Observations on the breeding, diet and behaviour of the Red-faced Parrot *Hapalopsittaca pyrrhops* in southern Ecuador

by E. P. Toyne & J. N. M. Flanagan

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The Red-faced Parrot *Hapalopsittaca pyrrhops* is endemic to southern Ecuador and immediately adjacent Peru where it is confined to the temperate Andean forests between 2300 and 3500 m (Collar *et al.* 1992). It is regarded as "critically endangered" (Lambert *et al.* 1993) and listed with other birds "for which their situation was serious and action is urgent" (Collar *et al.* 1992). Red-faced Parrot was previously dealt with as a subspecies of the Rusty-faced Parrot *Hapalopsittaca amazonina* but strong evidence to treat it as a full species has now been provided (Graves & Uribe Restrepo 1989). Prior to this study virtually nothing was known about the biology of this parrot or other members of the genus (Forshaw 1989, King 1989, Fjeldså & Krabbe 1990, Rasmussen *et al.* 1996). Here we present data on nesting chronology, diet and behaviour; information on nesting and vocalizations is presented elsewhere (Toyne *et al.* 1995, Toyne & Flanagan 1996).

Study area and methods

The forests of Loja Province were surveyed as part of the series of Imperial College "Parrots in Peril" expeditions which documented the status, distribution and biology of parrots in southern Ecuador (Toyne 1996). Suitable habitat for Red-faced Parrots was surveyed in Loja Province in two areas: around Saraguro (3°37'S, 79°14'W) and in Podocarpus National Park (PNP) (4°06'S, 79°09'W). Fieldwork was conducted in March–May 1992 and October 1994–February 1995. In addition, J.N.M.F. visited the Saraguro area intermittently between March 1995 and December 1996. For details of localities and habitat descriptions see Toyne *et al.* (1995) and Rasmussen *et al.* (1996).

Data on breeding biology were collected at a nest-site near Saraguro (Toyne & Flanagan 1996), which was visited between 10 November 1994 and 8 February 1995, and from general observations throughout the study. Behavioural data were collected at the nest-site during different stages of breeding. The nest was monitored during the incubation period over seven days between 10 November and 1 December 1994 for approximately 49 hours. On three days (11–12 and 30 November) the nest was watched from dawn to dusk. During the nestling period the nest-site was visited on six days and observational data were collected on four days (30 December 1994, 3–4 and 14 January 1995). On these days a total of approximately 41 hours was spent watching the nest. Nestlings were measured using standard techniques (Spencer 1984). Elsewhere, when parrots were located, basic ecological data such as flock size and food sources were collected

(see Toyne *et al.* 1992 for methods). Specimens of the food plants were collected under licence and deposited at the National Herbarium of the Museo Ecuatoriano de Ciencias Naturales, Quito; the herbarium of Universidad Nacional de Loja, Loja; the Royal Botanical Gardens, Kew; and Missouri Botanical Gardens, U.S.A.

Results

Flock size

Red-faced Parrots were encountered in pairs throughout the study period and also in flocks of up to 19 individuals. In April and May flocks were large (up to 18 individuals) and it was presumed that they contained family groups as they comprised adults and newly fledged young. In November and December flocks were mostly between four and ten. A flock of 19 individuals in November 1994, at Selva Alegre near Saraguro, was the largest recorded, but the age class composition of this flock was not known. Flocks were usually observed flying above the tree canopy (30 m from the ground), or low (1–2 m) on short flights (less than 200 m) over open ground between wooded habitats. We rarely saw them flying very high ($\geq$60 m from the ground) as some other parrots do. Occasionally they perched on isolated trees in open land.

During the survey their numbers appeared to be stable with similar sized flocks encountered in the same areas in 1992 and 1994–96.

Timing of breeding season

The Red-faced Parrot's breeding season in Loja Province appeared to be between October and January. These dates were based on monitoring one successful nest (Toyne & Flanagan 1996), observations of nest-prospecting pairs in the same area during November and December, and sightings of juveniles (identified by plumage differences) during January, April and May in three different forests.

The October–April period, which includes the dry season, is probably the breeding season for many bird species in this area, as suggested by the following records: Red-backed Hawk *Buteo polyosoma*—with young; Speckle-faced Parrot *Pionus tumultuosus*—nesting; Streaked Tuftedcheek *Pseudocolaptes boissonneautii*—nesting; Cinnamon Flycatcher *Pyrrhomyias cinnamomea*—nesting; Turquoise Jay *Cyanolyca turcosa*—nest-building; Great Thrush *Turdus fuscater*—pair copulating; Rufous-collared Sparrow *Zonotrichia capensis*—courtship feeding; Mountain Cacique *Cacicus leucorhamphus*—nesting.

Red-faced Parrots nested in habitat they used between October and June (no surveys have been conducted between July and September), suggesting that they were sedentary. Evidence from successful breeding in a cavity of a lauracous tree (Toyne & Flanagan 1996) and from three pairs prospecting cavities in four trees *c.* 500 m from this nest indicated that they are cavity nesters like the vast majority of parrot species. Three of the four cavities were natural holes in *Styrax* sp. (Styracaceae), *Symplocos* sp. (Symplocaceae) and an unidentified tree. The fourth hole looked like a previously used nest-hole in an

unidentified tree. On two occasions flocks of six parrots were observed visiting these holes in November and December. These flocks split into pairs, each of which visited different cavities. On one occasion two individuals from different pairs fought to enter a hole. Despite several checks none of the four cavities was used between November and January. One bird, which visited a Streaked Tuftedcheek's cavity nest in a tree, was presumed to be nest-prospecting.

The approximate nesting chronology of Red-faced Parrots could be estimated from observations at the successful nest. On 10 November, when the nest was discovered, the hen spent several hours in the nest but also left the nest for longer periods than we observed later, when she certainly was incubating. We suspect the hen was either laying or had just started incubation. On 21 November 1994 the nest tree was climbed and the nest (17.5 m above the ground) was inspected, and contained two creamy matt white, ovoid eggs. When the nest was next inspected on 10 December 1994, it contained two featherless nestlings, covered in grey down and with closed eyes. They were estimated to be 2–4 days old ± 1 day. On 3 January 1995 the nestlings were re-examined; on this date one was noticeably larger than its sibling (see Toyne & Flanagan 1996) and both were aged at 27 ± 2 days. This age was later validated by aviculturists independently from photographs (T. Arndt *in litt.* 1995). On 14 January 1995 both nestlings (*c.* 38 days old) were seen at the nest entrance. They still had down on their wings and backs, and their heads (crown, forehead and chin/throat) were strongly marked red. In this they differed from adults, which have a green throat and crown with red forehead and lores. By 25 January 1995 both young had fledged and were seen around the nest. Juveniles, some of which were fed by adults, were recorded in PNP and at two woods near Saraguro in April 1992. Juveniles were also observed in the same wood as the nest between 9 and 11 May 1989 (Rasmussen *et al.* 1996) and in January 1994. These data give an idea of the nesting chronology: pre-laying period, October; egg-laying and incubation period (*c.* 26–29 days), November–December; nestling period (*c.* 49–52 days), December–January; post-fledging period, January–May.

During October–December 1995 and November–December 1996 the nest was not re-used, although Red-faced Parrots were seen around the nest tree.

Behaviour of adults during incubation and nestling period

As both adults were of similar plumage it was not possible to tell for certain if the pair shared incubation and care of nestlings. However, the behaviour of the non-incubating bird, presumed to be male, was similar throughout the incubation and nestling period. So we assumed the female incubated and brooded the young, as is usual for most parrots (Forshaw 1989).

The average time a bird spent incubating during daylight hours, i.e. between returning to the nest and leaving it, was 192 minutes (n=7, range 115–290, s.d. 59.2). At feeding time one parrot approached the nest-site, calling. The incubating bird would then climb to the entrance

of the nest and after 1 or 2 minutes they would fly off silently together. They flew 20 m to a mature lauraceous tree where the non-incubating bird would feed its partner with regurgitated food. The parrots would leave the nest unattended for an average of 9 minutes (n=11, range 1–21, s.d. 7.8). The incubating bird was fed three times a day, generally between 07.00–08.30, 12.00–13.00 and 15.00–17.00 hours. The incubating bird was nearly always called off the nest by its mate and flew to a neighbouring tree to be fed by it; only once was it fed at the nest entrance.

The nestlings when *c.* 23+days old were not brooded but left unattended throughout most of the day until one adult returned to the nest, presumably to feed them. The average time between feeds was 113 minutes (n=13, range 14–250, s.d. 90.2). Adults fed the nestlings with regurgitated food on average five times a day. The adults spent little time at the nest (5.8 minutes, n=12, range 2–11, s.d. 2.9). The nestlings were brooded at night by an adult who entered the nest around 18.25 h.

On 14 January 1995 the young were at least 38 days old and, during that day, they were fed on four occasions at the nest entrance. During feeds each nestling was fed twice with regurgitated food. The nestlings were brooded that night.

The parrots did not appear to defend their nest against intruders; at any rate they showed no alarm when Mountain Caciques or Turquoise Jays landed on the nest tree and perched near or on the nest entrance. On 14 January 1995 a Strong-billed Woodcreeper (*Xiphocolaptes promeropirhynchus*) on two separate occasions landed at the nest entrance and looked into the nest but did not enter; both adult parrots were absent from the nest. Once a pair of Red-faced Parrots visited the nest tree and one of them entered the nest whilst the nest was occupied by a brooding bird and the two nestlings. The intruder left, presumably because it found the nest occupied.

Roosting habitat and roosting behaviour

On the evenings of 12 and 14 April 1992 Red-faced Parrots roosted in the 1994 nest tree. Although this tree was in fruit, no parrots were seen to feed from it. Roosting numbers increased each day; 4 on day one, 7 on day two and 18 on day three (observations then had to cease). In the morning (06.00–07.00 h) they left the roost and settled in adjacent trees before finally dispersing in small groups of two to six in all directions. The parrots arrived at the tree in small flocks (3–7) between 17.30 and 18.50 h. Before landing in the roost tree they would fly around the perimeter of the field, landing in the adjacent trees and calling loudly. While doing so, they would be joined by late-comers. On 14 April, when 18 birds came to roost, some flew into a nearby tree before entering the roost tree, whilst others flew directly into the top quarter of the roost tree. On all evenings, when the parrots were settling down to roost one parrot would perch on the crown of the tree in a look-out position and generally wait for 10 minutes before disappearing to roost with the rest of the flock.

Feeding ecology

Red-faced Parrots were recorded feeding on the following plants, all except *Myrcianthes* sp. in the Saraguro area. The only food previously recorded is *Phytolacca* berries (Fjeldså & Krabbe 1990).

Vriesea sp. (Bromeliaceae). The white stamens within the terminal inflorescence of these epiphytic plants were eaten in February 1995. The flowers were not open and the parrots had to remove the exterior petals with their bills to reach the stamens. In December one *H. pyrrhops* was observed drinking water that had collected in the leaves of an epiphytic bromeliad.

Virburnum leptophyllum (Caprifoliaceae). The berries of this tree were eaten in April 1992.

Weinmannia latifolia and *Weinmannia pinnata* (Cunoniaceae). The shoots, flowers and seeds of these trees were eaten in April 1992. One adult fed *W. latifolia* to a begging juvenile (Toyne *et al.* 1995).

Weinmannia elliptica (Cunoniaceae). The flowering parts and shoots from four trees of this species were eaten in late November 1994 and January 1995. In the latter month adults were observed feeding juveniles with this food.

Miconia jahnii (Melastomataceae). The berries of this tall tree were eaten in April 1992.

Miconia sp. (Melastomataceae). The green berries of this tall tree were eaten in November 1994 and February 1995.

Miconia sp., or *Calyptrella stellata* (Melastomataceae). The yellow seed pods were eaten throughout November and January (1994/95).

Myrcianthes rhopaloides (Myrtaceae). The seed pods of this tree were eaten during November and December in 1994 and 1996.

Myrcianthes sp. (Myrtaceae). The flowers of this tree were eaten at Cajanuma (PNP) in January 1995.

Aegiphila sp. (Verbenaceae). The dark green seed pods of this tree were eaten in November 1994 and February 1995.

Clethra revoluta (Clethraceae). The white flowers and seed pods were eaten in April 1992.

Cavendishia bracteata (Ericaceae). The berries from this 8 m tall plant growing in secondary forest were eaten in May 1992.

Disterigma alaternoides (Ericaceae). The berries from this plant, a scrambling 5 m tall shrub in secondary growth forest, were eaten in May 1992.

On 24 November 1996 J.N.M.F. observed a flock of 13 land on the ground next to the base of a tree stump. The ground there consisted of grass and bare soil. One parrot perched on the stump whilst the others foraged on ground that was selected as it was in the shade and provided some cover from predators. The look-out parrot changed several times. This observation is interesting as it probably represents the only case of this species foraging on soil, presumably for minerals.

Discussion

Clearly, one cannot draw many conclusions about the Red-faced Parrot's breeding biology from observations of one nesting attempt.

Due to the lack of data on *Hapalopsittica* species our data can only be compared to other similar sized parrots such as *Pionopsitta* species (Forshaw 1989). The Pileated Parrot *Pionopsitta pileata* has an incubation period of 24 days (*cf.* Red-faced Parrot: 26–29 days), fledging between 52–54 days of age (*cf.* Red-faced Parrot: 49–52 days) and self-feeding when 57–59 days old (Forshaw 1989). These data suggest that the Red-faced Parrot's incubation and fledging periods are similar to those of other parrots of similar size.

The fact that Red-faced Parrots feed on common Andean plant genera such as *Miconia*, *Myrcianthes*, *Weinmannia* and *Clethra* suggests that their restricted range and their rarity are not due to a dependence on certain foods. However, they may require special plants at certain times such as their breeding season. For example in October, the pre-laying period of most birds in the yungas of Cochabamba, Bolivia, Black-winged Parrots *Hapalopsittaca melanotis* were found to specialise on the fruits of cloud-forest mistletoes of the genus *Gaiadendron*, which may represent a high-nutrition food source (J. Fjeldså *in litt.* 1993).

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Addresses: E. P. Toyne, Department of Biology, Imperial College of Science, Technology and Medicine, London SW7 2BB, U.K. Current address: WWF-UK, Panda House, Weyside Park, Cattershill Lane, Godalming, Surrey GU7 1XR. J. N. M. Flanagan, Fundación Ecológica Arcoiris, Casilla 11-01-860, Loja, Ecuador.