

The Yellow-shouldered Amazon is a bird of xerophytic vegetation ranging disjunctly along the north Venezuelan coastal region onto Margarita, La Blanquilla and the Dutch island of Bonaire. Numbers on the mainland seem generally low; those on the islands appear to fluctuate, but have all declined. The species is widely exploited for trade, which at least in Venezuela serves a strong internal pet market. Tourist and associated developments on Margarita are a serious threat. The mainland requires systematic survey.

DISTRIBUTION The Yellow-shouldered Amazon occurs in a few disjunct areas along the northern coastlands of Venezuela and on the Venezuelan islands of Margarita and La Blanquilla, plus Bonaire in the Netherlands Antilles, having become extinct on Aruba and possibly also Curaçao in the Netherlands Antilles (for subspecies see Remarks 1).

Venezuela mainland Although the species is generally indicated as from arid regions of the coast (Phelps and Phelps 1958), records relate to two highly disjunct general areas, in the west in the states of Falcón and Lara and in the east in those of Anzoátegui and Sucre, within which populations appear themselves to be local and disjunct; the map (Figure 3) in Desenne and Strahl (1991) is not entirely accurate, given the details below, but offers the postulation that the species might extend across the top of the Lago de Maracaibo onto the Península de Guajira, and hence into Colombia.

Within the western general area, the species can be seen for sale along the roadside anywhere between Maracaibo (in Zulia state) and Puerto Cabello (in Carabobo state) (R. B. Ramírez *in litt.* 1988), although site of sale and site of capture obviously need not be identical. Field surveys indicated that the species occurs in Falcón as follows: in the west from the Zulia border east through Casigua (specimens in COP; at 11°02'N 71°01'W in OG 1961) to around Dabajuro (Phelps and Phelps 1958, Ridgely 1981a); in the central north around Coro (Hartert 1893), 20 km south of Coro on the Barquisimeto road (Arndt 1989), 85 km inland at Agua Clara (Arndt 1989), evidently on the same road since at 11°10'N 69°59'W in OG (1961), and around Las Veritas, 10°55'N 70°12'W, and indeed throughout the Distrito Democracia, chiefly along the ríos Pedregal and Japure (H. Dos Santos *per C. Bosque in litt.* 1992, whence coordinates); the Península de Paraguaná (Voous 1957, 1983, Low 1972; see Remarks 2) which, although cited by Ridgely (1981a) as an area from which the species is inexplicably absent, holds small numbers in a private reserve managed by Fundación Bioma at Piedra Honda, 11°57'N 70°00'W, in the Sierra de San Luís (Desenne and Strahl 1991, H. Dos Santos *per C. Bosque in litt.* 1992, whence coordinates); in Lara to the west of Barquisimeto, in March 1975 (Low 1981; see Remarks 3); and at Sanare, at the junction of the Chichiriviche road with the highway from Morón to Coro (M. Pearman *in litt.* 1991).

Within the eastern general area, records in Anzoátegui state are all from the north, around Puerto Píritu and between there and Barcelona, 40 km to the east (Phelps and Phelps 1958, Low 1981, Ridgely 1981a), birds repeatedly being found in the area (A. B. Altman *in litt.* 1988), although missed despite intensive searches in July 1988 (Arndt 1989); records in Sucre are from the Península de Araya (= Cariaco) in 1908 (Lowe 1909) and 1979 (G. Medina-Cuervo *in litt.* 1986), with a specific locality being Chacopata (S. Gorzula *in litt.* 1986), at 10°33'N 63°49'W (Office of Geography 1961).

Margarita Records from this large (950 km²: Andrade 1987) island are from the western third (see Remarks 4) which comprises the Península de Macanao and its isthmus, and prior to recent studies they were notably at Robledar (= Robledal) and Boca de Pozo on the west coast (see Remarks 5), Punta de Tunar (= Punta Tunal) on the north coast (Yépez Tamayo 1964), San Francisco and the Barranco del Maiz in the centre (Yépez Tamayo 1964, Vierheilig and Vierheilig 1988), and Boca del Río and the mangroves of the Laguna de la Restinga which lies behind the long beach connecting Macanao to the main island (Lowe 1907b, Yépez Tamayo 1964, Vierheilig and Vierheilig 1988, Arndt 1989; see DCN 1964). However, recent work has indicated that, while the species is widespread on the peninsula (concentrating at well-wooded quebradas, and with a high proportion of records between sea level and 250 m), it does not breed (and perhaps never occurs; but see Remarks 6) in the Restinga mangroves, this being a misattribution based on Blue-crowned Parakeet *Aratinga acuticaudata* (K. M. Silvius *in litt.* 1992). There are four main roost-sites on Macanao, all at 50-150 m above sea level: Quebrada de la Chica, ríos San Francisco/Guainamal, río Chacaracual or La Montaña, and río Guayacancito (Silvius 1989).

La Blanquilla Lowe (1907a, 1911) found the species in the eastern part of this relatively small (50 km²: Low 1983) island, most abundantly in January, while Cory's (1909) collector reported it from the

west, to which the natives claimed it was confined; but Phelps (1948), too, found it in the east.

Netherlands Antilles *Bonaire* Most recorded localities, clearly forming the core of the species's range, lie in the hilly north-west portion of this medium-sized (280 km²: Reijns and van der Salm 1981) island, west and north-west of Rincón. Within this area, moving clockwise from the north as read from CSD (1963), localities mentioned in the published literature are: Sabana, La Sana, Dos Pos (Poos), Montaña (= Montagne), Karpata, Lagún (Lake) Goto, Ceru Wecúa (Seroe Wekoewa) or Saliñ'e Tam (Saliña Dam, Tam), Brasiel, Saliña Frans, Boca Slagbaai, (Mount) Brandaris, Put Bronswinkel, Saliña Runchi and Saliña Bartol (Rooth 1968; also Hartert 1893, Rutten 1931, Phelps and Phelps 1951, Voous 1957, Reijns and van der Salm 1981); one further locality, Kernadoe (Low 1981; untraced on CSD 1963), is close to Fontein and about 1 km east of some radio antennae (R. Low *in litt.* 1991). Many more sites are marked without being named on the map in Reijns and van der Salm (1980, 1981), and others are named in the unpublished work of Spaans (1973), Mellink and Molina (1984) and Joordens (1985). Several of these localities in north-west Bonaire fall within the Washington-Slagbaai National Park (see Measures Taken). The two chief sites outside this area are both immediately north-east of Rincón, namely Onima (Low 1981, Voous 1983), marked as a small marsh on CSD (1963), and Fontein, a north-facing escarpment (Hartert 1893, Low 1981, 1983, Reijns and van der Salm 1981, Voous 1983). The map in Reijns and van der Salm (1980, 1981) indicates an otherwise undocumented area in the hilly country south of Rincón along the south-facing coast, extending east beyond Barcadera to the longitude of Fontein; Low's (1981) claim that birds appear south of Rincón only while food is scarce would therefore appear mistaken. However, all other localities mentioned do appear to reflect vagrancy by food-stressed birds, namely Kralendijk and to the south-east at Nikiboko, Wanapa and Lima (Rooth 1968, Low 1981). Voous (1983) also referred to the island of Klein Bonaire opposite Kralendijk as a site for the species, although it is not mentioned by other researchers and from CSD (1963) appears completely flat and covered in rock and scrub. An untraced locality is Terra Cora, where a bird (in ZMA) was collected in April 1978.

Aruba Details of the species's former distribution on this island are given in Voous (1957).

Curaçao Evidence that birds ever occurred on Curaçao is tenuous and ancient (see Voous 1957, 1983), although its position in relation to Bonaire, Aruba and the Península de Paraguaná suggest they ought to have done. In the late 1970s some escaped cagebirds were reported from the hills of Sint Christoffel (Voous 1983).

POPULATION The evidence generally points towards the total population of the Yellow-shouldered Amazon being several thousands, but there are insufficient data for much confidence other than to doubt that the total is merely "in the order of a few hundreds – possibly exceeding one thousand" (Low 1983).

Venezuela *mainland* Although feared rare, a brief survey in March/April 1981 proved the species numerous in both Falcón and Anzoátegui, with no evidence of a recent decline (Ridgely 1981a). Ninety years earlier Hartert (1893) had found it common at Coro and being exported to the country's cities in large numbers; and as recently as July 1988 single birds and groups up to five were observed, with locals claiming it occurred in thousands around Coro and in good numbers further inland, all of which tended to be borne out by the numbers of birds held captive in local households (Arndt 1989). A roost at a village near Las Veritas (name and coordinates supplied) in Falcón held some 700 birds in November 1989, and local people described the bird as abundant in the district (H. Dos Santos *per C.* Bosque *in litt.* 1992). On the Península de Paraguaná only a small population of some 30-40 birds is known (H. Dos Santos *per C.* Bosque *in litt.* 1992). On the Península de Araya recently the species was seen frequently (several times per day) (G. Medina-Cuervo *in litt.* 1986). Other recent reports are of two groups (eight and three respectively) at Lago de Píritu, 10 km west of Puerto Píritu, and of seven birds seen midway from there to Barcelona, June 1991 (J. Swallow *in litt.* 1991), and at least 35 at the intersection of the Chichiriviche road with the Morón-Coro road, August 1990 (M. Pearman *in litt.* 1991). The situation is confused by local reports that the species is "not common" in Venezuela (Low 1981), by Arndt's (1989) failure to find it at all in Anzoátegui, and by the patchy ornithological coverage which has resulted in the records from Lara, Sucre and seemingly even the Península de Paraguaná (see Distribution) being omitted in the major summaries of the species (e.g. Meyer de Schauensee and Phelps 1978, Ridgely 1981a, Forshaw 1989).

Margarita On the Península de Macanao the species was relatively abundant in the early 1960s,

with flocks of up to 30 being seen (Yépez Tamayo 1964). Three unrelated surveys of the peninsula in the late 1980s resulted in total estimates of 150-200 birds (Vierheilig and Vierheilig 1988), of not more than several hundred (Arndt 1989), and of between 650 and 800 (Silvius 1989; see Remarks 7).

La Blanquilla The species was “pretty common” on the island (“several fairly large bands”) on 5 April 1906 (Lowe 1907a). At around this time another researcher found birds “common in a grove on the westerly end” but “according to the natives... on no other part of the island” (Cory 1909). However, Lowe (1911) indicated that he had found it in a woodland belt along the eastern side of the island, in “numbers which exceeded, out of all proportion, anything which we have ever seen in any of the West Indian or Venezuelan islands”, with “as many as forty or more... flying together” and “several hundred” being seen in the course of a single morning; and it was there, too, that numerous flocks were encountered in 1944 (Phelps 1948: see Remarks 8). A census in August 1988 revealed less than 100 birds (Desenne and Strahl 1991), although a figure of 100-200 is given in Rojas (1991).

Netherlands Antilles *Bonaire* Birds were common near Fontein at the end of the last century, when nine were collected during a brief visit (Hartert 1893). In 1951-1952 the population was estimated to be 50-100 pairs (Voous 1957, 1983) or 60-80 pairs (in Rooth 1968), and in 1961 the same observer (K. H. Voous) thought there were fewer birds than 10 years previously (Rooth 1968). Rooth (1968) himself concluded that over 100 pairs were present, 1959-1960, but he saw so few birds on a brief visit in 1966 that in January 1968 he conducted a more detailed survey, resulting in an estimate of nearer 50 than 100 pairs. The general figures of 50-100 pairs were again affirmed in 1972-1973 (Voous 1983): more precisely, Spaans (1973) felt that between 90 and 180 birds were present and, allowing that not all would be pairs, indicated that the total breeding population could be less than 45 pairs and would certainly be less than 90 pairs. Several droughts, 1976-1978, resulted in declines estimated at one-third (Reijns and van der Salm 1981) or one-half or more (from 300 or 400 birds to 200 or even 100 in 1978) (Low 1981, Voous 1983). Nevertheless, in early 1980, two large roosts near Lake Goto and Saliña Tam held 180 and 120 birds respectively with several smaller roosts elsewhere in the north-west of the island, giving a total of at least 375 birds (Reijns and van der Salm 1981; see Remarks 9). In August 1984 216 birds were counted (Mellink and Molina 1984), in October/November 1985 a survey found at least 323 birds (Joordens 1985), and in October/November 1987 a total of 401 birds roosted among eight different sites (van Helmond and Wijsman 1988).

Aruba Hartert (1893) considered the species “not rare in the more wooded and rocky parts of the island”, which Voous (1983) interpreted as the south. However, by 1930 birds were scarce, by 1943 rare, and by 1947 probably extinct (Voous 1957). Subsequent records in 1955, 1961, 1965 and 1974 refer either to captive birds that were set free or to stragglers from the Península de Paraguaná (Voous 1983).

ECOLOGY On the Venezuelan mainland the Yellow-shouldered Amazon occurs in xerophytic vegetation consisting of monotonous dry scrublands dominated by cacti and thornbush with scattered small trees on sandy soil (Meyer de Schauensee and Phelps 1978, Ridgely 1981a, Arndt 1989); the Península de Araya, “everywhere of an arid and hilly nature”, has (or had) vegetation like the lower parts of Margarita (Lowe 1909). The assertion that the species is restricted to lowlands up to 100 m (Meyer de Schauensee and Phelps 1973) is disproved by observations well inland in Falcón and Lara, although the habitat is evidently the same (Low 1981, Arndt 1989). A partial correlation appears to exist between the species's mainland distribution and the southern limit of the South Caribbean Dry Zone, in which rainfall is less than 1,000 mm per year (see, e.g., map 4 in Sugden 1982). On the Caribbean islands, too, the species ranges beyond 100 m, with birds roosting in cliffs at 150-200 m and foraging at up to 450 m on Margarita (Arndt 1989), and being reported from Mount Brandaris (Hartert 1893) and Kernadoe “at high elevation” (Low 1981) on Bonaire. Nevertheless, on these islands the habitat is similar to the mainland, with (e.g.) one important gorge for the species on Margarita containing cacti, thornbush, scrub, isolated trees and groups of trees (Vierheilig and Vierheilig 1988); mangroves are sometimes used (along with open fields) on Bonaire (Voous 1983). In some places cliffs are used for nesting as well as roosting (Low 1981, Arndt 1989). The overall importance of woodland to the species is unclear: several early accounts (e.g. Lowe 1911) referred to its presence in woodland on La Blanquilla (although this island is predominantly flat and barren, with patches of acacia and cactus: Lowe 1907a, Low 1983) and in “lowland forests” in the Coro district (Hartert 1893); the survival of remnants of such areas could conceivably be decisive in determining its distribution, and hence explain the absence of the species from large expanses of apparently suitable

habitat (see Ridgely 1981a). Woodland may simply be important for providing secure nest-sites in areas where cliff-nesting is impossible, in which case the absence of the species from given areas might be a seasonal phenomenon, with breeding birds confined to areas with suitable nest-sites, but at other times ranging much more widely: this might explain why Ridgely (1981a) considered the species absent from around Coro, based on researches in March/April, when Arndt (1989) found it relatively abundant only 20 km to the south in July.

Food consists of various wild and cultivated fruits, seeds and flowers, with virtually all data stemming from Bonaire. Voous (1983) listed the tree fruits shimarucu (West Indian cherry) *Malpighia punicifolia*, watekeli *Bourreria succulenta*, palu di Bonaire *Casearia tremula*, wayacá *Guaiacum officinale*, almond *Terminalia catappa*, hoba *Spondias mombin*, benbom *Moringa oleifera*, apeldam *Zizyphus spina-cristi* and probably palu di lora *Capparis coccolobifolia* as food, plus the seeds from the pods of dividivi *Caesalpinia coriaria*, maraca *Crotalaria incana*, wabi *Acacia tortuosa*, indju or kwi *Prosopis juliflora*, tumba rabu *Leucaena leucocephala* and other Fabaceae and Mimosaceae. Reijns and van der Salm (1980, 1981) mentioned some of these but also fruits of *Bursera bonariensis*, the nectar-rich blossoms of the calabash-tree *Crescentia cujete*, the tops of the cactus (datu) *Lamaireocereus griseus* and the sweet fruits of the organpipe or candle cactus (cadushi) *Cereus repandus*, these last being available throughout the year. Voous (1983) implied that *Cereus* is only taken in times of food shortage but Hartert (1893) noted it in the species's diet on Bonaire along with *Melocactus*, *Morinda* (or possibly *Moringa*) and *Guava*, while on the Península de Araya in Venezuela birds were also seen consuming *Cereus* fruits (G. Medina-Cuervo *in litt.* 1986), and Voous (1957) himself collected three birds whose stomachs were entirely filled with cactus fruit; the juice of cactus fruit makes the face dirty (Hartert 1893) and this is possibly what Low (1981) interpreted as discoloration caused by nest-site preparation. Seeds, flowers, fruits, nectar and/or shoots of five cacti (cardón *Ritterocereus griseus*, yaurero *Subpilocereus repandus*, *Pilocereus lanuginosus*, *Melocactus lobelii* and *M. caesioides*), five legumes (*Platymiscium diadelphum*, yaque *Prosopis juliflora*, guíchere *Pithecellobium unguis-cati*, *Piptadenia flavia* and *Piscidia piscipula*), and plants from several families (*Bulnesia arborea*, *Guaiacum officinale*, *Bourreria cumanensis*, *Tabebuia chrysantha*, *Capparis odoratissima*, *Casearia tremula*, *Zizyphus mauritania*) provide food for the parrots on Margarita, and the distributions of the four whose common name is given, along with that of palosano (for nesting), are regarded as major reasons for the relative abundance of birds at lower altitudes (Silvius 1989); indeed, subsequent work has shown the cardón to be critically important as a year-round food source (Silvius 1991; see Measures Proposed). In addition, Voous (1983) mentioned reports that the species favours the fruits of mango, sapodillo, kenepa, pomegranate, papaya, avocado and soursop, also the seeds of millet (most or all of this seemingly being derived from Reijns and van der Salm 1980), and hence is sometimes destructive in fruit gardens and fields (its taking of millet was a cause of its destruction in Aruba). Birds certainly feed in disused plantations on Bonaire (Low 1981, 1983), probably take maize when available (Spaans 1973), and with severe aridity venture into villages to forage in gardens, even from tables (Reijns and van der Salm 1981). Around San Francisco de Macanao on Margarita the species causes (or used to cause) damage to maize (Yépez Tamayo 1964). On La Blanquilla Lowe (1911) recorded birds utilizing "the small yellow fruit-like seeds of some guaiacum trees and the fruits of the cactus". On the Venezuelan mainland near Las Veritas plants eaten included cardón de lefaria *Cereus deficiens*, cují *Prosopis juliflora* and unidentified plants called trompillo, curarí and baitoa (H. Dos Santos *per C. Bosque in litt.* 1992).

On the Venezuelan mainland near Coro, 1988, the age of young captive birds indicated breeding from as early as March but otherwise April and May, locals reporting nests being made in trees on nearby mountain slopes (Arndt 1989); in another account the trees used in Falcón are *Bulnesia arborea* and *Prosopis juliflora*, and the season extends from the end of March to the end of August, with a clutch-size of 3-4 (H. Dos Santos *per C. Bosque in litt.* 1992; also Rojas 1991). This generally accords with various items of evidence from the islands. Locals reported breeding, Bonaire, from March to July (but also in October, which was considered possible, at least occasionally), and behavioural cues indicated breeding in late April with hatching in May and fledging in July (Low 1981, 1983); Spaans's (1973) and Voous's (1983) information for the same island modifies this only slightly, with a reported breeding season from February to June and still begging young as late as October, but with one park guard indicating a July–September breeding season. On Margarita the season is from the end of March (most clutches are laid in April) to the middle of August (most young leave the nest in August) (Arndt 1989, Silvius 1989, Rojas 1991). A female from La Blanquilla (in YPM) had undeveloped ovaries on 23 March 1960. Presumably

breeding is a response to local conditions and its timing may therefore vary quite considerably between years. Clutch-size is reportedly 2-3 on Bonaire (Low 1981, 1983) and 4-6 has been claimed, Margarita (Vierheilig and Vierheilig 1988), although in 1990 the proven range was 2-5, average 3.4 (Rojas 1991), with (in the wild) an incubation period of 26 days (22 days in the case of a fifth egg in a clutch) and a fledging period of 59 days, with equivalent figures for captive birds of 24-27 (Noegel 1986) and 77 (Low 1983) respectively. Up to 30% of the population appeared to be breeding in 1989 on Margarita, the palosano *Bulnesia arborea* being much the most favoured for nesting in: of 31 nest-sites examined, 24 were in palosanos, two in mucos *Capparis pachaca*, three in quebrachos *Caesalpinia mollis* and two in yaureros *Subpilocereus repandus*, although in other parts of the island guayacan *Guaiacum officinale* is known to be used (Silvius 1989). In the following year (providing good evidence that nest-sites are reoccupied in successive years), a study of 34 nests showed that 27 were in quebradas or by rivers, four were on hillsides, two were on flat ground away from quebradas and one was in a cliff, with 27 being in palosano, three in quebrachos and one each in cotoperi *Talissia oliviformes*, guayacan and yaurero (Rojas 1991). On Bonaire the species uses both tree-holes and limestone cliffs, favoured trees being *Spondias*, *Capparis*, *Bursera* and *Guaiacum*, plus the cactus *Cereus repandus* (Hartert 1893, Rooth 1968, Low 1981, 1983, Voous 1983, Mellink and Molina 1984); on Aruba, hollow trees were reportedly used (Hartert 1893). On Bonaire, up to 90% of broods may be predated by rats, people or others, although nest-site competition (from Brown-throated Parakeets *Aratinga pertinax* and Pearly-eyed Thrashers *Margarops fuscatus*) appears to be slight (Mellink and Molina 1984). On Margarita, predation of newly fledged birds by raptors is thought probably high (Silvius 1989), and nest predation by the snakes *Constrictor constrictor* and *Corallus enydris* has been documented and many other potential nest predators, both reptile and mammal, identified (Rojas 1991). Extrapolating from estimates of breeding population size plus data on clutch-size, hatching success and fledging success, Rojas (1991) proposed that a breeding population of 70-106 pairs lay 238-360 eggs, 65% hatch into 155-234 chicks, and 50% are taken by nest-robbers, leaving 78-117 young to fledge; he thought that in 1990 the breeding population was probably 95 pairs, producing 323 eggs, 210 chicks and 105 recruits into the population.

Generally birds occur in pairs and small groups, but sometimes in larger flocks (60-80 and even over 100) when feeding, and commonly form communal roosts at least outside the breeding season (Meyer de Schauensee and Phelps 1978, Reijns and van der Salm 1981, Voous 1983); even when in flocks, however, birds clearly remain in close-knit pairs (Lowe 1911, Spaans 1973). On Bonaire, apparently in July, Hartert (1893) recorded nocturnal roosting in rocks, with birds leaving to forage at daybreak, returning between 08h00 and 09h00, moving out again in the afternoon and flying in again just before sunset. The two main nocturnal roosts on Bonaire in early 1980 were in fairly narrow, deep valleys in the lee of the hill (Reijns and van der Salm 1981), and Voous (1957, 1983) recorded diurnal resting in the crowns of various trees in secondary seasonal forest and cactus vegetation, with activity confined to the early morning and late afternoon. The steady fall-off in numbers at the 1980 nocturnal roosts through February and March has been interpreted as birds moving elsewhere in response to newly available foods (Silva 1989a) and as dispersal to breed (Forshaw 1989). Years with good rain may result in sufficient fruit for flocking behaviour to diminish (Rooth 1968).

On La Blanquilla Lowe (1911) found birds in large numbers in January but much diminished in the same location in February; believing the birds to be confined to this eastern area (and in this he might have been right, since Cory may have slipped in indicating occurrence on the western side of the island: see Population), he could only explain the difference by postulating occasional movements of birds to Margarita.

THREATS The most prevalent threat to the Yellow-shouldered Amazon is (largely internal) trade, but this is compounded by local threats such as tourism (on Margarita) and by various “natural” developments including drought; there are no published claims that habitat destruction has been highly significant, yet ecological studies in progress have shown it to be important on Margarita (see below), and a rigorous analysis of the historical evidence would probably reveal the same for parts of the mainland (see Measures Proposed). On Aruba the extinction of the species has been attributed by Voous (1983) to shooting and poisoning in response to crop damage, although earlier he (Voous 1957: hence also Low 1981, 1983) blamed it on the usurpation of land by a large oil-refining industry, and Silva (1989a) assumed that drought and the taking of nestlings as pets may have been no less factors than they are on Bonaire. International trade in the species has always been considered minimal (Low 1981, 1983, Silva 1989a), but

recent evidence (Venezuelan parrot shipments confiscated in Aruba, and others seen in Curaçao coming from Falcón) indicate that unknown numbers are entering foreign markets (M. L. Goodwin *in litt.* 1992).

Venezuela mainland A century ago Hartert (1893) referred to the rarity of museum skins “in spite of the numbers that are kept in confinement”, explaining that “large numbers are sent to the bird-shops of the larger towns of Venezuela and to Curaçao” from mainland locations. Although in 1981 Ridgely (1981a) found (a) mainland birds to be unusually fearless, indicating lack of persecution, (b) only small numbers being held locally as pets, and (c) no appreciable trade, Arndt (1989) later encountered a situation (in Falcón) more similar to that recorded by Hartert (although wild birds were still very approachable), with the species much favoured as pets by local people (almost every fourth house having a specimen in one area), and with birds also being sold very cheaply (equivalent of US\$3), which suggested how common they then were as traded items. This was confirmed by a contemporaneous but independent assessment which showed that at least eight birds could be found for sale at the roadside between Puerto Cabello and Maracaiba on any date, indicating a heavy threat from trade in Falcón (R. B. Ramírez *in litt.* 1988), and again by research in 1990 which revealed that near Las Veritas the capture of chicks (using a barbed *Bromelia* leaf) is an intensive and widespread activity during May, at the end of which it is easy to find six or more birds in most homes, the birds being sold to dealers for international trade or roadside resale between Coro and Maracaibo (H. Dos Santos *per* C. Bosque *in litt.* 1992). Roadside sale of birds also occurs in Anzoátegui (Desenne and Strahl 1991). “Habitat destruction” was regarded as a major factor (A. B. Altman *in litt.* 1988); on the Península de Araya this takes the form of slow but probably irreversible pressure from overgrazing by goats and firewood-gathering by local people (S. Gorzula *in litt.* 1986); overgrazing was strongly in evidence at the one site in Lara (Low 1981). On the Península de Paraguaná the species was reportedly commoner 30 years ago, but has declined perhaps for natural reasons, e.g. increasingly long dry seasons, absence of water and of nest-sites, there being no evidence of trade, despite the peninsula being much used for the illicit transfer of the species to the Netherlands Antilles from the hill country around Coro (H. Dos Santos *per* C. Bosque *in litt.* 1992).

Margarita Burgeoning tourism and local trade now affect the species, tourism much more problematically. As an indication of the development of Margarita as a resort, Andrade (1987) reported a growth in visitors from 270,868 in 1971 to two million in 1986 and a projected six million by 2010, with a concomitant rise in the resident population from 197,000 in 1981 to 515,000 in 2010. Although it was thought that the Península de Macanao had remained untouched by this growth, and remains sparsely populated and little visited, it was feared that the new identity of the island as a resort would result in ecological disturbances and transformations that could affect the species (Vierheilig and Vierheilig 1988). In fact sand-mining for the construction business had already begun on Macanao in the late 1980s, slowly destroying the birds' primary foraging habitat as well as the four key roosting areas and nesting trees, such that habitat loss in general counted as a greater threat to the species even than the taking of young (Silvius 1989, Desenne and Strahl 1991). Up to 50 birds per year are killed as crop pests (Silvius 1991); nevertheless, it is the local exploitation of the species for pets that most obviously has an impact, with at least 50% of young being taken by traders in 1989 (Silvius 1989); “the vast majority of the fishermen living on Macanao owned one or two *A. barbadensis* as pets” and the species's “increasing scarcity... has caused locals to abstain from felling nest-trees in order to ensure a recapture the following year”, a barbed leaf or fishing hook now being used to extract the featherless chicks (Desenne and Strahl 1991). Indeed, the high number of confiscations during 1988 suggested that organized efforts, possibly indicating international trade, were operating (Desenne and Strahl 1991). Periodic drought probably also causes high mortality amongst adults, but it is possible that the most important factor limiting the population on the island is nest-site availability, caused in part by the loss of nest-trees owing to sand-mining and to the (formerly) destructive actions of some trappers when taking the young (Silvius 1989).

La Blanquilla Young are taken by fishermen (Desenne and Strahl 1991), presumably as pets. Silva (1989a) noted that the island was at one stage leased as a goat ranch, the impact of which can hardly have been beneficial to the native vegetation: Lowe (1907a) referred to “large numbers of donkeys, horses, and goats all over the island”, and Murphy (1952) said it was “devastated by overpopulation of domestic animals”.

Netherlands Antilles Bonaire The taking of young for the local pet-trade (bird-catchers know the nest-

sites well) is the most serious threat (Voous 1983), this seemingly affecting cliff-nesters more than tree-nesters (Low 1981, 1983); in the late 1970s as many as 100 birds were estimated to be in captivity on the island at a time when the wild population may not have been much more (Low 1981, 1983). Birds so taken may also be sold elsewhere within the Netherlands Antilles for up to US\$110 (Rooth 1968, Silva 1989a, J. de Freitas *in litt.* 1991). The species is considered a pest and is sometimes shot by farmers because of the damage done to crops and orchards (Reijns and van der Salm 1981), but this presumably only occurs when drought stresses birds. Drought is in fact a serious second threat, since the reduction in food-supply leads not only to the shooting but also to the starvation or capture of birds as they move into villages in other parts of the island; in 1978 200 were estimated to have died, which may have been 50-75% of the population, as a result of drought from February to June, and in 1982 a similarly caused mortality occurred (Low 1981, Reijns and van der Salm 1981, Voous 1983). Although this pressure is natural, the human occupation of Bonaire and defence of its cultivated resources represents a constraint on the parrots which unnaturally amplifies their vulnerability at such times. Other natural problems for the species involve nest-predation by and possibly nest-site competition from the endemic race (*bonairensis*) of the Pearly-eyed Thrasher, although this, too, suffers in droughts (Voous 1983), nest-predation by rats *Rattus* and nest disturbance by iguanas (R. van Halewyn *in litt.* 1986).

MEASURES TAKEN The Yellow-shouldered Amazon is protected by law in Venezuela, although this is not enforced (G. Medina-Cuervo *in litt.* 1986; also Desenne and Strahl 1991). Similarly the species has been protected by law on Bonaire since 1952, when its capture and export were forbidden (Low 1983), but to no great avail (see Threats), despite intervention by ICBP's Pan American Section in 1962 (not 1963 in Silva 1989a), which resulted in assurances of enforcement. The only part of its mainland range under protection is the private Fundación Bioma reserve on the Península de Paraguaná (see Distribution). The island of Margarita already possesses two national parks, three regional parks and 37 other protected areas (Andrade 1987) but none covers a significant population of Yellow-shouldered Amazons (K. M. Silvius *in litt.* 1992); however, a recent agreement was reached between WCI, Pro Vita Animalium and the Venezuelan Ministry of the Environment to conserve the species's habitat, increase public awareness of its plight, reduce trade and coordinate efforts for captive breeding, law enforcement and local education (WCI *Bulletin* March/April 1990: 7). Calls for ecological studies and precise evaluation of the situation on Margarita (Low 1981, Arndt 1989) have been answered by the initiation of two projects currently in progress, one investigating the species's ecology (e.g. Silvius 1989, 1991, Rojas 1991) and the other representing an educational campaign (Desenne and Strahl 1991); these initiatives have already started to produce important results, such as the fledging of 30 young in both 1990 and 1991 from nests that were traditionally poached (Silvius 1991). On Bonaire the species occurs in the 3,800 ha Washington-Slagbaai National Park, which embraces Goto, Saliña Tam, Slagbaai and Mount Brandaris, and is administered by STINAPA, the Netherlands Antilles National Parks Foundation (Voous 1983). In 1978 STINAPA flew in 2,000 kg of mangoes and sweet gourds to help feed starving birds (Low 1981, 1983).

MEASURES PROPOSED Most published suggestions and exhortations refer to the islands, but it seems likely that the mainland holds far larger populations of the species and must not be neglected. The first requirement is therefore for a comprehensive survey of the mainland areas at various seasons to determine more clearly the distribution and status of the species and to initiate quantitative studies on its ecology, with particular emphasis on food, nesting habitat and the possible importance of woodland (see Ecology). Ecological studies on Margarita (see Measures Taken) have already indicated the importance of cactus fields in the lowlands of Macanao and of palosano stands in the main riverbeds (see Ecology), and it is imperative that these receive full protection. While these studies are progressing on Margarita, parallel work is long overdue on Bonaire, for example to elucidate alleged food competition from Brown-throated Parakeets and nest-site competition from Pearly-eyed Thrashers (Voous 1983); such studies are also merited on La Blanquilla, which Desenne and Strahl (1991) have urged to be declared a protected area. From this ecological work and the proposed surveys a broad plan for protected area development, habitat management and local education can be generated for, as Low (1983) asserted, the bird must be protected in all parts of its range. Following STINAPA's action in importing fruit to Bonaire in the 1978 drought, a fund for use in future droughts on the island has been called for (Low 1981, Silva 1989a) as well as the planting of drought-resistant food trees (Silva 1989a). Captive breeding from Bonaire's conservatively estimated 100 birds (in the late 1970s) could (a) produce young to meet local demand and (b) highlight the

plight of the species (Low 1981); the value of a captive-breeding programme is endorsed by Noegel (1986), Silva (1989a) and Lantermann and Schuster (1990) but, unless it is specifically targeted at filling the market and replacing the illegal pressure on wild birds (see comments in Desenne and Strahl 1991: 166), there is little need for the effort and expense involved (a view also expressed for Margarita by Silvius 1989). Indeed, there should first be a very careful evaluation of local bird-keeping traditions and the chances of influencing it – and hence of shrinking demand – by education and enforcement. Meanwhile, the collection of further live specimens should not be permitted (Silva 1989a).

A general blueprint for parrot conservation in Venezuela has called for several measures outlined above, but has also highlighted the importance of evaluating trade data to determine smuggling patterns and trends, the value of using parrots as ecological indicators by their inclusion in plans for monitoring and managing protected areas, the need for public education campaigns both at the source areas and in the major centres of consumption, and the particular necessity of training enforcement personnel in trade-related issues (Desenne and Strahl 1991).

REMARKS (1) The subspecies *rothschildi* on Margarita, La Blanquilla and Bonaire is invalid (Voous 1957, 1983, Low 1981, 1983, Forshaw 1989, Silva 1989a). (2) Voous (1957) cites “J. Racenis, Doc. Int. Un. Prot. Nat. 3rd Gen. Ass., Caracas, 1952, p.26” for the information that the Península de Paraguaná is particularly important for the species on the Venezuelan mainland; however, inquiries of the IUCN library and of K. H. Voous himself have failed to trace the reference as cited. (3) Several curiosities attend the report from west of Barquisimeto: Low (1981) called the state Tara; Silva (1989a) added that the site in question is “near Aritagua”, which most resembles Yaritagua, to the east of Barquisimeto (see TAW 1986); but A. B. Altman (*in litt.* 1991) has affirmed that the town in question is Atarigua, west of Barquisimeto and near Puente Torres. (4) A record from El Valle on the main part of Margarita (Lowe 1907b) is referable to the Orange-winged Amazon *Amazona amazonica*, found on the island by Robinson and Richmond (1895), Clark (1902) and evidently also Fernández Yépez *et al.* (1940; see Remarks 6), although the species had disappeared by the time it was searched for by Vierheilig and Vierheilig (1988). This was a bird which was found in “many large flocks” in 1895 (Robinson and Richmond 1895), and while the causes of its disappearance remain unclear, Clark (1902) referred to it as “a very popular cage bird with the natives” as well as to its behaviour “on the approach of a hunter”, which certainly suggests that direct human pressure may have been responsible. This local extinction of a congeneric emphasizes the risks run by the Yellow-shouldered Amazon on Margarita. (5) Where Silva (1989a) had Boca de Pozo, which is just south of Robledar, Low (1981) had Boca de Río, which is on the opposite side of the peninsula; Yépez Tamayo (1964) had Boca de Río. (6) It seems probable that the amazons sometimes enter the mangroves at Restinga, even if Vierheilig and Vierheilig (1988) and Arndt (1989) misunderstood which species they were told nested there. For example, Lowe (1907b) saw “several parties round the lagoon at the west end of the island”, and by this he presumably meant the west end of the main island. Incidentally, the confusion he started over the existence of *barbadensis* on the main island (by assuming that birds he saw at El Valle were the same as those at the lagoon) was not entirely dispelled by Fernández Yépez *et al.* (1940) or Yépez Tamayo (1964), so that Rojas (1991) repeated the mistake of believing that *barbadensis* had once occurred at El Valle and thus had suffered a significant range contraction. (7) The “probably 800-1,000” in Desenne and Strahl (1991) was an early guess based on the unanalysed results of the third survey (K. M. Silvius *in litt.* 1992). (8) It is curious that Silva (1989a) referred to a Venezuelan ornithologist failing to find the species on Blanquilla several decades after Lowe's visit. (9) The figures in Reijns and van der Salm (1981), which chronicle numbers at the two main roosts, indicate the the sites were not checked simultaneously (except once) and that the peak of 180 at one site occurred before the second site was even discovered; if the total of 375 included the simple addition of 180 and 120, it is patently unreliable.