaceous Amazon *Amazona vinacea* in the araucaria groves; this has also been the case in at least part of north-eastern Rio Grande do Sul (R. S. Ridgely *in litt.* 1989) where, however, time of year is important (N. Varty verbally 1992).

Rio Grande do Sul The Red-spectacled Amazon seems now (and indeed may always have been) almost entirely restricted to this state, where records both ancient and modern stem roughly from within an area bounded by 28°00' to 31°00'S and 50°30' to 54°00'W, with sightings concentrated in the north-eastern and northern central highlands, thence south through the centre of the state across the central depression to the northern portion of the southern central hill country, although it could occur somewhat beyond these limits in all directions (Belton 1984-1985, which see for map; also Gliesch 1930). It is now found mostly between 300 and 1,000 m (Ridgely 1981a, Belton 1984-1985), although it formerly also occurred lower (and in the south still does so), having been collected at Taquara, 39 m at 29°39'S 50°47'W, and São Lourenço, 3 m at 31°22'S 51°58'W, in the nineteenth century and in 1928 and 1929 (von Ihering 1899a; specimens in AMNH), São Leopoldo, 20 m at 29°47'S 51°10'W (Finsch 1867-1868), Porto Alegre, 10 m at 30°02'S 51°12'W (Gliesch 1930), Pedras Brancas (now Guaíba), 10 m at 30°07'S 51°20'W, and Barra do rio Camaquã, 31°17'S 51°45'W (von Ihering 1899a; all coordinates and altitudes from Belton 1984-1985), with "summer" records from the Serra dos Taipes and the Serra do Herval (both untraced) and speculated "winter" records from Cima da Serra (von Ihering 1899a; see Remarks 4). In the far north of the state, the Indians at Nonoai Indian Reserve remember the species and used to capture it, and it still occurs at Espigão Alto State Park near Barracão (E. Albuquerque *per* N. Varty verbally 1992).

There have been two recent assessments of the breeding and non-breeding distributions of this puzzling species in the state. The first was that outside the breeding season it apparently moves in large numbers from area to area, depending on food supply, but scatters in pairs throughout the entire region for nesting from the end of September to the beginning of January (Belton 1984-1985). The second (apparently developed by W. A. Voss: N. Varty verbally 1992), consistent with other evidence (such as that the species only appeared at Taquara in March, April and May: von Berlepsch and von Ihering 1885; but see Remarks 5), is that the breeding grounds, occupied from August to January, are chiefly in the south of the state, and that there is a post-breeding dispersal, January to August, to the highland plateau of the north and north-east (Silva 1989a). Current studies have indicated that the truth lies in between: there are essentially two populations, one breeding in the northern part of the state around Carazinho and probably near Vacaria, the other in the south, concentrating around Caçapava do Sul and Santana da Boa Vista (F. Silva *per* N. Varty verbally 1992); birds in the north may move seasonally, while those in the south certainly do, occurring in large numbers in Carazinho's municipal park and thus presumably then mixing with the northern birds (N. Varty verbally 1992).

BirdLife International (1992) Threatened Birds of the Americas.
Cambridge, UK: BirdLife International.

Large (post-breeding) roosts have been noted in an araucaria grove (now included in the Aracuri-Esmeralda Ecological Station) at 900 m at 28°14'S 51°10'W, 18 km south of Esmeralda (Belton 1984-1985) and in a *Podocarpus* grove a few kilometres away during a period when the first-mentioned roost was deserted (King 1978-1979), and in an araucaria grove at Rincão dos Pereira, 300 m at 30°48'S 53°03'W (Belton 1984-1985), 11 km north-east of Santana da Boa Vista (Belton 1984-1985), although this latter has probably now disappeared (N. Varty verbally 1992). It is possible that the entire population sometimes gathers at the Esmeralda site (King 1978-1979).

Argentina Two males were collected at Santa Ana, Misiones province, in October 1909 (Orfila 1936-1938) and September 1917 (specimen in MACN) respectively, but the only recent records (coordinates from Paynter 1985) are a single bird seen in February 1980 at arroyo Urugua-í, 25°54'S 54°35'W, in Iguazú department (Chebez 1981); two birds in flight over Ruta Nacional 12, 2 km north of Garuhapé, c.26°55'S 54°55'W, in December 1982 (F. Moschione and L. Pastorino *per* J. C. Chebez *in litt*. 1992); and an unspecified number in flight across the río Paraná 2 km from Candelaria, 27°28'S 55°44'W, in July 1987 (F. Moschione and J. Sancristóbal *per* J. C. Chebez *in litt*. 1992).

Paraguay Occurrence in south-eastern Paraguay has been speculated (Forshaw 1978), as a few (but dwindling) araucaria groves are found in that country (Ridgely 1981a, Nores and Yzurieta 1986), and in fact there is a single, neglected record of three birds collected in June 1928 on the "río Pyraty-y (Alto Paraná)" (río Piratiy, 24°08'S 54°22'W in OG 1957a), of which one was later obtained for the national museum (Podtiaguin 1941-1945). "Summer" birds in the serras of Rio Grande do Sul were said to have come from Paraguay (von Ihering 1899a; see also Remarks 5). López (in press) knew of no certain records.

POPULATION Modern attempts at judging numbers only began in the 1970s, but evidence of the species's former abundance, based on reliable witnesses, reveals a previously undocumented and very startling decline: thus in "winter" 1950 a local resident at Vacaria saw a flock estimated to be a kilometre in width which took 45 minutes to pass overhead (E. A. Isaia and A. Kindel *per* N. Varty verbally 1992), and people at Caçapava do Sul have similar stories of great abundance in the 1950s, but all now report an enormous decline in the number of birds observed (N. Varty verbally 1992).

In May 1971 numbers at the Esmeralda roost were put at between 10,000 and 30,000 (Forshaw 1978), and in May 1972 less than 10,000 were estimated (by W. Belton in Silva 1981a) or, in another version, possibly less than 5,000, this apparent decline following the removal of tall araucarias at the site (W. Belton *in litt.* 1974 to W. B. King); no significant flocks were registered there in 1974 (Belton 1984-1985). Silva (1981a) recorded that in May 1975 less than 5,000 were seen at the site, which may or may not have represented a decline, but a decline in other roosting areas was noted, principally the Santana da Boa Vista site, where only 2,000 were seen in February 1976 (Belton 1984-1985). In 1976 the Esmeralda roost was temporarily deserted for reasons unknown (King 1978-1979), but a flock of about 2,000 began to roost in a nearby *Podocarpus* grove (King 1978-1979). In July 1980 c.1,000 birds (Silva 1981a) but in late February and mid-May 1983 c.10,000 birds were estimated at the original Esmeralda roost (Belton 1984-1985). In 1989 no fewer than 14,000 birds were estimated to be present, but in 1991 the highest number recorded was only around 300; this is noted as a decline (Scherer Neto 1991b), although it seems equally possible that the birds had simply moved elsewhere. It is worth noting that 350-500 birds were roosting at the Carazinho park roost in January 1992 prior to the departure of birds from the southern breeding populations (N. Varty verbally 1992).

That the species was probably never common in Misiones, Argentina, as araucaria always had a very limited distribution there (Hueck 1978, Nores and Yzurieta 1986), seems at odds with evidence offered in Threats under Vinaceous Amazon, which, however, indicates that the tree is certainly now extremely limited in extent there; almost complete deforestation in San Pedro and General Belgrano departments has occurred (Chebez 1985a, Nores and Yzurieta 1986).

ECOLOGY Although it has been authoritatively reported that the Red-spectacled Amazon breeds in forested areas where the commonest tree is *Araucaria angustifolia* (Belton 1984-1985), this is not true of the two southern breeding populations, where the habitat is lowland riverine forests (up to 300 m) among the hills (N. Varty verbally 1992) or what Silva (1989a) called dense broadleaved forest. During the non-breeding season it mainly roosts in araucaria groves, though *Podocarpus lamberti* groves may also be used (King 1978-1979, Belton 1984-1985). During the day it frequents *Podocarpus* groves in January and February, while for the rest of the non-breeding season, at least from the end of February to July, it is found in araucaria groves (Belton 1984-1985, Sick 1985, Silva 1989a), although araucaria does not produce ripe fruit until April/May (N. Varty verbally 1992). During the breeding season the Red-spectacled Amazon is found in pairs that may vocalize in flight but often move about silently and are very secretive near their nest (Belton 1984-1985); hence lack of calls at this season does not necessarily signify lack of birds. They possibly gather at food sources even then, as a flock of 12 was seen on 7 October (Silva 1981a), although these may have been younger, non-breeding birds. In contrast they become very noisy during the non-breeding season when they move about in varying-sized flocks of 5-150 birds, fly long distances every day (up to 70 km: E. Albuquerque *per* N. Varty verbally 1992), and gather in enormous roosts at night, sometimes possibly the entire population at one or a few roosts (King 1978-1979, Belton 1984-1985). Birds coming into roosts in May appeared as two categories, one of fairly silent pairs and one of noisy family groups of 2-4 (Sick 1985).

In January and most of February the principal food source is the seeds of *Podocarpus lamberti* (not earlier in the breeding season, as fruiting only occurs in these months: N. Varty verbally 1992), while other favourites are the fruits of a *Eugenia* sp. and a *Campomanesia* sp., both in the family Myrtaceae (Belton 1984-1985, Sick 1985), also berries and fruit of *Nectandra* and *Ocotea* spp. (Silva 1989a). That the cones of *Araucaria angustifolia* ripen from the end of February (Sick 1985) is mistaken (they appear on the trees then but only ripen in April: N. Varty verbally 1992) but they appear to form the principal food source of the parrot at least until July (Belton 1984-1985, Sick 1985), after which the birds (in one account) spread out in smaller groups (Silva 1981a) or (in another) return south to their broadleaved forest breeding zones (Silva 1989a). In October the parrots have been observed feeding on the fruits of *Melia* sp. (Silva 1981a).

Trees used for nesting were, in the five nests recorded, *Casearia* sp. and *Quillaja brasiliensis*, both of the holes being 10 m up (Silva 1981a, Belton 1984-1985), *Ficus* sp., *Cuparia vernalis* and "angico", the holes in these last three being 7.8, 6.1 and 9.2 m up respectively (N. Varty verbally 1992). According to local people, the number of young varies from two to four, but is usually three, and they are always fledged by Christmas (Belton 1984-1985, Silva 1989a). The incubation period of a captive pair was 29-30 days in one case (Diefenback and Goldhammer 1986), 26-27 days in another (Low 1991a,b,c). The young probably fledge when around nine weeks old as in other species of *Amazona* (Forshaw 1978), which would mean that egg-laying in this species commences at the end of September; however, Low (1991a,b,c) recorded fledging as early as around 50 days. Egg-laying (though infertile) by a bird apparently three years of age has been recorded in captivity (Diefenback and Goldhammer 1986). In January the young begin to flock with their parents in parties of 30-50 prior to their movement into the highlands (Silva 1989a), and still larger roosting flocks form at this season (N. Varty verbally 1992).

THREATS The Red-spectacled Amazon is reported to be a rare and little favoured bird in captivity (Ridgely 1981a, Diefenback and Goldhammer 1986), although over a century ago hunters shot at flocks to bring down birds alive and sell, there being a good market for what was considered a good talker (von Berlepsch and von Ihering 1885). The information that 976 were imported into the U.S.A. in 1977 (Anon. 1980) seems doubtful in view of the large number involved, and the fact that the species was protected at the time, all legal trade in it having ceased since its listing on Appendix I of CITES, which came into force on 1 July 1975 (WTMU 1988). However, there is certainly a continuing organized trade in the species, at least at the internal level, with two key dealers in Florianópolis and Fontoura Xavier, and losses of birds to this pressure appear to be significant (N. Varty verbally 1992). Although it is sometimes shot by local people for food (Diefenback and Goldhammer 1986, N. Varty verbally 1992), the other major threat at present appears to be habitat destruction (Sick and Texeira 1978, Sick 1985, Diefenback and Goldhammer

1986, Nores and Yzurieta 1986). In Paraná state the original area forested by araucaria was 73,780 km^2, in 1930 it was reduced to 39,580 km^2 and in 1965 only 15,932 km^2 remained; in Rio Grande do Sul the situation is similar (Sick and Teixeira 1979; see also Hueck 1978). Most reforestation in Brazil from 1966 to 1976 was of the foreign trees *Pinus* sp. and *Eucalyptus* sp., araucaria only being planted in 2.7% of the areas being reforested (Sick and Texeira 1979). Sick (1985) gave the deforestation of traditional roosting sites as the cause of the decline of the parrot, although Ridgely (1981a) doubted that lack of araucaria seeds or roosting sites was responsible and suggested that lack of breeding sites, e.g. trees large enough to have suitable big holes, was the cause.

In Argentina the site where it was observed in 1980 has been flooded by the Urugua-í Reservoir (J. C. Chebez *in litt*. 1992). Loss of araucaria in Misiones is documented in Threats under Vinaceous Amazon.

MEASURES TAKEN The species is protected under Brazilian law (Bernardes *et al.* 1990) and is listed on Appendix I in CITES (King 1978-1979). The largest roosting site has been protected (Belton 1984-1985), and although it was deserted in 1976 (King 1978-1979) it was later again in use (Belton 1984-1985).

MEASURES PROPOSED Although the protection of *Araucaria angustifolia* forests and groves, being the principal food source of these parrots for the winter, seems to be important for preserving the parrot (Sick 1985, Diefenback and Goldhammer 1986, Nores and Yzurieta 1986), attention should also be given to the preservation of mixed forest with *Podocarpus lamberti* groves, as these provide most of its food in January and February, and perhaps during the breeding season (Sick 1985), and nesting trees (Silva 1981a) and habitat should also be secured; such recommendations need local adjustment, as (e.g.) there are many *Podocarpus* trees around Santana de Boa Vista and very few around Caçapava do Sul (N. Varty verbally 1992). Belton's (1984-1985) urging of a full study of the species to find and try to preserve major roosting sites and food resources, and to determine its life history and the factors causing its decline, has been heeded: a project to study the ecology of this and the Vinaceous Amazon in Rio Grande do Sul is now being developed by CNPq and PUC-RS in collaboration with ICBP.

REMARKS (1) The near-threatened Alder Amazon *Amazona tucumana* was previously regarded as a race of *A. pretrei* (Peters 1937), but was separated as a full species on the basis of a (probably erroneous: Ridgely 1981a) record of sympatry in Misiones province, Argentina (SOMA 1935-1942). However, the two forms seem to differ in the juvenile plumage, and also by *pretrei* being sexually dimorphic, while the sexes are alike in *tucumana* (Diefenback and Goldhammer 1986). These differences (see also Low 1991a,b,c), plus their evidently different feeding requirements, tend to support the view that *pretrei* and *tucumana* should be treated as two species, although biochemical and other evidence is needed to disclose their true relationship.

(2) Occurrence in Uruguay was mentioned by Finsch (1867-1868) (inasmuch as he noted a specimen labelled from Montevideo), von Ihering and von Ihering (1907), Brabourne and Chubb (1912), Cory (1918), Peters (1937), Podtiaguin (1941-1945), who specifically mentioned Artigas and Rivera departments, and Barattini (1945), but apart from a single specimen (now in BMNH) unreliably labelled "Rio de la Plata" and in any case probably a cagebird (P. R. Colston verbally 1988), there appears to be no good basis for this and, as no natural araucaria groves are found in the country (a few plantations may now grow in a semi-wild state: Hueck 1978), it seems quite unlikely that it ever occurred (Cuello and Gerzenstein 1962), and it was omitted altogether by Gore and Gepp (1978). Nevertheless, because (a) occurrence so far south as Uruguay would of necessity be in the breeding season, and (b) the species does not require araucaria when breeding (see Ecology), absence of the tree does not prove absence of the parrot.

(3) This (apparently single) specimen record from São Paulo seems to have caused all authorities (e.g. Pinto 1978, Belton 1984-1985, Sick 1985) to indicate that the original distribution extended from that state south to Rio Grande do Sul, whereas the probability is that the São Paulo record was of a wandering

bird in the austral winter. However, according to C. Yamashita (*in litt.* 1990) the São Paulo record is simply in error, and the species probably never occurred in Paraná either.

(4) None of these "serra" localities appears to have been traced by Belton (1984-1985), although he gave an Herval in hills in the farthest south of the state, and von Ihering (1899a) himself, in providing a record of Red-tailed Amazon *Amazona brasiliensis* (see relevant account) from Cima da Serra, indicated it as in the north, close to the border with Santa Catarina.

(5) The problem of the migration of this species was not resolved by the accounts of it in either Belton (1984-1985) or Sick (1985). The account provided in Silva (1989a) seems to fit the facts best, although not entirely: thus the large flocks that visited the Serra dos Taipes and environs from January to April were reported by von Ihering (1887) to return in April to their usual region, the pine forests of the province's highlands, implying that they came down from that region in December (although he admitted that the direction and causes of these wanderings were not clear); later (von Ihering 1898) he remarked that the species visited São Lourenço (the southernmost traced locality known for the species) from Paraguay, as if breeding might take place in the latter rather than the former. None of this is entirely clarified by recent studies, but habitat destruction may well have played a role in altering past patterns of dispersal and movement.