VINACEOUS AMAZON *Amazona vinacea* **V/R**[10]

Formerly abundant and widespread from Bahia, Brazil, south through eastern Paraguay to northern Argentina and Rio Grande do Sul, this amazon has declined dramatically in numbers as its populations have retreated into isolated pockets of forest, mostly in the south of its range: although perhaps still secure in places (work is needed to identify further key sites), the reasons for its long-term decline and the basic details of its ecological needs remain obscure (work is equally needed to address these matters).

DISTRIBUTION The Vinaceous Amazon is endemic to the Atlantic Forest region of south-eastern South America, extending originally from Bahia to Rio Grande do Sul in Brazil into eastern Paraguay and Misiones and apparently Corrientes, Argentina, but now apparently confined to relatively few, highly scattered sites within this range. A record from Montevideo, Uruguay (Finsch 1867-1868), is discounted here as a trade skin of uncertain provenance.

Brazil Although largely to be regarded as a bird of southern Brazil (São Paulo southwards), the Vinaceous Amazon appears to persist in tiny isolated pockets in all four range states to the north.

Bahia Southern Bahia is cited repeatedly as the northernmost part of the species's range (e.g. Pinto 1938, Meyer de Schauensee 1966, Ridgely 1981a, Forshaw 1989) but the evidence for its former occurrence there (there are no recent records: Ridgely 1981a) appears to derive almost entirely from the testimony of Wied (1831-1833), who reported never finding it in the coastal high forest but rather in the hills of the hinterland ("Sertong", i.e. "sertão"), particularly often near "Vareda", which Bokermann (1957) traced to within 50 km of "Barra da Vareda", now apparently Inhomirim (see Remarks 1). Most interestingly, however, captive specimens seen in July 1990 in Lençóis (northern end of the Chapada Diamantina National Park) were claimed by the owner to have been caught from a local population (R. Parrini verbally 1990). Bosch and Wedde (1981) gave Salvador as a specific locality, without explanation.

Espírito Santo Like Bahia, the evidence for the inclusion of this state in the species's range has been weak, and Ridgely (1981a) could find no recent records. A female was collected at Braço do Sul (rio Jucu Braço Sul) in June 1897 (Hellmayr 1915), and there are four specimens from "Engenheiro Reeve", 400-600 m, March and April 1903 (in AMNH), this apparently being Rive, at 20°46'S 41°28'W (see Remarks 2). In recent years a relict population was located in the municipalities of Agua Doce do Norte and Barra de São Francisco, in the north-west close to the border with Minas Gerais; although the species may be extinct now (see Population), reports continue of birds present at Guararema, 18°50'S 40°43'W (Nova Venécia municipality) and Pedra Torta (untraced) in Barra de São Francisco (D. M. R. Fortaleza *in litt*. 1990, 1991).

Minas Gerais This state has commonly been omitted from the range (e.g. in Meyer de Schauensee 1966, Ridgely 1981a, Forshaw 1989), but there is a specimen (in MZUFV) from Piranga, November 1938, Pinto (1952) saw the species along the Rio Doce (whence a skin in MNRJ from 1917, unless this was in Espírito Santo), and Sick (1985) must have had other reports (see Population). In recent years five sites have been found: Ibitipoca Park, where one or two are frequently seen (M. A. de Andrade *in litt*. 1988); the left bank of the rio São Francisco near Januária and Itacarambi in the north-west, in November 1986 (a startling range extension) (M. A. de Andrade *in litt*. 1988); the Monte Verde area, Camanducaia municipality, in the extreme south (M. A. de Andrade *in litt.* 1988); the Caratinga Reserve at Fazenda Montes Claros (M. A. Brazil and D. R. Waugh *in litt.* 1987, R. S. Ridgely *in litt*. 1991); and Caparaó National Park, April 1991, at 1,600 m (J. F. Pacheco verbally 1991).

Rio de Janeiro Although commonly given as a range state (e.g. in Pinto 1938, Meyer de Schauensee 1966, Forshaw 1989), the evidence for occurrence is very weak and Burmeister (1856) regarded it as naturally absent. However, the species was found around Nova Friburgo in 1828 (see Population), when a juvenile male was collected at Morro Queimado, near Rosário (22°41'S 43°15'W in OG 1963b) (Reinhardt 1870, Krabbe undated). Recently the species was rediscovered in the state 15 km north of Valença (400 m), where a pair was seen in December 1990 and locals reported a small breeding (but seasonally absent) population (J. F. Pacheco verbally 1991).

São Paulo Between 1818 and 1821 the species was collected at "Pahor" (east of Campos do Jordão), "Murungaba" (east of Campinas), Ipanema (west of São Paulo) and Itararé (von Pelzeln 1868-

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

1871; see Remarks 3). There are three specimens from Xiririca or rio Preto, Xiririca (now Eldorado, 24°32'S 48°06'W in OG 1963b), in the Serra Paranapiacaba, dating from August/September 1929 (Pinto 1938, and in MCZ), and another from Iguape, October 1900 (Pinto 1938). In recent years records are from the Campos do Jordão State Park on the north-east slope of the Serra da Mantiqueira, 1,500-2,000 m (Willis and Oniki 1981a); the Jacupiranga State Reserve near Jacupiranga, 750 m (Willis and Oniki 1981a), with a flock of 60 on the boundary of the latter in March 1991 (H. Palo Junior *per* P. Scherer Neto verbally 1991); several pairs along BR 116 in the extreme south of the state bordering Paraná (extensive forest in the region), October 1991 (B. M. Whitney *in litt*. 1991); and a flock of 30 at km 526 on the same road, January 1991 (S. C. Luçolli and Z. Kock *in litt*. 1992). Three unidentified amazons at Boracéia Experimental Station in January 1987 were thought most probably Vinaceous (D. F. Stotz *in litt*. 1988); see also under Santa Catarina concerning the work of Diefenback and Goldhammer (1986).

Paraná The species was collected in 1820 at Pitangui, near Curitiba (von Pelzeln 1868-1871); OG (1963b) indicates a rio Pitangui at 25°01'S 49°59'W, i.e. just south of Castro. Other specimen records are of three birds, Castro, May and August 1907 (Pinto 1938); two, Foz de Iguaçu (one labelled as at 90 m), May 1950 (Aguirre and Aldrighi 1983, and in AMNH); three, Tibagi (two simply labelled Fazenda Monte Alegre, which is the same place), 900 m, August 1907 and March 1930 (in AMNH and MZUSP); one, Rio Claro, Serra da Esperança (from these two qualifiers the locality appears to be Rio Claro do Sul, 25°56'S 50°41'W, in OG 1963b), February 1922 (Sztolcman 1926); and one each at Rio Baile (untraced, but not as defined in Paynter and Traylor 1991) and Cândido de Abreu on consecutive days in November 1929 (in FMNH). Recent records are from Fazenda Santa Rita in Ponta Grossa municipality (untraced) (L. dos Anjos *per* S. C. Luçolli *in litt*. 1992), Fazenda Monte Alegre in Telêmaco Borba municipality (untraced) (R. A. Berndt *per* S. C. Luçolli *in litt*. 1992), and Fazendas São Pedro and Santa Cândida in General Carneiro municipality (untraced), in the extreme south (S. D. Arruda and S. C. Luçolli *in litt*. 1992). The record above from São Paulo state along BR 116 suggests that birds occur there inside Paraná; see also under Santa Catarina concerning the work of Diefenback and Goldhammer (1986).

Santa Catarina Sick (1972, 1985) regarded the state as one in which the species persisted in relatively good numbers, and Sick *et al*. (1981) indicated that it was known there via references in the literature, specimens in state museums and their own observations (no details given); nevertheless, there is very poor documentation of its presence. Five previously unpublished records, the second, third and fifth made during fieldwork by Sick *et al*. (1981), are (in the west, adjacent to Argentina) Parque de São Miguel (not a protected area), São Miguel do Oeste, 8 October 1980; (in the east, north to south) Bom Sucesso, Itaiópolis municipality, 26 October 1978; Sassafrás Biological Reserve, Benedito Novo municipality, same date; Piuras, Serra da Bocaina do Sul, Lages municipality, 15 December 1982; Morro da Palha, Lauro Müller municipality, 16 February 1978 (L. A. R. Bege *in litt*. 1991). A little west of this last, the species was observed in the São Joaquim region in January 1990 (Pacheco and da Fonseca 1990). Moreover, MNRJ has a bird from the rio Uruguay, Porto Feliz (now Mondaí), in August 1928. Diefenback and Goldhammer (1986), in searching for the Red-spectacled Amazon *Amazona pretrei*, encountered only the Vinaceous Amazon in the araucaria groves of the northern part of this state, and also in those of São Paulo and Paraná, but they did not specify their records.

Rio Grande do Sul The species is now confined to the north and north-east of the state (Belton 1984-1985, which see for coordinates of localities below). Specimen records are from Arroio Grande (near Taquara) and Linha Tirajá (near Nova Petrópolis), 1880-1890 (von Berlepsch and von Ihering 1885; specimens in AMNH); two males, Itaquy, February/March 1905 (Pinto 1938); a male from São Francisco de Paula, 900 m, December 1918; a male from São Pedro ("coastal lagoons"), October 1928; a female from Sananduva, 600 m, January 1929; a male and female from Nonohay (Nonoai), Passo da Entrada, 600 m, February 1929; and a female from Passo Fundo, 600 m, March 1929 (all in AMNH). Other older records are from Poço das Antas, Canela and Torres (Gliesch 1930, Belton 1984-1985); Silva (1989a) ignored Belton's (1984-1985) warning that von Ihering's (1902) eggs (see Ecology) sent from São Lourenço did not necessarily originate there. Modern records are from Turvo State Park and Nonoai Indian Reserve (E. Albuquerque *per* N. Varty verbally 1992), Espigão Alto State Park near Barracão (W. A. Voss *per* S. C. Luçolli *in litt*. 1992), Carazinho (N. Varty verbally 1992), Vacaria (Belton 1984-1985), Bom Jesus, where it occurs at times (Forshaw 1978, 1989), Cambará do Sul (N. Varty verbally 1992),

Aparados da Serra National Park (Ridgely 1981a, Belton 1984-1985, TAP), Tainhas (W. A. Voss *per* S. C. Luçolli *in litt*. 1992), Canela (W. A. Voss *per* S. C. Luçolli *in litt*. 1992), São Francisco de Paula National Forest (N. Varty verbally 1992, TAP) and the untraced Fazenda Mauro J. Machado (W. A. Voss *per* S. C. Luçolli *in litt*. 1992).

Paraguay The Vinaceous Amazon was evidently once fairly widespread in south-eastern Paraguay (coordinates below are from OG 1957a or Paynter 1989) in the departments of Amambay, Canindeyú, Caaguazú, Alto Paraná, Itapúa and Guaíra, this last based on specimens collected at "Villa Rica" (male, July 1893, in AMNH; also Salvadori 1895b) and "Villa Ricca" (male and female, June 1907, in BMNH), apparently the westernmost point from which the species has been recorded (see Remarks 4). A contraction of range eastwards, southwards and northwards seems to have occurred: thus there is a record from Yhú (24°59'S 55°59'W) (Salvadori 1895b) and a specimen (male) from east of Caaguazú town, 300 m, November 1930 (in AMNH), but birds no longer occur in the department of the same name (Silva 1989a); there are 15 specimens from Capitán Meza, Itapúa (27°01'S 55°34'W), from where the species now seems to have disappeared (Nores and Yzurieta 1983); and the species was not reported in 1988 by inhabitants in Amambay (Silva 1989a; see Remarks 5). However, apart from recent first (but see Remarks 4) records (no details given) for the department of Concepción at Estancia Centurión and Santa María de la Sierra (López in press), the species survives in Canindeyú (despite not being reported to Silva 1989a) and Alto Paraná.

Canindeyú Up to eight birds were seen daily, 16-18 July 1977 in forest east of Celos Parini along the road to Saltos del Guaíra (R. S. Ridgely *in litt*. 1991); many were seen at Arroyo Pozuelo, 2-5 November 1987, many at Catueté, 24 July 1989, many along the río Carapá south of Mbaracayú, 25 July 1989 (F. E. Hayes *in litt.* 1991); it remains numerous in the Mbaracayú Reserve (Sierra de Maracaju) (P.A. Scharf *per* R. S. Ridgely *in litt.* 1991); and morning flights of 30-35 (at least 50 therefore considered present in the area) were seen at the 8,000 ha Guayaki Reserve (Estancia Itabo) in the south-east, June 1991 (R. S. Ridgely *in litt*. 1991).

Alto Paraná Records (north to south) are from the western shores of Itaipu Dam in two forest reserves, Itabo and Limoy (N. Pérez *in litt*. 1988); to the north of Hernandarias (Nores and Yzurieta 1983); east of Puerto Presidente Stroessner, 22 August 1977 (R. S. Ridgely *in litt*. 1991); Puerto Gibaja (25°33'S 54°40'W; specimens in UMMZ); Puerto Bertoni (25°38'S 54°40'W) (Bertoni 1927; see Remarks 6; specimens in UMMZ are from 7 km north); Paranambú (presumably Puerto Paranambú, 25°59'S 54°46'W), where already extinct (Silva 1989a); the Río Ñacunday basin, 26°03'S 54°45'W (Nores and Yzurieta 1983); Colonia Dorada (untraced), where extinction was looming in 1988 (Silva 1988a, 1989a,b); and at Comandacay (untraced) (Nores and Yzurieta 1983); F. E. Hayes (*in litt.* 1991) saw four birds at Puerto Barra, 28 September 1989 (locality untraced).

Argentina All specific Argentine records of the Vinaceous Amazon are from Misiones province, although Canevari *et al.* (1991) also mentioned north-east Corrientes; unless otherwise stated, coordinates are from OG (1968) or Paynter (1985). Specimens have been collected at Iguazú, 1900 (Orfila 1936-1938); Deseado (25°47'S 54°03'W), General Belgrano department, a male, August 1955 (Navas and Bó 1988a); along the Arroyo Urugua-í (25°54'S 54°36'W) at km 10, 1958-1961 (44, of which 35 are in AMNH, three in ANSP, five in LACM and one in YPM); San Antonio, 26°07'S 53°45'W, October 1946 (specimen in IML); Eldorado, 26°24'S 54°38'W, May/June 1962 and July 1963, four (Navas and Bó 1988a,); August 1967, one (Keve and Kovács 1973); Tobunas, 1953 and 1959 (Navas and Bó 1988a, plus 10 skins in LACM, whose labels give 26°28'S 53°54'W: K. L. Garrett *in litt.* 1986); Montecarlo, September 1956 (specimen in IML); San Pedro, 26°38'S 54°08'W, November 1949 (specimens in IML); Santa Ana (27°22'S 55°34'W), 12, 1910-1920 (Orfila 1936-1938, and specimens in AMNH, IML, MACN); Bonpland (or Bonplano), 27°29'S 55°29'W, January 1912 (specimen in IML); Concepción (27°59'S 55°31'W), two males, June 1881 (in BMNH and MNHN; also White 1882); and Villa Lutecia (= Teyú-cuarí: J. C. Chebez *in litt*. 1992), near San Ignacio (27°16'S 55°32'W), July 1910 (one in MNHN). In 1986 it was still reputedly possible to see flocks at Eldorado (Silva 1989a; M. Nores *in litt*. 1992

dissented from this view), but at other localities such as Concepción and San Javier (27°53'S 55°08'W), mentioned by White (1882), the species has disappeared (Silva 1989a); indeed Nores and Yzurieta (1983) questioned whether it survived anywhere in the country, including Iguazú National Park (around 30 years ago it was still present near Iguazú Falls; Eckleberry 1965), the last observation there being in April 1983 (R. J. Straneck *per* J. C. Chebez *in litt*. 1992).

However, in recent years three relictual populations have been found, at Campo Viera, 27°23'S 55°02'W (Oberá department), San Antonio and San Pedro (M. Nores and D. Yzurieta *in litt*. 1986, J. C. Chebez *in litt.* 1986, 1989, 1992; also Silva 1991d); a review of the past and current status of the species in Misiones is in Chebez (in press). It is worth noting that the record from Parque de São Miguel in westernmost Santa Catarina, Brazil, is from "an entirely agricultural area, but on the Argentine side there is undamaged subtropical forest which is perhaps the cause of the occurrence" (L. A. R. Bege *in litt*. 1991); the area in question would be well east of San Pedro, from the coordinates above.

POPULATION The Vinaceous Amazon has now become a rare bird almost everywhere in its range, having once been abundant in many places. Thus for example Wied (1831-1833) saw large roosting flocks in central Bahia, P. Lund (in a hitherto entirely neglected report) found birds "extremely common" at Nova Friburgo in Rio state in 1828 (Reinhardt 1870) although it was absent there 20 years later (Burmeister 1856, Reinhardt 1870), White (1882) referred to "incredible numbers" in one area of Misiones from which it is now extirpated, Bertoni (1927) witnessed skies darkened by immigrating birds in Paraguay in the 1890s, and Silva (1989a, 1991d) reported a trapper in Paraguay telling him of 8,000 or more birds at Colonia Dorada and up to 4,000 at Paranambú, both in 1978; all these populations have disappeared or, in the case of Colonia Dorada, where only around 300 were judged to survive in 1988 (Silva 1988a), will soon do so (Nores and Yzurieta 1983, Silva 1989a). Thus in 10 years Paraguay has moved from being the Vinaceous Amazon's stronghold, even though numbers might be relatively small (Ridgely 1981a; also Forshaw 1989), to the point where the species is now judged the country's most endangered parrot (Silva 1989a); however, it has been reported as numerous at Mbaracayú (see Distribution), and indeed as fairly common throughout Alto Paraná and Canindeyú departments both at the start and end of the 1980s (Nores and Yzurieta 1983, F. E. Hayes *in litt.* 1991, M. Nores *in litt*. 1992), and as commoner than Turquoise-fronted Amazon *Amazona aestiva* in the Itabo and Limoy reserves (N. Pérez *in litt.* 1988), with c.80 seen on the shores of the Itaipu Dam in May 1991 (M. Nores *in litt*. 1992). In Argentina the species appears to hang by a thread, with a very low total population (see Distribution).

In Brazil the situation is confusing: the species may never have been very abundant in the northern half of its range, and must now be close to extinction in Bahia and Rio de Janeiro states, while the relict population in Espírito Santo produced 80, 38, 12 and five chicks in successive years, although there have been no reliable records since 1984 (D. M. R. Fortaleza *in litt*. 1990); moreover, the evidence amassed under Distribution does not reflect encouragingly on the position in Minas Gerais (despite over 30 being found on the first day of a recent visit to Caratinga Reserve: R. S. Ridgely *in litt*. 1991) or to the south, so that Ridgely (1981a) regarded it as local even in the core of its range. Nevertheless, Sick (1972) referred to the species as still most frequent in Santa Catarina and Rio Grande do Sul, and later as still relatively common in Santa Catarina and Minas Gerais (Sick 1985), tending to suggest that he had access to information that has not been filtering out to compilers of data like Ridgely (1981a), Forshaw (1989) or Silva (1989a). The only items of quantified information on the abundance of the species are from two sites in São Paulo state, Campos do Jordão State Park and Jacupiranga State Reserve, where in the late 1970s 113 and 107 individuals were recorded per 100 hours of survey respectively (Willis and Oniki 1981a); the record of 60 from the borders of the latter (see Distribution) is encouraging. At Aparados da Serra the breeding population is probably less than 12 pairs, 2-3 pairs being usually the maximum daily count (TAP), and at São Francisco de Paula there have been counts of up to 20 birds in recent years (TAP) but only 3-4 pairs appear to breed (N. Varty *in litt*. 1992).

ECOLOGY The extent to which the Vinaceous Amazon is allied to araucaria is not clear, although there is an obvious strong preference in Rio Grande do Sul (TAP), and the coincidence of its disappearance from most of Argentina and the loss there of most araucaria (see Threats) seems like a direct correlation,

particularly as two of the three remaining small populations in Misiones are linked with relict patches of araucaria (J. C. Chebez *in litt*. 1992). While the species's range originally extended north well beyond the normally understood range of *Araucaria angustifolia* in the Atlantic Forest region, the map of the latter in Hueck (1978: 229) shows pockets extending up the Serra Paranapiacaba through Itatiaia National Park to the east of Belo Horizonte as far as a site just north of the Rio Doce, which conforms fairly well with the evidence under Distribution; and Hueck's (1971, 1978) mistake in implying that araucaria is wholly absent from eastern Paraguay (TAP; see also Distribution: Paraguay under Red-spectacled Amazon) is borne out by a male taken there in July that had been eating "arauci" (Salvadori 1895b; specimen in AMNH). Certainly in Rio Grande do Sul the Vinaceous Amazon is a bird of araucaria forest (Belton 1984-1985), while in São Paulo the habitat in Campos do Jordão State Park is forest of *A. angustifolia* and *Podocarpus lamberti*, although at Jacupiranga State Reserve it is epiphyte- and bamboo-rich humid forest (Willis and Oniki 1981a). At Aparados da Serra and São Francisco de Paula the species occurs almost exclusively in mixed evergreen forest with numerous emergent araucaria (TAP). Thus it appears that some important ecological link exists between the parrot and at least one cone-bearing tree species, this being neither supported nor opposed by evidence in the rest of this paragraph. The specimen collected on the rio Uruguay in Santa Catarina was in "capoeira" (young second growth), and of the five other unpublished records given for the state two were from Atlantic Forest, two from mixed forest, and one (in the west) from "floresta branca" (L. A. R. Bege *in litt*. 1991). Sick (1985) gives its habitat as dry interior forests, pinewoods and forest patches ("capões") surrounded by fields. Ridgely (1981a) noted that in Paraguay and Argentina the species occupies lowland forest whereas in Brazil, owing perhaps mostly to forest clearance, it is largely restricted to foothills up to at least 1,100 m (indeed Campos do Jordão, as noted under Distribution, lies at 1,500-2,000 m).

Birds eat buds, flowers and tender leaves, including eucalyptus and pine leaves (Sick 1985, N. Varty verbally 1992). A July specimen had eaten wild fruits and berries; in August a pair were observed eating araucaria nuts (Belton 1984-1985). Birds have been reported foraging in araucaria in the company of Red-spectacled Amazons and Scaly-headed Parrots *Pionus maximiliani* (Forshaw 1978, 1989). Eating of mineral-rich soil in swamps has been reported (Silva 1989a). A century ago birds evidently caused some damage to orange crops, appearing "very voracious, as they feed all day long" (White 1882) (which actually suggests food-stress, possibly caused by failure of a staple resource). At that time other food noted included the fruits of *Achatocarpus* and seeds of *Pilocarpus* spp. (Bertoni 1927).

From gonad condition of museum specimens Navas and Bó (1988a) judged breeding to occur in Misiones in September/October; this is supported by enlarged testes in two Paraguay specimens from 30 August (in UMMZ), and by egg-laying in August by captive birds, Espírito Santo (D. M. R. Fortaleza *in litt*. 1991). However, variation in the timing of breeding occurs, perhaps between years or between pairs, as other evidence is of inactive testes, late July (Belton 1984-1985), half-developed testes in late October in a Rio Grande do Sul specimen (in AMNH), and nesting in December (Belton 1978; also White 1882). Silva (1989a) gave the breeding period as October to January. A hollow araucaria (Belton 1984-1985), a huge myrtle in which the nest-cavity was 2 m deep (von Ihering 1902) and a cedar *Cedrela odorata* (Reinhardt 1870) have been recorded as nest-trees; but most are in araucarias (N. Varty verbally 1992). There is also a curious report of colonial nesting "in a cliff about 300 km from São Paulo" (Bertagnolio 1981); this is supported by the record of three nests in a single tree in Rio Grande do Sul, reported by foresters to N. Varty (verbally 1992), and it appears that the variation in breeding season noted above may in fact result from delayed breeding in some pairs unable to find a suitable nest-site other than one already occupied (suitably large araucarias are often extremely uncommon): thus, a forester reported a nest-site that for 30 years was occupied twice in a season, with young (usually 3-4) fledging in late December and more young (usually only 1-2) fledging in late March (N. Varty verbally 1992). Silva (1989a) reported 2-4 eggs in a clutch, D. M. R. Fortaleza (*in litt*. 1991) four; the pair in the cedar had three nearly fledged young on 20 November (Reinhardt 1870), and 3-4 young are usual in Rio Grande do Sul (N. Varty verbally 1992). The fledging period is around 70 days (Silva 1991d).

A report in Forshaw (1978, 1989), that the species is "at times" quite common at a locality in Rio Grande do Sul, plus Bertoni's (1927) description of thousands immigrating into Paraguay during cloudy or rainy weather, poses the question of whether significant movements or migrations take place, a point

which bears directly on conservation. However, the dates of specimens collected in Misiones (see Distribution) suggest year-round residence (33 of the AMNH specimens from Arroyo Urugua-í were collected in the first half of 1958; the 10 LACM specimens from Tobunas were collected in June, July, August and September). Recent evidence from São Francisco de Paula National Forest, Rio Grande do Sul, suggests that there is some post-breeding dispersal: birds breed in November–December, some remain in January–February but all disappear for March; from April through to July pairs return to feed on araucaria in the 900 ha of native forest, and in July and August they form flocks of up to 30 birds, these breaking down into pairs for the commencement of the breeding season in September–October (N. Varty verbally 1992). If there is a tie-up between the bird and araucaria or another conifer, then its movements would largely be dictated by within- and between-year variations in cone-crop production (see, e.g., Ecology under Thick-billed Parrot *Rhynchopsitta pachyrhyncha*). In Bahia, birds formed large flocks when going to roost in low wooded hills (Wied 1831-1833).

THREATS Deforestation has clearly been the critical factor in the steep decline of this species: Ridgely (1981a) pointed out that possibly the only part of its range where reasonable tracts of habitat remained was in eastern Paraguay, but noted that no protected area in that region was big enough to support a viable population; he also noted that forest destruction was proceeding apace in Paraguay in July/August 1977. Silva (1989a) showed that this destruction continued over the period 1978-1988, during which time a major area reputed to have held at least 8,000 birds was almost totally converted to grassland. Ríos and Zardini (1989) referred to deforestation at the rate of 1,000 km^2 a year, largely in the east. The flooding caused by the Itaipu Dam clearly reduced forest habitat (N. Pérez *in litt.* 1988). In Misiones, where once the inhabitants shot the species for food (White 1882), modification or destruction of habitat has proceeded throughout the 1980s (Ridgely 1981a, Nores and Yzurieta 1983, Navas and Bó 1988a); most significantly, the 210,000 ha of araucaria that remained in the province in 1960 had been reduced by 1988 to two salvageable patches of 400 and 100 ha (Araucaria and Cruce Caballero Provincial Parks), with barely the same amount of dispersed araucaria in San Antonio Strict Nature Reserve and Urugua-í Provincial Park combined (J. C. Chebez *in litt*. 1992). The view that the species simply needs large areas of forest, and that Iguazú National Park's size, cited as "225,000 ha" (it is 49,200 ha: CNPPA 1982, although when combined with Yacuy and Urugua-í Provincial Parks and Iguaçu National Park in Brazil the area under protection reaches 300,000 ha: J. C. Chebez *in litt*. 1992), is "insufficient to support populations of all but the most adaptable of parrots" (Silva 1989a) needs revision in the light of the evidence concerning araucaria. In Brazil the destruction of habitat has been poorly documented by ornithologists, but in Paraná 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).

Trade at the international level appears not to have had a major impact. Low (1972) thought the Vinaceous Amazon "one of the most desirable of the amazons available in Europe but... imported irregularly and in very small numbers". A shipment of over 100 entered the U.S.A. in the mid-1970s (King 1978). Ridgely (1981a) knew of small numbers being captured in the wild in Paraguay and felt that the bird could no longer tolerate any such pressure; yet as late as 1988 Silva (1988a, 1989a,b) saw the remnants of a once major Paraguayan population being heavily trapped, and indeed met with trappers who claimed to be holding 500 smuggled birds on the Brazilian side of the border from Colonia Dorada. In Argentina persecution for the internal live animal trade (extending back to the last century) probably affected the populations there adversely (Navas and Bó 1988a; also J. C. Chebez *in litt.* 1986). In Brazil, small numbers have recently begun to appear on the domestic market (C. E. Carvalho *in litt*. 1987), and market birds are easily found in Rio Grande do Sul (N. Varty verbally 1992).

The disappearance by the 1840s of what was in the 1820s an evidently healthy population at Nova Friburgo was tentatively explained as the twin impact of heavy persecution first for food (the species being considered "good game") and second for skins from which to manufacture "feather flowers" as ornaments for sale in Rio de Janeiro (Reinhardt 1870).

MEASURES TAKEN The Vinaceous Amazon is protected under Brazilian law (Bernardes *et al.* 1990) and listed on Appendix I of CITES (King 1978-1979). Small populations occur in several protected areas, namely Ibitipoca Park, Caparaó National Park and the Caratinga Reserve (Minas Gerais), Sassafrás Biological Reserve and possibly São Joaquim National Park (since Morro da Palha lies on its border: L. A. R. Bege *in litt*. 1991) (Santa Catarina), Campos do Jordão State Park and Jacupiranga State Reserve (São Paulo), Turvo, Nonoai and Espigão Alto parks, São Francisco National Forest and Aparados da Serra National Park (Rio Grande do Sul), plus Mbaracayú proposed national park (57,000 ha, recently acquired: *Nature Conservancy* September/October 1991: 6) and Itabo and Limoy Biological Reserves (11,200 and 14,828 ha respectively: Ríos and Zardini 1989) in Paraguay; it is presumed extinct in Iguazú National Park, Argentina (see Distribution, Population), but an attempt to help the remnant populations in that country is being made by "Proyecto Nauta" and involving a local education and captive-breeding programme (eggs have been laid and one chick hatched but not reared) at Campo Viera that uses birds reclaimed from local holders of wild-caught birds (J. C. Chebez *in litt.* 1989, 1992). A project to study the ecology of Vinaceous and Red-spectacled Amazons in Rio Grande do Sul is now being developed by CNPq and PUC-RS in collaboration with ICBP.

MEASURES PROPOSED Silva (1989a) called for protection of substantial tracts of forest where this species occurs, and for investigations into its biology. These are clearly important requirements (and for a reforestation project in Minas Gerais see the corresponding section under Blue-chested Parakeet *Pyrrhura cruentata*); however, perhaps the first thing needed is a major survey to determine key sites for the species in São Paulo, Paraná, Santa Catarina, Rio Grande do Sul and, in Paraguay, the departments of Canindeyú and Alto Paraná, particularly with regard to major areas of araucaria. This important work could be carried out as part of a wider survey to identify key sites for other fauna endemic to and rare in the Atlantic Forest region, for example (in birds) Black-fronted Piping Guan *Pipile jacutinga* and Helmeted Woodpecker *Dryocopus galeatus* (see relevant accounts). Meanwhile, support for such reserves as Caratinga in Minas Gerais and Mbaracayú in Paraguay (for the latter see Gauto 1989) is imperative. The population near Valença in Rio de Janeiro is worthy of further study, especially because Golden-capped Parakeet *Aratinga auricapilla* has been found in the same area (see relevant account). The view that captive breeding deserves a greater role (Low 1984, Silva 1989a) cannot be endorsed here, except inasmuch as international support from aviculturists could be given to Proyecto Nauta in Argentina, and as a means of reducing trade pressure on remaining wild populations there.

REMARKS (1) Bokermann (1957) could not trace Vareda precisely, but mapped it at around 15°00'S 41°25'W; OG (1963b) lists no "Vareda" but several places called "Vereda", including a Vereda do Paraíso at 15°28'S 41°27'W. (2) OG (1963b) gives "Reeve" as a former spelling of "Rive", the only locality of this name in Brazil. (3) From the itineraries in von Pelzeln (1868-1871) and by reference to OG (1963b), it can be determined that "Pahor" lies between Areias (22°35'S 44°42'W) and Canas (22°43'S 45°05'W); and that Morungaba (*sic*) is at 22°52'S 46°48'W. (4) There is an anomalous record, apparently backed by a specimen, from the mouth of the río Apa near San Lázaro, i.e. north-westernmost Concepción, where in December 1939 birds were uncommon but in flocks of 4-6 (Podtiaguin 1941-1945). This author also lists the departments of Misiones and Caazapá for the species. Bertoni (1927) mentioned Yaguarasapá, which Paynter (1989) could not trace even to department. (5) Silva (1989a) mentioned Amambay department as having no birds, as if it once did; the recent records from Concepción certainly indicate that occurrence there was possible and, if so, then the adjacent area of southernmost Mato Grosso in Brazil might also hold or have held birds. (6) Bertoni (1927) established the name *paranensis* for birds he found at Puerto Bertoni, but the examples involved were judged to be a colour phase by Peters (1937).