

Rapid and extensive conversion of its grassland and cerrado habitat to agriculture in central and south-east Brazil appears to be threatening this poorly known small tinamou, for which there are almost no recent records.

DISTRIBUTION The Lesser Nothura is endemic to central-southern Brazil from central Mato Grosso and Goiás south to central São Paulo. The species's occurrence in Bahia (von Ihering and von Ihering 1907) is unsubstantiated (Hellmayr and Conover 1942). In the following account, records are arranged from north to south within states, as follows:

Federal District Brasília in May 1963 (specimen in MPEG) and December 1965 (specimen in MNRJ), and in Brasília National Park in November 1983 (specimen in MNRJ) and 1987-1990 (TAP), prefiguring the disclosure of the species's occurrence alongside the Dwarf Tinamou *Taoniscus nanus* in the IBGE Roncador Biological Reserve south of Brasília (Teixeira and Negret 1984);

Goiás Luziânia, September 1979 (specimen in MNRJ); Goiânia, January 1968 (two specimens in LSMZ); Emas National Park, 1985 and 1987 (A. Negret verbally 1987, R. S. Ridgely verbally 1988, TAP);

Minas Gerais (see Remarks 1) rio Preto near Paracatu, January 1967 (specimen in MNRJ); Tejuco (= Diamantina, type-locality) (von Spix 1824, Hellmayr and Conover 1942); Agua Suja (= Romaria in Paynter and Traylor 1991) (Laubmann 1934); Lagoa Santa (Reinhardt 1870); Serra do Cipó at Alto da Palácio, July 1977 (Willis and Oniki in press);

Mato Grosso Chapada (= Chapada dos Guimarães: Paynter and Traylor 1991), September 1882 and June 1885 (Allen 1891-1893; specimens in AMNH, plus one undated in BMNH); Serra da Chapada (untraced but perhaps the same as the preceding), 700-900 m, September 1902 (specimen in BMNH);

Mato Grosso do Sul Fazendas Corralinho and Carrapatos (near Campo Grande) on successive dates, 31 August and 1 September 1938 (Pinto 1964, specimens in MZUSP); Fazenda Capão Bonita, Vacaria, c.110 km south of Campo Grande, September 1937 (specimen in FMNH); and Fazenda Barra Mansa, somewhere on the rio Brilhante, also south of Campo Grande, June 1954 (Pinto 1964, specimen in MZUSP);

São Paulo São José do Rio Pardo, 1927 (Pinto 1938); Lagoa Branca (specifically at Casa Branca), April 1957 (specimen in LACM); Ribeirão Bonito, September 1929 (Pinto 1938, 1964, specimen in MZUSP); "Irisanga" (= Orissanga, 22°12'S 46°57'W in Paynter and Traylor 1991), December 1822 (von Pelzeln 1868-1871); Itirapina, recently (E. O. Willis *in litt.* 1986, TAP; see Remarks 2); Botucatu airfield, February 1947 (Pinto 1964, specimen in MZUSP); Fazenda da Florida, Bofete, April 1938 (Pinto 1964, specimen in MZUSP); Itatinga, September 1902 (Hellmayr and Conover 1942, specimen in AMNH); Sorocaba, specifically Salto, May 1937 (Pinto 1964, specimen in MZUSP); Itapetinga, March and June 1927, July 1928 (Pinto 1938, 1964, specimens in MCZ, FMNH, MZUSP); Fazenda Cambará, Aracaçu, October 1938 (Pinto 1964, specimen in MZUSP); Fazenda do Rio Verde (just north of Itararé), August 1820 (von Pelzeln 1868-1871); Itararé, September 1820, "February, March" (von Pelzeln 1868-1871; see Remarks 3).

POPULATION This bird may be overlooked (D. M. Teixeira *in litt.* 1987), and even common locally (J. Vielliard *in litt.* 1986), yet recent specimens and documented sight records are paltry in number, suggesting a steep decline: E. O. Willis (*in litt.* 1986) mentioned having one recent locality (a small grassland area near Itirapina: TAP) in São Paulo, source of most records historically, and the other recent records are from Brasília and Emas National Parks and the IBGE reserve in Distrito Federal (see Distribution). Lesser Nothuras apparently occur in low densities in these few known modern localities: in Brasília National Park, up to three individuals were heard singing in an area of c.20 ha of campo sujo, but none was found in much larger but seemingly suitable areas of the same habitat (TAP); and in Emas National Park a few individuals could be flushed during long walks through lush campo limpo, and others were occasionally seen along roadsides through the same habitat, but the species was seemingly greatly outnumbered by the Spotted Nothura *Nothura maculata* (TAP, R. S. Ridgely *in litt.* 1992).

ECOLOGY The Lesser Nothura inhabits cerrado, sometimes in the same areas as Spotted Nothura, though in scrubbier grassland (“campo mais sujo”) (Sick 1985), primarily in undisturbed areas of campo limpo and campo sujo habitat (TAP), being unable to adapt to man-modified habitats, unlike the Spotted Nothura (de Magalhães 1978); it is also notable that this species has been recorded at many of the same localities (Lagoa Santa, Orissanga, Itararé, Itapetininga, Brasília) as the Dwarf Tinamou (see relevant account). J. Natterer (von Pelzeln 1868-1871) recorded solitary individuals of this species from high grass on the plains, noting that they run fast and that, when hunted with dogs, often hide in armadillo holes and can usually then be caught by hand (this reluctance to fly, even when almost stepped on, also being noted in recent fieldwork: TAP). At Emas these inconspicuous birds are usually encountered singly in open expanses of grassland (campo limpo) with scattered bushes and small trees, often in areas where large termite mounds are numerous; they apparently prefer areas with a continuous cover of tall grasses and sedges, and are almost impossible to see in such areas (in contrast to Spotted Nothura) (TAP). One small area of campo sujo in Brasília National Park supported a small population over a period of at least four years, during which the site remained unburnt; no individuals were seen or heard in nearby, similar-looking habitat that was burnt at least twice during that period (TAP). In preferred habitat at both Brasília and Emas, Lesser Nothuras were found in close proximity to four other bird species that are similarly threatened in central Brazil (near-threatened at the global level): Ocellated Crake *Micropygia schomburgkii*, Cock-tailed Tyrant *Alectrurus tricolor*, Sharp-tailed Tyrant *Culicivora caudacuta* and Black-masked Finch *Coryphaspiza melanotis* (TAP). There is no information on diet. The male collected in Mato Grosso do Sul in September had testes enlarged (FMNH label data), and juveniles have been captured in January (Reinhardt 1870), March (Pinto 1938) and June (Allen 1891-1893); this suggests that breeding normally takes place during the rainy season, October–February. The species has been noted to fall prey to Burrowing Owls *Speotyto cunicularia* (Teixeira and Negret 1984).

THREATS The near-total destruction of open grasslands both in south-east Brazil (São Paulo) and in the vast central planalto (Mato Grosso, Goiás and Minas Gerais) must be regarded as one of the great ecological catastrophes in South America, all the more regrettable because so utterly neglected as an international conservation issue. The speed and extent of the conversion of the Brazilian grassland ecosystems to large-scale agriculture is astonishing, most largely disappearing only since 1960: new farming techniques, such as liming to cure aluminium toxicity and acid soils, has allowed agrobusiness to develop throughout the region, with large-scale development involving eucalyptus, pines, sugarcane and soybeans (de Magalhães 1978, E. O. Willis *in litt.* 1986), and more than 95% of potential arable or stock-raising land has probably already been appropriated or otherwise thoroughly degraded (TAP; also E. O. Willis *in litt.* 1990). Relatively pristine tracts of upland grassland south of 15°S are now confined to portions of five national parks and a small number of other types of reserve: most natural grassland vegetation elsewhere in Brazil seems likely to disappear altogether by the end of the century (TAP).

As a result of this development, nearly all the species endemic or near-endemic to the open vegetation of central Brazil have suffered drastic declines (Teixeira and Negret 1984, Cavalcanti 1988, Willis and Oniki 1988b), and a few may even be extinct through large parts of their former range, these being the Lesser Nothura and the threatened Dwarf Tinamou, Blue-eyed Ground-dove *Columbina cyanopsis*, White-winged Nightjar *Caprimulgus candicans*, Rufous-sided Pygmy-tyrant *Euscarthmus rufomarginatus*, Ochre-breasted Pipit *Anthus nattereri*, Black-and-tawny Seedeater *Sporophila nigrorufa*, Cinereous Warbling-finch *Poospiza cinerea* and possibly also the mysterious Cone-billed Tanager *Conothraupis mesoleuca* (see relevant accounts). Most of the remaining campo and cerrado habitat specialists of the region (e.g. the near-threatened Cock-tailed Tyrant, Sharp-tailed Tyrant and Black-masked Finch) would also be considered threatened but for the fact that they retain reasonably healthy populations in the grasslands of north-central Bolivia (see Parker *et al.* 1991); these latter stand also to gain from the preservation of natural grasslands advocated for Corrientes province, Argentina (see Measures Proposed under Strange-tailed Tyrant *Yetapa risora*). The Bearded Tachuri *Polystictus pectoralis* is another species whose populations in this region (nominate *pectoralis*) have been virtually exterminated (see Remarks 4 under White-winged Nightjar; also Remarks 2 below).

Lush campo sujo habitat in Emas National Park is not currently secure (see Threats under White-winged Nightjar).

MEASURES TAKEN The Lesser Nothura is protected under Brazilian law (Bernardes *et al.* 1990). The species occurs in the IBGE Roncador Biological Reserve, where it shares its habitat with the threatened Dwarf Tinamou (Teixeira and Negret 1984), and in Brasília and Emas National Parks (28,000 ha and 132,000 ha respectively: IBAMA 1989; see Distribution).

MEASURES PROPOSED Detailed studies of this and the other grassland and cerrado tinamous of central Brazil (Red-winged Tinamou *Rhynchotus rufescens*, Spotted Nothura and Dwarf Tinamou) are most desirable, with particular emphasis on the ecology of Lesser Nothura and Dwarf Tinamou. This and other species listed in Threats should be prime targets of a major scheme of terrestrial reconnaissance and biological survey throughout the remaining patches of appropriate habitat within their ranges, notably in the three protected areas from which it is known (Emas and Brasília National Parks and the IBGE reserve), but also the other major parks and reserves of the region: Serra das Araras Ecological Reserve (28,000 ha) in Mato Grosso, which is proving to be rich in endemic Brazilian Shield fauna and flora (E. O. Willis *in litt.* 1991); Chapada dos Guimarães National Park (33,000 ha), also in Mato Grosso, although much of the region's best campo sujo habitat appears to lie to the north of the park boundary, to which therefore an extension might be made (TAP); Chapada dos Veadeiros National Park (60,000 ha) in Goiás; Grande Sertão Veredas National Park (84,000 ha) and Serra da Canastra National Park (71,500 ha), both in Minas Gerais (areas from IBAMA 1989). The northern and western ranges of the Brazilian Shield, such as Serra do Cachimbo, Serra dos Apiacás and Serra do Roncador, support poorly known campo and cerrado plant and animal communities (TAP) that deserve investigation for this group of birds and which can hopefully be protected against modification by man.

Improved fire management techniques should be employed in all national parks and biological reserves to ensure that all stages of campo vegetation (campo limpo, campo sujo, campo cerrado) are present at all times. Much research is needed on the effects of fire and grazing on the structure and floristic composition of central Brazilian grasslands, and on the ecological role of fire in the distribution and abundance of campo birds. Work to illuminate these matters might also be directed at determining the possibility of reclaiming and restoring certain degraded areas.

REMARKS (1) There is a specimen in USNM labelled "Conceição do Lerro, Brazil" and also from Belo Horizonte Zoo, dated August 1933 and with the information that its habitat is "campo" and its abundance is great. Conceição do Lerro cannot be traced, but the locality in question was presumably near to Belo Horizonte and at least within Minas Gerais; a Conceição da Barra, now Cassiterita, is at 21°07'S 44°28'W (in OG 1963b). (2) The near-threatened Bearded Tachuri retains a small population in the same remnant patch of grassland at Itirapina (E. O. Willis *in litt.* 1991), which considerably adds to the importance of the site (see Remarks 4 under White-winged Nightjar *Caprimulgus candicans*). (3) According to the itinerary in von Pelzeln (1868-1871), J. Natterer, the collector involved, was not at Itararé except in August/September 1820 and possibly January 1821, although there is some confusion about his activities and whereabouts at the start of 1821 (see, e.g., Remarks 4 under Red-tailed Amazon *Amazona brasiliensis*). These skins from February and March presumably represent purchased items.