

# Natural history and conservation of the endangered Saffron-cowled Blackbird *Xanthopsar flavus* in Argentina

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## Summary

Based on 21,518 km of road surveys, the Argentinian range of the endangered Saffron-cowled Blackbird *Xanthopsar flavus* now seems confined to two small and disjunct areas in Corrientes and Entre Ríos provinces, north-east Argentina. In Corrientes the species inhabits natural pastures and rice-fields; in Entre Ríos agropastoral land. Estimates based on numbers of localities and flock sizes suggest a Saffron-cowled Blackbird population of 500–1,000 individuals. This blackbird is highly gregarious. Mean flock size ( $n = 30$ , non-breeding period) was 31.9 birds (range: 6–102), and was significantly larger in Entre Ríos. In Corrientes foraging blackbird flocks associated mostly with the Black-and-White Monjita *Xolmis dominicana*, in Entre Ríos with the Brown-and-Yellow Marshbird *Pseudoleistes virescens*. Nesting in both provinces was colonial, with up to 24 nests in a 0.43 ha plot. Nests were built in native and introduced herbaceous plants. The Shiny Cowbird *Molothrus bonariensis* parasitized 29.2% of the nests in one colony; its eggs and chicks are larger than those of the host. Plausible reasons for the species's extinction or decline at a local level are drainage of wetlands (south-west Buenos Aires Province) and the replacement of pastures with pine and eucalypt plantations in Corrientes. General threats include trapping for the pet trade and increased cowbird parasitism. Flocks below a minimum size may not be viable. An urgent measure of protection would be the fencing and preservation of traditional colony sites.

En base a 21.518 km de censos de rutas parece que la distribución actual del amenazado Tordo Amarillo o Dragón *Xanthopsar flavus* en Argentina está limitada a dos pequeñas áreas disyuntas en las provincias de Corrientes y Entre Ríos. En Corrientes la especie se encuentra en pasturas naturales y arrozceras, mientras que en Entre Ríos usa campos agrícola-ganaderos. Una estimación basada en el número de localidades y tamaños de bandadas indicaría una población total de 500 a 1.000 individuos. El tamaño promedio de bando ( $n = 30$ , período no reproductivo) fue 31,9 individuos (rango 6–102) y es significativamente mayor en Entre Ríos. En Corrientes las bandadas se asocian principalmente con la Monjita Dominicana *Xolmis dominicana*, y en Entre Ríos con el Pecho Amarillo *Pseudoleistes virescens*. La nidificación fue colonial en ambas provincias, con una densidad de hasta 24 nidos en 0,43 ha. Los nidos se construyeron en plantas herbáceas nativas y exóticas. El Tordo Renegrido *Molothrus bonariensis* parasitó 29,4 % de los nidos de una colonia, siendo sus huevos y pollos significativamente mayores. Posibles razones para la extinción y declinación a nivel local de la especie serían el drenaje de humedales (SO de Buenos Aires) y el reemplazo de pasturas por bosques implantados de pinos y eucaliptos (Corrientes). Las amenazas a nivel generales incluyen la captura para el

comercio de aves de jaula, y un mayor parasitismo de cría. Una medida urgente de protección de la especie sería cercar y preservar sitios tradicionales de nidificación.

## Introduction

Icterines rank among the best-known Neotropical passerines, as shown by several comparative studies on their ecology and breeding (Orians 1985, Robinson 1986). Nevertheless, some Neotropical species remain almost unknown. Currently the Saffron-cowled Blackbird is classified as endangered (Collar *et al.* 1994, Fraga 1997). Conservation measures for the species require a sound knowledge of distribution and ecology, so far lacking. The Saffron-cowled Blackbird is a high conservation and research priority among Neotropical birds (Parker *et al.* 1996).

In Argentina Saffron-cowled Blackbirds have suffered a drastic retraction in range (Collar *et al.* 1992, Narosky and Di Giacomo 1993). Information on their distribution and natural history is sparse, and sometimes contradictory (e.g. Smyth 1927, Pereyra 1933 on nesting biology). Here we present recent field data on the status, past and present distribution, basic ecology and breeding biology of Saffron-cowled Blackbirds in Argentina. We identify reasons for the species's decline, and make recommendations for its survival.

## Materials and methods

Range contraction of Saffron-cowled Blackbirds was estimated by comparing records before and after 1985. The older records were obtained from the literature and from labels in the collections of the Argentinian museums: Museo de Ciencias Naturales "B. Rivadavia" (MACN) in Buenos Aires and Museo de Entre Ríos (MER) in Paraná. Records after 1985 were obtained from the literature, from a grassland passerine survey (Fraga 1996) and our field trips. During the trips we totalled 21,518 km of road surveys in the range mapped for the species in Ridgely and Tudor (1989). This area includes the Argentinian provinces of Formosa, Misiones, Corrientes, Entre Ríos and Buenos Aires. The surveys were conducted between August 1995 and September 1997. Whenever possible all localities with historical records were visited or checked for the presence of blackbirds. We present three measures of range retraction within Argentina, comparing records before and after 1985: latitudinal range, longitudinal range, and number of quadrats occupied by the species. The last variable was estimated by plotting past and present localities of Saffron-cowled Blackbirds in a grid of quadrats measuring 15 by 15 minutes of latitude and longitude. In estimates of population size, localities are defined as sites separated by distances of 10 km or more.

Field studies were carried out in the provinces of Entre Ríos and Corrientes in Eastern Argentina. Between November 1995 and September 1997 we located 34 flocks or groups of blackbirds 36 times (multiple observations of the same nesting group are regarded as one record). Behavioural observations and counts of Saffron-cowled Blackbirds were facilitated by their conspicuous colouration, remarkable tameness and preference for open habitat. Flock sizes were also estimated from photographs and videos. Egg lengths and widths were measured

with digital callipers, and egg volumes were estimated with the formula of Douglas (1990). We follow Parker *et al.* (1996) for scientific bird names.

## Results

### *Former Argentinian distribution*

The map in Ridgely and Tudor (1989) shows Saffron-cowled Blackbirds as distributed in Eastern Formosa and Chaco, most of Santa Fe, Southern Misiones, the whole of Corrientes and Entre Rios, and Northern Buenos Aires. Nores (1996) also found a nineteenth century source mentioning this blackbird for the pampas of Rio Cuarto, Córdoba.

Nevertheless, some old records are not supported by specimens or are possible misidentifications. No specimens are known from Córdoba or Chaco. The collector S. Venturi repeatedly reported this bird for Santa Fe but, according to Hartert (Hartert and Venturi 1909), his specimens were misidentified Unicoloured Blackbirds *Agelaius cyanopus* females. Two Saffron-cowled Blackbird specimens collected in Santa Fe were in the collection of the MER (pers. obs.); according to Freiberg (1943) both were obtained at Arroyo Miní. This locality, untraced by Collar *et al.* (1992) lies in the Paraná River watershed, between the cities of Paraná and Santa Fe (roughly at 31°40' S, 68°36' W). For Misiones there are two specimens at the MACN, collected in 1932 at Loreto (27°19' S, 55°32' W). There is also a single specimen for Formosa, collected in the Paraguay River watershed at Colonia Dalmacia (Esteban 1953). Other old records and specimens are summarized in Collar *et al.* (1992) and Darrieu and Camperi (1994). From these records, the past Argentinian distribution of the species appeared to be in the Mesopotamian provinces of Corrientes and Entre Rios, as well as in Buenos Aires province, north of 37°25' S. This is the approximate latitude of the southernmost localities for the species: Laguna Las Bandurrias and the laguna near Fortín Trabajo (Doering and Lorentz 1879), and of Arroyo Pigué (Barrows 1883).

### *Present Argentinian distribution*

According to Narosky and Di Giacomo (1993) Saffron-cowled Blackbirds are extinct in Buenos Aires Province. We did not obtain a single post-1985 record for this province in our survey, nor in the historical localities of Doering and Lorentz (1879), Barrows (1883), Holland (1893), Gibson (1918) and Pereyra (1933). We have post-1985 records of the species only for Entre Rios, in the Departamentos Gualaguaychú and Uruguay, and for Corrientes, in the departamentos Santo Tomé and Ituzaingó (Figure 1). These two areas appear disjunct, being separated by a 450-km gap in north Entre Rios and south Corrientes where we failed to find the blackbirds during repeated surveys. This intermediate region, covered with a denser growth of native thorny trees of *Prosopis* and *Acacia* (Carnevali 1994), is perhaps a natural barrier to a species preferring open country. W. Partridge collected extensively in this area in the 1960s (Darrieu and Camperi 1994) but all his Saffron-cowled Blackbird specimens from Corrientes were from the departamentos mentioned above. There is a supposed record from the gap (A.

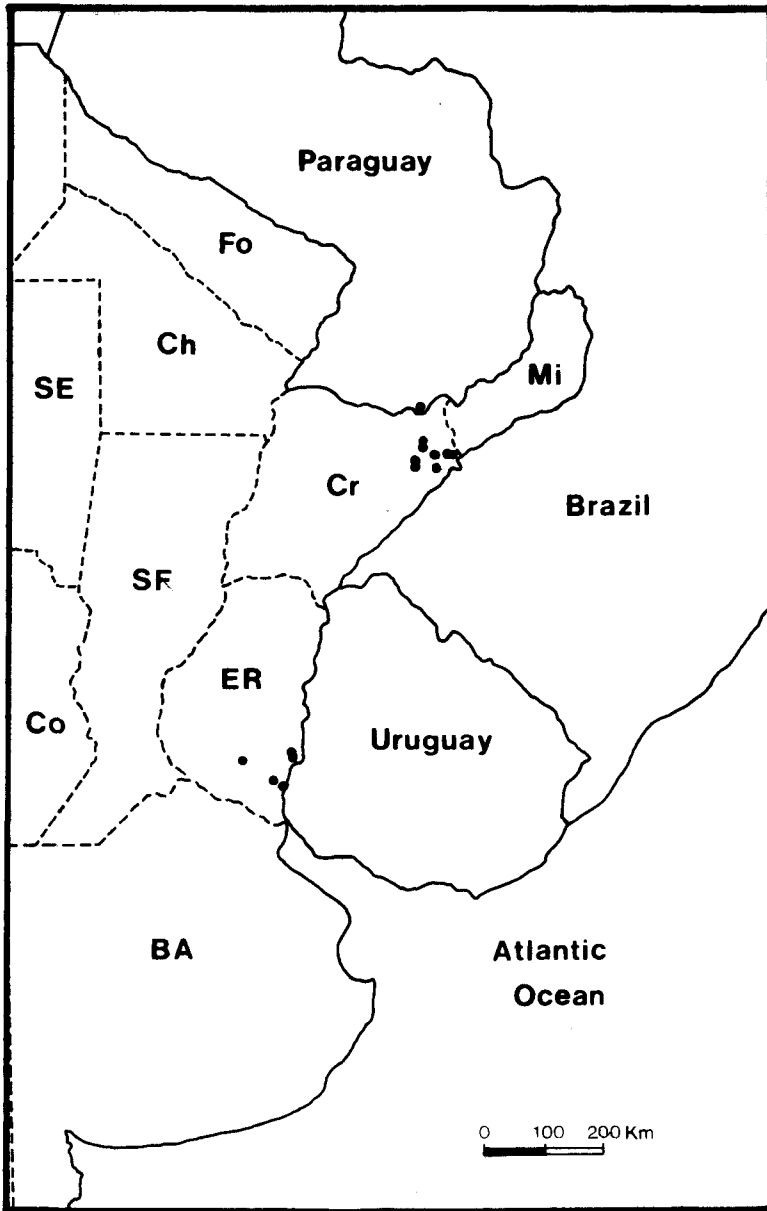


Figure 1. Present distribution (circles) of Saffron-cowled Blackbirds *Xanthopsar flavus* in Argentina. The locality shown in Paraguay is actually Isla Talavera in the Paraná River, on the border between Argentina and Paraguay, now flooded by the Yacyretá hydroelectric plant. Provinces of Argentina abbreviated as follows: Fo, Formosa; Mi, Misiones; Ch, Chaco; Cr, Corrientes; SE, Santiago del Estero; SF, Santa Fe; Co, Córdoba; ER, Entre Ríos; BA, Buenos Aires.

Tarak and M. Christie in Klimaitis 1986; this is record No. 53 in Collar *et al.* 1992), but it was actually obtained in departamento Santo Tomé, 80 km north of Paso de los Libres (M. Christie, *in litt.*).

The Corrientes blackbird population is possibly continuous with populations in Rio Grande do Sul, Brazil (Belton 1985), and the Entre Rios population seems

Table 1. Range contraction of Saffron-cowled Blackbirds in Argentina, estimated in terms of latitudinal and longitudinal range, and in the number of occupied quadrats measuring  $15 \times 15$  min of latitude and longitude. Estimates of latitudinal and longitudinal retraction are based on a past distribution ending at  $37^{\circ}25' S$  and  $62^{\circ}24' W$

Variable	Before 1985	After 1985
Latitudinal range	$9^{\circ} 56'$	$6^{\circ} 05'$
Longitudinal range	$7^{\circ} 03'$	$1^{\circ} 33'$
Number of quadrats	23	11

continuous with Uruguayan populations across the Uruguay River (A. Staggi and A. Azpiroz, pers. comm.). A possible connection between the Corrientes and Paraguay populations seemed to occur in the area recently flooded by the Yacyretá Dam (M. G. Rams and G. Ledec, pers. comm.). Table 1 summarizes the range retraction of Saffron Cowled Blackbirds in Argentina.

### Habitat

Although on three occasions during our survey Saffron-cowled Blackbirds perched on isolated trees (native and exotic), we have no records of the species in forests or dense woodlands. The general landscape of open rolling terrain and small boggy swales described for Brazilian populations (Belton 1985, Ridgely and Tudor 1989) broadly applies to Corrientes populations. The hilly area of north-east Corrientes is known as the Campos district (Cabrera 1976, Carnevali 1994), with a maximum altitude of 170 m and covering an approximate area of 11,000 km<sup>2</sup>; 90% of the Campos is grasslands and savannas, the rest subtropical forest patches and gallery forest (Carnevali 1994). Yearly rainfall in the district ranges from 1,300 to 1,500 mm. Localities in Corrientes where we found the blackbird were natural pastures ( $n = 5$ ) ranging from dry (on hilltops) to wet and boggy, sometimes bordering large permanent marshes (*esteros*). One population of about 100 birds lived in an estancia (ranch) with extensive irrigated rice-fields. Rice cultivation in this estancia started in the early 1980s, and perhaps the birds simply managed to survive in the transformed landscape. Four other estancias devoted to large-scale rice cultivation lacked blackbirds.

Saffron-cowled Blackbird habitats in Entre Rios were also in rolling, mostly treeless country, but most of the land was drier, and devoted to agriculture and cattle pastures. Former localities in north-east Buenos Aires province were in a similar landscape, the Rolling Pampas (after Soriano 1991). Average yearly rainfall in this area is 900 to 1,000 mm. In south-west Buenos Aires, with a mean yearly rainfall of 800 mm, the species was reported from the edges of streams and ponds in the foothills of the Sierras de Tandil and Ventana (Doering and Lorentz 1879, Barrows 1883, Holmberg 1883).

Table 2. Records of association of foraging flocks of Saffron-cowled Blackbirds with two bird species in Corrientes and Entre Rios provinces

Province	Associated species			
	None	Black-and-White Monjita	Brown-and-Yellow Marshbird	Both
Corrientes	2	9	1	1
Entre Rios	4	1	8	0

### Foraging habits

With four exceptions we saw Saffron-cowled Blackbirds foraging only on the ground. The foraging areas were either covered with short turf or entirely bare, in roads, recently ploughed land or burnt fields. Foraging birds walked, and spent most of the time probing in the soil, or in the vegetation. Foraging tactics included much gaping, poking into the basal leaves of *Eryngium*, removing loose leaves or pieces of dry dung with the bill to uncover food; sometimes they used their feet to bring down leaves and stems. Foraging in vegetation was seen in two nesting females, which were collecting insects from flower heads of *Eryngium*, a male extracting seeds from the spike of cultivated *Sorghum* and, in a large post-breeding flock, taking caterpillars from the leaves of cultivated sunflower plants *Helianthus annuus*.

Two other bird species were commonly observed in the areas where Saffron-cowled Blackbird flocks foraged (Table 2), particularly in Corrientes. The Black-and-White Monjita *Xolmis dominicana* was usually seen perched 0–1 m above the blackbird flocks, and then hovering and sallying to the ground. In most cases the monjita was the most conspicuous member of the mixed flock. Our data suggest that the blackbird seeks the company of the monjita rather than *vice versa*. For instance, two flying groups suddenly turned around and alighted near the perched monjitas; and nine times we saw blackbirds abandon a foraging spot to follow the monjitas to another place. The monjitas were quite scarce in Entre Rios, and we saw only one blackbird flock following monjitas for about 70 minutes.

The Brown-and-Yellow Marshbird *Pseudoleistes virescens* foraged on the ground near Saffron-cowled Blackbird flocks in both provinces. Once we saw in Corrientes a mixed flock of blackbirds with Brown-and-Yellow and Yellow-rumped Marshbirds *P. guirahuro*. In Entre Rios we also saw roosting with Brown-and-Yellow Marshbirds. We saw Saffron-cowled Blackbirds responding to the alarm calls of the last marshbird (two cases), and *vice versa* (one case).

### Social behaviour in the non-breeding season

Flock sizes in the non-breeding season ranged from 6 to 102 birds (counted from a photograph), and averaged 31.9 individuals ( $n = 30$ ). Mean group size for foraging flocks was 15.6 individuals in Corrientes ( $n = 14$ ) versus 46.2 individuals in Entre Rios ( $n = 16$ ); the difference is highly significant (Mann–Whitney  $z = 10.537$ ,  $P = 0.0012$ ) although the samples are somewhat pseudoreplicated (i.e. some groups were sampled more than once). Foraging Saffron-cowled Blackbirds tolerated small inter-individual distances, of 20–30 cm.

Flying predators seen near flocks included Aplomado Falcons *Falco femoralis*, Sharp-shinned Hawks *Accipiter striatus* and Long-winged Harriers *Circus buffoni*. Hudson (1920) reported that foraging Saffron-cowled Blackbird groups displayed sentinel behaviour, but we saw only three clear-cut occurrences. When flying in the presence of hawks, blackbirds grouped into tight flocks.

#### *Blackbird numbers*

During the surveys we counted totals of 957 individuals (non-breeding season) and 147 individuals (breeding season). As estimates of population size, our counts suffer from two opposite sources of error: multiple counting of the same flocks, and missing flocks that were far from roads. The first type of error was more important in Entre Rios, because of the excellent network of rural roads in that province; also non-breeding flocks were highly mobile. In Corrientes both types of error were equally probable. Rough estimates of population numbers were obtained by multiplying (for each province) the number of localities by the maximum flock size; estimated numbers would be 306 individuals (Entre Rios) and 250 individuals (Corrientes).

#### *Breeding biology*

Breeding of Saffron-cowled Blackbirds in Argentina has been reported only from the provinces of Entre Rios (Barrows 1883; Klimaitis 1984, 1986) and Buenos Aires (Holland 1893, Hudson 1920; Pereyra 1933, 1938) the total number of breeding localities given by these sources being five. The breeding record of Smyth (1927) for Santa Helena, near the Paraná River in Entre Rios, was questioned by Pereyra (1933). Pereyra examined Smyth's clutches at the egg collection in the MACN in Buenos Aires, and concluded that the presumed Saffron-cowled Blackbird eggs were instead those of Unicoloured Blackbirds. We examined the same eggs, still carrying Pereyra's handwritten comment on the label, and our belief is that Pereyra was correct. Besides, Smyth gave no details of the nests themselves, or their locations. This nesting record is therefore questionable.

Our earliest date for egg laying was 18 October, and the latest 13 November (estimated from fledging date). No evidence of second broods was obtained.

#### *Breeding dispersion and nest locations*

Entirely isolated nests were not seen. All 31 nests we saw were in three colonies, ranging in size from 3 to over 24 nests. The smallest colony (No. 1) was in a narrow strip of soil between two drainage ditches, in an abandoned rice-field at Estancia Mora Cué, Corrientes. Inter-nest distances were between 12 and 8 m. In 1996, about 1 km away in the same estancia, we located a group of c. 30 pairs (colony No. 2), in a 1.2-ha marsh patch in an abandoned rice-field, invaded by the sedge *Rhynchospora corymbosa* and grazed by cattle. Water level in the colony did not exceed 20 cm. Most pairs were defending clumps of the sedge, several were carrying nest material, but only four completed nests were found. The colony was not revisited, so no internest distances are available. Three of four



Table 3. Plant species (N, native; I, introduced) where nests of Saffron-cowled Blackbirds were located

Plant	Colony no.	Nests (n)
<i>Rhynchospora corymbosa</i> (N)	2	4
<i>Eryngium horridum</i> (N)	3	2
<i>Senecio</i> sp. (N)	1	2
<i>Conyza bonariensis</i> (N)	1	1
<i>Cirsium vulgare</i> (I)	3	7
<i>Baccharis salicifolia</i> (N)	3	15

pairs of the Brown-and-Yellow Marshbird (nests with chicks and eggs) were nesting in the colony.

In Entre Rios the blackbird nested in dry soil. In 1996 we found a colony (No. 3) of 24 nests (probably some nests were missed) in a crescent-shaped plot measuring 0.43 ha. The site was mostly covered by a dense growth of the composite shrub *Baccharis salicifolia*, not exceeding 1.2 m in height. This colony was located between a field of oats *Avena sativa* and a natural pasture grazed by cattle. The pasture contained a mixture of native and introduced grasses (*Stipa* sp., *Lolium multiflorum*) and herbs (*Glandularia pulchella*, *Echium plantagineum*, *Senecio* sp.). Inter-nest distances in colony 3 ranged from 5 to c. 18 m. In the adjacent oatfield White-browed Blackbirds *Sturnella superciliaris* were nesting. A possible fourth colony (three pairs, unknown number of nests) was checked too late, with recently fledged chicks. The location was a dry ditch along a paved road, with *Paspalum quadrifarium*, *Eryngium pandanifolium* and teasel *Dipsacus ful-lonum*.

Nests were built in six species of native and introduced plants (Table 3) and were not more than 1.2 m above ground level; one nest was built on the ground (colony 3) between the basal rosette leaves of *Eryngium horridum*. Nests were bulky open cups, built mostly of leaves of grasses, *Eryngium* sp., thistles and unidentified plants. One nest in Corrientes contained a small amount of mud in the bottom. Mean measurements of five nests from two colonies were: external diameter 11.2 cm, internal diameter 6.8 cm, depth 6.5 cm.

Clutch size in 12 non-parasitized nests ranged from three to five eggs (average 3.67 eggs). Saffron-cowled Blackbird eggs are white to bluish-grey, spotted in shades of brown and reddish brown; they were variable as to the distribution and size of the spots. Some eggs have curly lines in dark brown. Mean ( $\pm$  SD) egg measurements are given in Table 4. Eggs were from Corrientes ( $n = 4$ ) and Entre Rios ( $n = 30$ ) nests. The histogram of egg volumes suggests a multimodal

Table 4. Measurements (mean and SD) of length, width, volume and shape of eggs of Saffron-cowled Blackbirds ("host"), and those of Shiny Cowbirds ("parasite") found in blackbird nests

Species	Variable			
	Length (mm)	Width (mm)	Volume (cm <sup>3</sup> )	Shape index (width/length)
Host ( $n = 34$ )	22.7 (0.97)	17.2 (0.97)	3.44 (0.34)	0.759 (0.037)
Parasite ( $n = 8$ )	23.2 (0.70)	19.0 (0.70)	4.28 (0.46)	0.817 (0.02)

Differences in width, volume and shape between eggs of both species (Mann-Whitney U-tests) are significant (width:  $z = 15.94$ ; volume:  $z = 15.41$ ; shape  $z = 12.99$ ,  $P < 0.001$  for the three variables).



distribution and significantly diverges from normality ( $\chi^2 = 4.30$ ,  $df = 1$ ,  $P = 0.04$ ). One female in colony 3 produced a clutch of rather small eggs, but their fertility could not be verified. The estimated incubation period at one nest at colony 3 was 12–13 days.

At hatching Saffron-cowled Blackbird chicks had orange-coloured skins and long tufts of buffish-white down. The mouth lining was red and the rectal flanges yellow. The mean mass around hatching time of three chicks was 3.3 g. Pin-feathers appear around day 6. If disturbed, chicks can leave the nest from day 9 onwards; the normal nestling period seems to be 11–12 days. At this age chicks are feathered and coloured like females, but paler; the rump is grey rather than lemon-yellow. Chick mass at fledging time ( $n = 5$ ) ranged from 26 to 31 g (mean 28.7 g).

### *Brood parasitism*

Shiny Cowbirds *Molothrus bonariensis* (mostly females) were seen flying over blackbird colonies in Corrientes and Entre Rios. Cowbird eggs and chicks were found in 7 (29.2%) of 24 nests at colony 3. Mean blackbird clutch size in the parasitized nests was 3.14 eggs; this is based on the maximum number of host eggs seen, as some eggs were missed or punctured in our subsequent visits. Blackbird eggs were punctured in three other nests without cowbird eggs, but possibly visited by Shiny Cowbirds (the nests were abandoned). All cowbird eggs from blackbird nests were spotted, usually in shades of brown over a greyish or buffish-white background. Measurements of cowbird eggs are given in Table 4. Two cowbird eggs resembled closely the host eggs in colour, but could be separated by shape and volume.

At hatching cowbird chicks were heavier than host chicks (3.9 g,  $n = 3$ ), as expected from their larger egg mass. Hatchling cowbirds in nests of other hosts have similar weights (Fraga 1978, 1985). The parasites also differed from host chicks in having sparse grey down. Cowbird fledging mass was larger than host fledging mass.

### *Breeding behaviour and parental care*

In the breeding season Saffron-cowled Blackbirds occur in groups of pairs; both sexes showing agonistic behaviour (chases, supplantings). Both sexes interact at close distance with Bill Up or Head Up Displays (display terminology after Orians and Christman 1968). Males sing persistently to nesting females, with a Song Spread display. Although we saw males following females with nest material in the bill, it is not clear if they nest build. Incubation is by the female alone. Males chase or mob avian nest predators (Chimango Caracaras *Milvago chimango*, Crested Caracaras *Polyborus plancus*, Long-winged Harriers) and Shiny Cowbird ( $n = 9$  records, versus 0 for females). We saw as many as six males simultaneously chasing a female Shiny Cowbird from colony 2 in Corrientes, for about one minute. Four males chased a Long-winged Harrier at colony 3.

Overall we saw seven males and nine females feeding nestlings. As many as three or four prey items may be carried in the bill, including caterpillars and abdomens of mantids and Tettigoniidae. When we visited nests with chicks both

putative parents approached us (as close as 2 m), sometimes joined by several neighbour pairs. The same response was seen when a predatory snake visited nests (see below). Pairs with fledged chicks gather and move in flocks.

#### *Nest success*

The ratio nestlings/eggs laid at colony 3 was 12/83 (14.4 %). Apparently only seven chicks fledged; so total success was 8.4%. Known causes of failure were cattle passing through the colony (probably four nests destroyed), brood parasitism (see above) and predation (four nests). A green colubrid snake *Philodryas patagoniensis* was found eating a nestling in colony 3, and probably had already eaten chicks and eggs from two nearby nests.

Success and potential recruitment (season 1996) was roughly measured by estimating the ratios of fledged chicks to adults in post-breeding flocks in early 1997. In January 1997, in Entre Rios a single estimate gave 14 fledglings to c. 60 adults. In the area of colony 2 in Corrientes, in May 1997, the ratio of juveniles/adults was 4/14 in two small flocks.

## Discussion

### *Natural History*

Habitats used by Saffron-cowled Blackbirds in Corrientes are similar to those reported for the species in Rio Grande do Sul, Brazil (Belton 1985). The use of agricultural and pasture land, as seen today in Entre Rios, was reported in the nineteenth century for populations around Buenos Aires city (Sclater and Hudson 1888). Foraging habits and techniques of Saffron-cowled Blackbirds are similar to those used by Brown-and-Yellow Marshbirds (pers. obs.). Associations between blackbirds and marshbirds for foraging and roosting has been reported from Buenos Aires Province (Doering and Lorentz 1879, Holmberg 1883, Gibson 1918), and in Brazil (Belton 1985) and Uruguay (A. Azpiroz, pers. comm.). The foraging association with the Black-and-White Monjita in Corrientes agrees with Brazilian data (Belton 1985, Fontana and Voss 1995).

Saffron-cowled Blackbirds are highly gregarious during both breeding and non-breeding seasons. Flocks are conspicuous when feeding in rather bare soil. Possibly foraging blackbirds use monjitas and marshbirds as heterospecific sentinels. This hypothesis would explain why no sentinel behaviour was seen in Corrientes, whereas it was seen three times in monospecific Entre Rios flocks.

The nesting dispersion and nest sites found in this study agree with data in the literature (Barrows 1883, Gibson 1885, Pereyra 1938, Belton 1985). Data on nests and eggs are similar to those in Pereyra (1938).

### *Conservation*

We believe that a population size of 500–1,000 Saffron-cowled Blackbirds in Argentina is consistent with our survey counts, and with the small number of localities where we saw the species.

Currently the blackbirds are not found in national parks or provincial reserves. Habitat loss (rather than habitat modification) seems a major threat to the species. Drainage ditches built early in this century affected two historical localities at south-west Buenos Aires Province reported by Doering and Lorentz (pers. obs.). Replacement of pastures with pine and eucalypt plantations is currently removing habitat and, particularly in Corrientes, this activity has affected many localities where Saffron-cowled Blackbirds were collected in the 1960s (Darrieu and Camperi 1994) but where the species is now absent. The impact of rice cultivation deserves research. The Entre Rios Saffron-cowled Blackbird population seems reasonably well adapted to live in an agropastoral landscape. The blackbird is a ground forager that may benefit from the presence of grazing livestock. Therefore, the expansion of cattle raising (and even agriculture) may not be a cause of the decline of the species.

General threats to Saffron-cowled Blackbirds are capture for the bird trade and cowbird parasitism. The species is colourful, and traded under several fancy names, mostly that of *Damita* (pers. obs.). The nesting colony reported by Klimaitis (1986) was found and removed by professional bird catchers. Plausibly populations around large cities, like Buenos Aires, may have suffered a similar fate. In May 1997 some bird traders in this area (Avellaneda, Buenos Aires Province) banned the sale of Saffron-cowled Blackbirds in their market (C. Bertonatti, pers. comm.). Nevertheless, on January 1998 six blackbirds (adults and juveniles) were on sale at US\$30 each in the Tigre market, near Buenos Aires city (C. Bertonatti and N. Rey, pers. comm.).

Shiny Cowbird parasitism was first reported by Barrows (1883) and has been reported in Uruguay as well (Craviño 1993). Cowbird parasitism is sometimes regarded as a potential major threat to the species (Collar *et al.* 1992). Although parasitism has occurred for more than a century, Shiny Cowbirds seem to have increased in numbers in the blackbirds' breeding grounds. On the other hand, the incidence and impact of cowbird parasitism on colony 3 in Entre Rios was less deleterious than in most Shiny Cowbird hosts studied in Argentina (e.g. Fraga 1985, Mermoz and Reboresda 1994). Further studies are much needed and, because Shiny Cowbirds are so common, a removal experiment (Stutchbury 1997) is feasible.

The Saffron-cowled Blackbird is highly gregarious, and possibly flocks under some critical size may not be viable. Colonization of new nesting areas apparently requires movements of whole flocks (Barrows 1883, Pereyra 1938, Klimaitis 1984). The species seems highly mobile in the non-breeding season, and this poses a problem in designing reserves. Protection and temporal enclosure of the sites used by breeding colonies is feasible, and by reducing disturbance caused by cattle and horses, may well increase the recruitment rate of the species.

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