MAROON-FRONTED PARROT *Rhynchopsitta terrisi* **V**[9]

With a population not known with certainty to exceed 2,000 and habitat (mature pine forest generally between 2,000 and 3,500 m) covering up to no more than 7,000 km^2*, this colonial cliff-nesting parrot risks gradual decline through forest destruction and needs the benefit of protected areas in both the north and south of its limited range in the Sierra Madre Oriental, Mexico.*

DISTRIBUTION The Maroon-fronted Parrot (see Remarks 1) is confined to a small area of north-east Mexico in a narrow section of the Sierra Madre Oriental some 300 km long and averaging 60 km in width, covering south-east Coahuila, west-central and southern Nuevo León, and south-west Tamaulipas; of the approximate 18,000 km^2 thus delineated, only 20-40% or some 3,500-7,000 km^2 contains appropriate habitat (Lanning and Lawson 1977), and if indeed the southernmost breeding site is Cerro Potosí (see below) then the entire breeding range of the species is only the northern third of this area. Records from Veracruz do not necessarily pertain to this species (see Remarks 2).

Localities for the species from north to south are as follows (with some distances and orientations derived from Lanning and Lawson 1977): (*Nuevo León*) mountains south-west of Monterrey in the region of San Isidro, Laguna Sánchez and "San José de Bosquillos" (correctly, San José de las Boquillas: N. F. R. Snyder *in litt*. 1992), with four sites (including "Highrise" cliff and "Las Cuevas") 7 km and 31 km north-east, 5 km west and 17 km south of Laguna Sánchez (Lawson and Lanning 1981, Valenzuela *et al*. 1981, Sada 1987, M. A. Gómez Garza *in litt.* 1991; see Remarks 3); (*Coahuila*) at 26 km east of Saltillo (Lanning and Lawson 1977; see Remarks 4); west of Saltillo reportedly in the small range extending to just beyond General Cepeda (D. V. Lanning verbally to W. B. King 1978; also Woodard 1980); Diamante Pass, 8 km south-east of Saltillo (Burleigh and Lowery 1942); Las Vacas, 13 km south-east of Saltillo (Ely 1962), the precise site of one specimen (in DMNH) being 3 km south on the north slope of [Mount] Zapalinamé; an unspecified area in mountains south of Saltillo (Ely 1962); the Sierra Guadalupe south-west of Saltillo (Lawson and Lanning 1981); various sites adjacent to San Antonio de las Alazanas (itself 50 km south-east of Saltillo), namely Los Lirios, 15 km to the north (Lanning and Lawson 1977) and Mesa de las Tablas and Ciruela (16 km and 22 km respectively to the east) (Hardy and Dickerman 1955; also Urban 1959; see Remarks 3); then (again in *Nuevo León*) a cliff 25 km north-east of Cerro Potosí (and 40 km south-east of Laguna Sánchez), the southernmost known breeding site of the species, found in 1991 (D. V. Lanning and N. F. R. Snyder *in litt*. 1992); on Cerro Potosí 15 km north-west of Galeana, and at 10 km south-east of Galeana (Moore 1947); a high mountain area (notably Cerro Viejo) around Zaragoza, north-west of Ciudad Victoria (Lanning 1978), this apparently being north of the border of Tamaulipas; Cerro Peña Nevada, c.100 km south of Cerro Potosí and on the Tamaulipas border (Lanning and Lawson 1977); (*Tamaulipas*) in the Sierra de Guatemala at La Joya de las Salas, 20 km north-west of Gómez Farías (Robins and Heed 1951) and Rancho del Cielo, between La Joya valley and Gómez Farías (Robins and Heed 1951); Lanning and Lawson (1977) mentioned Ocampo along with Gómez Farías as the southernmost point of the range, but without indication of a record.

POPULATION Given the reports of habitat destruction (evidently throughout this century and before) within the range of the Maroon-fronted Parrot, King's (1978-1979) assumption of a decline is entirely justified. Assessment of the modern situation is compromised by the species's seasonal movements and vagrancy, with regular or occasional local abundance being no helpful guide. Indeed, even some assertions about total numbers are based on mistaken assumptions: thus Lawson and Lanning (1981), by reporting a roost of 1,400 in the north of the species's range in September and another of 1,600 in the south in January, prompted Ridgely (1981a) to interpret this as yielding at least 3,000 birds (later summarized as "estimated at only 3,000 plus"), whereas a study of the evidence indicates a possible migration from north to south in November (see Ecology), so that the two roosts could conceivably – if improbably – have been of the same birds. In fact, the count of 1,400 in September was thought to consist entirely of non-breeding birds, so this was very definitely a minimum figure for the area in question, at or near the Highrise cliff near San Antonio de las Alazanas (Lawson and Lanning 1981). Lanning and Lawson (1977) had earlier counted 800-1,000 birds in early April 1977 east of Saltillo, believed another thousand could exist in the region between San Antonio de las Alazanas and Cerro Potosí, and thus were confident of 2,000 in the

BirdLife International (1992) Threatened Birds of the Americas.
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northern part of the range, probably to be revised upward with further exploration; nevertheless, given the view that birds do not breed on or south of Cerro Potosí (see Distribution), the figure of 2,000 could serve as a baseline total. Generally, it seems much too small; in fact Lanning (1978) counted 1,600 at the "southern" (Cerro Viejo) roost while estimating 2,000, and it seems improbable that the entire population of the species was concentrated at this one site.

Recent observations at Highrise and adjacent cliffs showed a significant increase in the number of nesting pairs compared with the late 1970s, suggesting both that the number of usable nest-holes was not limiting the population in the 1970s and that food supplies had been adequate in the intervening years (D. V. Lanning and N. F. R. Snyder *in litt*. 1992).

ECOLOGY The prime habitat of the Maroon-fronted Parrot appears to be mixed conifer forests, mostly at higher elevations; birds descend as low as 1,300 m and have been found at 3,700 m on the highest ridge visited, but are most frequently encountered between 2,000 and 3,500 m (Lanning and Lawson 1977, D. V. Lanning *in litt*. 1992). Principal food is pine seeds, including those of Arizona pine *Pinus arizonica*, *P. gregii*, Aztec pine *P. teocote*, *P. montezumae* and Mexican pinyon *P. cembroides*; the birds depend on this broad variety as each species's cone crop varies from year to year (*P. cembroides* generally produces seed only once every five years) and moreover shows local variation in abundance within years (Lawson and Lanning 1981). Other foods taken include seeds of a fir *Abies*, acorns of a *Quercus* and nectar (and also seeds: M. A. Gómez Garza *in litt*. 1991) from *Agave macroculnis* (as many as 30 birds have been seen on a single plant); Acorn Woodpeckers *Melanerpes formicivorus* have been seen trying to drive parrots off a snag where they were evidently breaking into the former's acorn cache, but also off agave blooms (Lanning and Lawson 1977, Lawson and Lanning 1981; also Ely 1962). Birds have not been recorded feeding, despite their availability, on the seeds of Douglas fir *Pseudotsuga menzesii* or Arizona cypress *Cupressus arizonica*, although mass roosting in a stand of the latter was once witnessed (Lanning and Lawson 1977, Lawson and Lanning 1981) and general use of the former is reported (Ely 1962). Birds need water and have been seen queuing and squabbling at a small seep high on a sheer cliff at which no more than two could drink at a time; while at a stream on Cerro Potosí (supposedly the only source of water on the mountain, close to the radar station: Valenzuela *et al*. 1981) birds were seen picking off fragments of ice from beside a waterfall and taking bites of snow from adjacent patches (Lanning and Lawson 1977).

Dependence on pine seed explains three aspects of the species's life history: (1) its non-breeding nomadism; (2) its breeding period, in late summer and fall, coinciding with seed ripening; (3) the location of nest-sites near areas of mixed-conifer forest, which give the highest likelihood of a perennial food supply (Lawson and Lanning 1981). Despite speculation of tree-nesting (see King 1978-1979), nesting occurs exclusively in holes in limestone cliffs, there being few trees of sufficient size to offer nest-holes (see Threats); in places nesting appears to be colonial, such that a favoured locality like "Highrise" held 17 and probably 28 nests in 1979, although this may be a function of hole availability, since some 100 nests were estimated along a 28 km length of cliff that included Highrise, 1979 (Lawson and Lanning 1981). In 1978 most young had fledged at Highrise by mid-November (Lawson and Lanning 1981); in 1981 at evidently the same site there were no birds present on 7 November and local people reported their disappearance four weeks earlier (Valenzuela *et al*. 1981); assuming that the species is similar to the Thick-billed Parrot *Rhynchopsitta pachyrhyncha*, with an incubation period of 26 days and a fledging period of two months (see relevant account), egg-laying would have taken place in mid-August in 1978 but in early July in 1981. Such variations in timing of breeding are evidently normal and related to variations in timing and abundance of pine crops; thus two males from one locality had enlarged testes on 30 May 1959 (in FMNH), while in the previous year a male from the same region had enlarged testes as late as 21 October (in DMNH). All this evidence points to the fact that the close synchrony of nesting in this species recorded by Snyder *et al.* (1987: 100) is a regular occurrence. In 1979 one to three (possibly four) young were reared per successful nest, with asynchronous fledging over several days; generally all birds desert the area very soon afterwards (Lawson and Lanning 1981; also Valenzuela *et al*. 1981). In six of eight fledgings observed in 1978 the young birds followed the parents; in two they preceded them (Snyder *et al.* 1987: 165).

The nomadism referred to above outside the breeding season remains within a relatively small area, and in fact some pattern of occurrence has emerged: thus in the northernmost part of the species's range, i.e. south-east Coahuila and west-central Nuevo León, birds could not be found in January 1978 and were reportedly absent each year (or largely so: some birds may be present throughout, at least at one site: Sada 1987) from October to March, whereas in the southernmost part of the range, i.e. south-west Tamaulipas, locals reported some birds present throughout the year (no proof of breeding) but with a dry season influx from October to April (Lanning 1978; also Robins and Heed 1951). The record of flocks totalling over 600 flying south very high over Las Vacas (Coahuila) on 16 November (Ely 1962) certainly suggests migration and conforms well with the above evidence. At Cerro Potosí in the middle of the range locals reported the species present throughout the year, whereas the major roost near Zaragoza, to the south but also in the middle of the range, was only occupied from mid-November to February/March (Lanning 1978).

The species is highly sociable and forms communal roosts throughout the year (presumably serving as foraging information centres), although breeding pairs spend the night at the nest and even in roosting flocks pairs remain together (Ely 1962, Lanning and Lawson 1977, Lawson and Lanning 1981). Birds roost in trees and cliffs (D. V. Lanning *in litt*. 1992), leaving at dawn and dispersing widely to feeding areas, often seen travelling over 40 km along one ridge between a feeding and a roosting site (Lanning and Lawson 1977) or very high overhead in pairs or small groups flying from one mountain to another (Ely 1962): there are two peaks of activity with a lull over the middle of the day, with non-breeders at Highrise for example often gathering during this lull in flocks of several hundred on the cliffs and in the adjacent forest to rest and preen (Lawson and Lanning 1981). Nocturnal roosting can involve the use of pre-roost assembly-points in the late afternoon (Ely 1962) or else the steady accretion of birds from three hours before sunset, though with a final urgent rush of birds at sunset itself before they settle for the night (Lanning and Lawson 1977). The varied weather of the mountains influences birds' movements: in the cold of early morning they fly low over slopes and valleys, but in the heat of the day they fly above ridges and cliffs, often soaring; they avoid bad weather, skirting round heavy clouds and thunderheads, and returning early to roosts ahead of afternoon storms (Lanning and Lawson 1977).

THREATS Habitat destruction has been considered the major threat: the species's mixed-conifer forests are being destroyed by fire, logging and clearance for agriculture, with for example fire claiming c.5,000 ha of habitat in two of the best areas, Sierra de la Marta in 1975 and Cerro Potosí in 1978 (as much as 50% of the habitat on the latter was destroyed). Indeed at Cerro Potosí an active logging mill was responsible for extensive lumbering in November 1981, when the birds there appeared to be food-stressed (Lawson and Lanning 1981, Valenzuela *et al*. 1981); however, in 1991 there was considerable regeneration of pines on both Cerro Potosí and Sierra de la Marta, with logging on the former perceived as very selective and the pine cover there still good (D. V. Lanning and N. F. R. Snyder *in litt*. 1992). At Highrise cliff some 200 local people are dependent on the adjacent forest for their firewood, building timber and grazing, and at Las Cuevas, where a colony of up to nine pairs exists, an access road was built for loggers in 1989, resulting in no breeding that year as well as devastation to the area, although three pairs nested in 1990 (M. A. Gómez Garza *in litt.* 1991). Heavy grazing by goats and other livestock prevents pinewood regeneration in some areas (Lanning and Lawson 1977). As long ago as the late 1950s it was observed that "much of the original conifer forest has been destroyed" in the north of the species's range (Ely 1962), although as recently as the late 1970s the forests in the south (Tamaulipas) were still largely intact (Lanning and Lawson 1977); however, if birds are migratory between the two their survival will depend on the preservation of areas of forest in both regions.

Otherwise the species is relatively untroubled: although around Highrise herders sometimes kill birds with slingshots for fun, or let their dogs take grounded fledglings (M. A. Gómez Garza *in litt.* 1991), it is not actively hunted for food because locals believe it bad eating; it is not persecuted because it does not eat corn or apple crops; and it is not trapped for trade because the nests are inaccessible and because it makes a poor talker (Lawson and Lanning 1981). It is certainly almost unknown in captivity, with possibly only a single bird in the U.S.A. in the late 1980s (Silva 1989a). Nevertheless, there is some danger of trade becoming significant, and vigilance will be required. Red-tailed Hawks *Buteo jamaicensis*

and Common Ravens *Corvus corax* are capable of eating parrot eggs and young, and Spotted Owls *Strix occidentalis* (see Remarks 5) may also do so (Lawson and Lanning 1981).

MEASURES TAKEN The Maroon-fronted Parrot is listed on Appendix I of CITES and is protected under local law, though this is not enforced (King 1978-1979). A status survey of the species was funded by ICBP PACS in 1978 (Lanning 1978). A large part of the range is covered by the Cumbres de Monterrey National Park, the largest such park (246,500 ha) in Mexico (Anon. 1989), but it appears to be poorly protected (only two guards operated there up to 1982: Vargas Márquez 1984) and damage to habitat through tree clearance within it is such that its value as a protected area appears nugatory (see Anon. 1991a, Low 1991). Plans to reforest the area of Sierra de la Marta burnt in 1975 involved establishing 180 trees per hectare of four different pine species, of which only one was native to the area (Lawson and Lanning 1981); the outcome so far appears to be encouraging (see Threats).

MEASURES PROPOSED The preservation of a number of very large tracts of forest where the species occurs in several parts of its range (to allow for periodic local failure of cone crops) has been deemed urgent (Woodard 1980); one such tract might be around Highrise cliff (see Remarks 5). This is vital for local people, too, as the lower-lying agricultural landscape and two large cities, Monterrey and Saltillo, depend on these forests for moderating climate, stabilizing soils and supplying water (Lawson and Lanning 1981). A research programme in resource management to determine whether sustained-yield logging can continue has been called for (Forshaw 1989). Ridgely (1981a) urged formal protection of the birds' nesting cliffs and feeding areas. Most recently, proposals have been formulated to purchase and warden an area of forest in which the species breeds called “El Condominio”, and to initiate a captive breeding project (Anon. 1991a, Low 1991); there may be great merit in the first part of this scheme, but there seems to be no evidence that captive breeding will benefit the species. Perhaps most usefully at this stage an educational campaign, emphasizing the local endemism of the species and generating grass-root interest in its conservation, would help develop a new awareness of the heritage of the region's forests and in particular erect a barrier of popular opposition to any attempts to begin trapping and trading the birds (N. F. R. Snyder *in litt.* 1992).

REMARKS (1) The Maroon-fronted Parrot was originally described as a full species (Moore 1947), then lumped as a race of Thick-billed Parrot (Hardy and Dickerman 1955) and then, based on the view that colour pattern is particularly significant for recognition in parrots, separated again (Hardy 1967). An explanation of some mixed characters of the two forms is that some Thick-bills wander to the Sierra Madre Oriental in winter (scarlet-fronted birds have been reported from San Antonio de las Alazanas, Coahuila, at that time) and then stay and miscegenate (Ely 1962); if this is the case, it dissolves Hardy's (1967) argument. Nevertheless, Ridgely (1981a) and Lawson and Lanning (1981) accepted specific status, and their judgement is acknowledged here before that of (e.g.) King (1978-1979), Forshaw (1989) and Silva (1989a). That the genus *Rhynchopsitta* is very close to the macaws is captured in the idea that the two forms might be called “macawlets” (in Robins and Heed 1951). Because both members are threatened, so is the genus. (2) It has been suggested that records from Veracruz refer to the Maroon-fronted Parrot, not the Thick-billed (Ridgely 1981a); however, the chances seem to favour the latter (see Distribution: Veracruz under Thick-billed Parrot). (3) Laguna de Sánchez is at 25°21’N 100°17’W in OG (1956a) and is marked as such on AGSNY (1954), with San Isidro a few kilometres to the west and “Boquillas” (*sic*) further west still; the ridge to the south where the birds presumably occur is also the state line between Nuevo León and Coahuila, and “San Antonia de las Alzanas” (*sic*) is only 40 km distant west-south-west over the mountains, with Ciruela and “Mesa de Tablas” (*sic*) only c.20 km to the south-west. (4) The cliffs 26 km east of Saltillo may be identical with one of the sites listed as in the mountains south-west of Monterrey. (5) The fact that the near-threatened Spotted Owl is common at Highrise suggests the special value of creating a reserve there.