ST LUCIA AMAZON *Amazona versicolor* **R**[11]

Endemic to moist forest on the central-southern mountains of St Lucia, this parrot has experienced depletion of numbers owing to habitat loss, hurricanes, hunting and trade, but recent action by government and non-government agencies has now reversed the situation, with some 300-350 individuals extant and the nation sensitized to the importance of the species.

DISTRIBUTION The St Lucia Amazon is endemic to St Lucia in the West Indies. Its original range on the island is reasonably assumed to have followed the original distribution of moist forest there, and thus prior to 1850 it was "widespread" (Butler 1980, 1981a). During the twentieth century it has been documented in progressive retreat into the core of the central and southern block of mountains, in the 1920s from La Sorcière south (Bond 1928b), in 1971 from the Barre de l'Isle south (Diamond 1973), in 1950 with an estimated 295 km^2 of habitat (clockwise running from Forestière to La Sorcière, St Joseph Estate, Mt Durocher, Blancnard, Saltibus, Fond St Jacques, Mt Tabac and Mt Parasol), in 1969 with only about 82 km^2 (Jovicich 1976, Butler 1980, 1981a; see Remarks 1). Since the mid-1970s its range has been within a roughly 65-70 km^2 area of forest from Millet and Mont Lacombe in the north to Mont Beucop and Calfourc in the east, Piton Cochon, Piton St Esprit, Desrache and Grand Magasin in the south, and Morne Gimie and Mont Houlemon in the west and north-west respectively (Jeggo 1976a,b, 1981, Butler 1980, 1981a); details of localities to and from which birds make daily dispersals are given in Jeggo (1976a) and Butler (1981a). Centres of abundance within this range may vary with time or season: Bond (1928b) found most birds around Piton Lacombe but was told the greatest concentration was between Dennery and Micoud near the windward coast (Danforth 1935 found them only on Piton Lacombe); since the mid-1970s apparent changes in abundance in three key survey areas, Millet, Quilesse and Edmund Forest, have been documented in Jeggo (1987) and Jeggo *et al.* (1989). Survey work in 1990 confirmed that the south-western parts of the remaining forest hold the greatest concentrations of parrots, while those in the north-east support very few (Jeggo and Anthony 1991).

POPULATION Although judged to have been relatively abundant before 1850 (Butler 1980, 1981a), and still described as "not uncommon in the high woods" at the turn of the century (Thompson 1902; see Remarks 2), the species evidently thereafter declined seriously (see Threats) and recovered again, since Porter (1930a) recorded that "twenty years ago the bird was to all intents and purposes practically extinct" but that it was "now fairly common" with flocks of 20 being reported on their way to their feeding areas. An estimated 1,000 birds existed in around 1950 (Jovicich 1976, Butler 1978, 1980, 1981a), and at the end of the decade the species was judged "not as rare as usually thought" (Frost 1959; see Remarks 3), although Bond (1961) detected a marked deterioration in status since his work there in the late 1920s. At the start of the 1960s the species was regarded as in danger of becoming rare through excessive shooting (Sjögren 1963) and by the end of the decade this prediction was evidently coming true, with some 40 estimated being shot every year and the species considered common in only about half its remaining habitat, then c.20 km^2 in extent (Wingate 1969). Survey work in 1975, which included the sighting of a flock of 20, and follow-up studies in 1976, resulted in an estimated 100-150 birds remaining (Jeggo 1976a,b) or plain 125 (Nichols 1976, 1977a) or 150±25 (Jovicich 1976, Butler 1978, 1980, 1981a) or 125-150 (Nichols 1977b) or 100±25 (Jeggo 1981). A study in July–August 1977 concluded that the total population was probably no more than 100 (Butler 1978), a figure that appeared to be valid for the situation up to 1980 (Butler 1980, 1981a; hence also Low 1980b, Silva 1980). Following (but despite) the devastation wrought by Hurricane Allen in 1980 (see Threats) a survey suggested a population level similar to that of 1975/1976, i.e. 150±25, which "would tend to indicate a small increase on the 1977 figure", although the only specific conclusions were that "the hurricane adversely affected the possible recent upward trend of the population" (Butler and Jeggo in Butler 1980) and that "the hurricane had not caused a significant decline in the parrot population" (Jeggo and Taynton 1981). Four subsequent surveys have revealed a steady increase in numbers: the first, in 1982, recorded the species with much greater frequency than that in 1980, the conclusion being that certainly no decline had taken place, that the increased frequency might reflect changes in distribution in response to forest damage, but that it might indicate an increasing population (Jeggo *et al.* 1983); the second, in 1986, though based on the revised

BirdLife International (1992) Threatened Birds of the Americas.
Cambridge, UK: BirdLife International.

opinion that "the sightings in 1982 did not indicate any increase in the population", estimated numbers at 200-250 (Jeggo 1987); the third, in 1988, estimated numbers at 250-300 (Jeggo *et al.* 1989); and the fourth, in August–September 1990, resulted in a further estimated increase to 300-350 (Jeggo and Anthony 1991).

ECOLOGY Habitat is the canopy of tropical moist forest in the montane interior of the island; diurnal movements take the species outwards from the heart of the forest in the early morning, sometimes to the periphery of its habitat and into adjacent areas of secondary growth, birds returning to roost in the later afternoon and evening (Jeggo 1976a,b; see Remarks 4). Jovicich (1976) noted activity to occur typically (although varying in poor weather) from 45 minutes before sunrise, reaching a peak between 07h30 and 08h00, tailing off to nothing by 10h30-11h00, beginning again around 14h30 and culminating in a late afternoon peak at c.17h00, winding down completely 45 minutes before darkness.

Catholic use of the apparently abundant and extensive food-plants has always been assumed (Jeggo 1976a, Butler 1981a) but little has been published. To date, birds have been recorded eating flowers or fruits of strangling fig (aralie) *Clusia* sp., wild breadfruit (bois pain marron) *Talauma dodecapetala*, gri gri palm *Acrocomia irenensis*, pennypiece *Pouteria* sp., bois cote *Miconia mirabilis*, "pomme-de-lien" (*sic*; no scientific name given), by implication the palm *Euterpe globosa* and, after Hurricane Allen, bananas in cultivated areas (Jeggo 1976a, 1977, Butler 1980, 1981a, Jeggo and Taynton 1981, Forshaw 1989). Jovicich (1976) reproduced a list of food sources provided by his respected guide (S. John), as follows (excluding those listed above): balata chien *Manilkara riedleana*, bois tan rouge *Byrsonima martinicensis*, chatagnier *Sloanea massoni*, dalmarie *Pithecellobium jupunba*, gommier *Dacryodes excelsa*, goyavier *Cassipourea guianensis*, l'ensense *Protium attenuatum*, mapon *Torrubia* [*sic*] *fragrans*, paletuvier *Pterocarpus officinalis*, wild mahoe *Sterculia caribaea*. The species's apparent absence from Edmund Forest between late August and late November is possibly due to a lack of fruiting *Clusia* in the area at that time (Butler 1981a). A bird collected in July 1931 contained "a large number of small unidentified fruits and their seeds" (Danforth 1935).

Nests are placed in holes in trees, but despite the report by Mühlhaus and Mühlhaus (1983) that *Dacryodes excelsa* is the most favoured species, it is not preferred to the same degree as by the St Vincent Amazon *Amazona guildingii* (see relevant account): thus of 10 nests, 1975/1976, three were in gommier, two in pennypiece, two in burnline *Sapium caribaeum*, and one each in wild breadfruit, boardwood *Simarouba amara* and "bad job" (scientific name not given) (Jeggo 1977). Breeding coincides with the dry season from February to August; from the evidence of two nestlings found in late May and early June 1975, plus the sighting of a newly fledged bird on 13 June, egg-laying that year would have occurred from the end of February through March (Jeggo 1976a). Clutch-size is two, though generally only one young is reared (Mühlhaus and Mühlhaus 1983); the only two nests found in 1975 each held only one chick (one nestling was later found dead outside the cavity, possibly victim of an opossum *Didelphis marsupialis*, and the other was taken for captive breeding), while in 1976 of seven certain and five suspected nests only three reached nestling stage, these holding two young each (all taken for captive breeding) (Jeggo 1976a,b, 1977). In 1979 and 1980 breeding success was judged to have been better (Jeggo and Taynton 1981), and indeed the recovery of the population, 1980–1988, indicated an increase in numbers of 150-200 birds at an average recruitment of 25-30 per year (Jeggo *et al.* 1989). Maturity is reached at several years (Jeggo 1981); a captive (paired) female laid infertile eggs at four years old, two fertile clutches at six (Jeggo 1983); the incubation period is 28 days, and the first young hatched in captivity flew at 81 days (Jeggo 1983).

THREATS Causes of decline in the St Lucia Amazon may be attributed to habitat loss, hunting (partly for trade), and predation or competition from indigenous or introduced bird and mammal species.

Habitat loss The chief cause of overall decline has been habitat destruction (Mühlhaus and Mühlhaus 1983), a point often overlooked in some of the detailed reviews of the species's status in the past 20 years; for example, the fact that the species's habitat covered 295 km^2 in 1950 and only 65-70 km^2 in 1975 (see Distribution) indicates an inevitable, irretrievable and disastrous loss in numbers. Although in that latter year the forests were under protection for water supplies, considerable fragmentation of forest

and inroads into forest reserves were being made by shifting cultivators (Jeggo 1976a,b, Butler 1978, 1981a). Hurricane Allen, on 4 August 1980, apparently killed at least two birds, disabled the tourist walk, and severely damaged the nature reserve established chiefly for the parrot; throughout the island, 39% of trees were considered dead, 41% were recovering and 20% were unaffected, while within the parrot's range the equivalent figures were 56%, 28% and 16%; yet (owing very largely to the pre-existing conservation programme) there was no invasion of forest land by displaced farmers and the forest quickly began regenerating (Butler and Jeggo in Butler 1980, Jeggo and Taynton 1981). A proposed dam proved to offer little threat to existing forest (Jeggo 1987), but monitoring of changes at Millet resulting from its construction remains important (Jeggo and Anthony 1991). It has been proposed that cutting vines for (e.g.) basket-weaving affects the birds by denuding and disturbing the forest (Butler 1978, 1981a), but no evidence has been adduced. Uncontrolled tree-felling since the 1950s may have led to a scarcity of trees with deep, dark cavities such as St Lucia Amazons can use but which Pearly-eyed Thrashers *Margarops fuscatus* avoid, leading to competition between the two (see below).

Hunting and trade The reduction of the species to near extinction around 1910 (see Population) was attributed wholly to hunting for food and trapping for pets, while its recovery (a conservation measure taken that was not sustained) resulted directly from the exaction of severe penalties for such infringements (Porter 1929, 1930a); certainly at the turn of the century dead birds were on sale "almost every week in the market of the little town of Soufrière" (Thompson 1902). However, while the policy of strict protection was known in 1931 to Danforth (1935), he found evidence that "considerable numbers... had been killed for eating within the past few years" and expressed his concern for the future of the species if this trend continued. Both the problem and the species were still present thirty years later (Bond 1961, Sjögren 1963) such that in 1969 it was estimated some 40 were being killed annually, many as accidental victims of "wing-shooting" in which the intention was to bring down the bird alive for the cage-bird market (Wingate 1969, Butler 1978). In 1971 the species was "intensively hunted" (Diamond 1973) and in 1975 hunting was regarded as the bird's chief threat: the whole forest was found intersected with hunters' trails, with birds "extremely wary and nervous" and considered fair game and good eating (Jeggo 1976a); in 1977 the situation was essentially the same (Butler 1978, 1981a). Hunters were also still wing-shooting birds as tourists paid high prices for them, but there was very little evidence of trapping young for pets (Jeggo 1976a). There is a comment that birds were usually caught with lime made from wild breadfruit sap (Frost 1959), this presumably referring to a period when the species's habitat came lower and birds might have visited suitable trees near cultivations.

Predation and competition Indigenous predators include Broad-winged Hawk *Buteo platypterus*, fer-de-lance *Bothrops caribaeus* and boa *Constrictor constrictor*, though none of these can be a serious problem (Jeggo 1976a, Butler 1978); introduced predators include rats *Rattus*, mongoose *Herpestes auropunctatus* and opossum, none of which should be a serious problem either (the mongoose being terrestrial and the opossum being itself greatly hunted: Jeggo 1976a). However, the Pearly-eyed Thrasher, a nest-competitor that was rare on the island in 1950 but which is now common in the forests, was seen repeatedly interfering with parrots in the 1976 breeding season and was then judged to represent a considerable threat (Jeggo 1977, 1981a).

MEASURES TAKEN The recent history of conservation on St Lucia has become a model for other Caribbean countries and reveals an achievement unparalleled elsewhere in the world. Jeggo (1976a), in support of the captive breeding programme he then considered vital to the St Lucia Amazon's survival, called for studies of the species's ecology and the establishment of reserves based on the results, and added that "above all it is important to generate a spirit of enthusiasm for conservation in St Lucia", something he regarded as a long-term option only.

In fact, the spirit in question arrived in human form as P. J. Butler (see, e.g. Wille 1991, Nielsen 1992), whose recommendations (Butler 1978) – for (a) stronger penalties against hunters, trappers and exporters of the parrots, (b) nature reserves in existing forest reserves, (c) environmental education, (d) registration of all captive parrots, (e) a local breeding project with existing captive birds and (f) promotion of nature tourism – all received the endorsement of the government, Butler (1980, 1981a,b) himself being invited back in 1978 to implement them, so that by 1980 (a) the St Lucia Amazon had been declared the

national bird, a new Wildlife Ordinance was passing into law raising the fine for killing a parrot from 24 to 5,000 East Caribbean dollars, and a new Forest, Soil and Water Ordinance was poised to bestow stronger powers to conserve forest, (b) a 16 km^2 nature reserve had been established including Morne Gimie, Mont Cochon and almost all the known parrot nesting areas (major support for this coming from WWF), (c) education packs on the parrot, the forest and conservation in general had been produced and targeted on the island's 20,000 school children, a centre was under construction, and broadcasts had spread the message, (d) of 15 known captive birds (nine at JWPT, six on the island) all had been registered, (e) a small aviary had been constructed on the island but no further birds were to be taken from the wild, and (f) two tourist walks had been established that were raising funds for conservation.

Following Hurricane Allen, Butler and Jeggo (in Butler 1980) recommended (i) the protection of natural forests against invasion by new landless farmers, (ii) replanting with native trees, (iii) erection of artificial nest-boxes to compensate for tree losses and to help avoid competition with Pearly-eyed Thrashers (implemented without success: Butler 1982), (iv) closure (immediately implemented) of the open season, (v) continuation of the environmental education programme, and (vi) monitoring of the parrot population (implemented by Jeggo *et al*. 1983, 1989, Jeggo 1987). Progress was reviewed by Jeggo (1987), who particularly identified for praise precisely what he had called for a decade earlier, the continuing education programme, with its high profile of the parrot through tee-shirts, bumper stickers, monthly magazines ("Bush Talk" for adults, "Jacquot" for children) and media coverage, all of which had resulted in "a very great feeling that *A. versicolor* is something very special to St Lucia and that it should be protected and cherished". Further reviews of the history and progress of (conservation education) work on the St Lucia Amazon are in Butler (1991, 1992).

Major organizational support for the conservation of the St Lucia Amazon since the mid-1970s has come from JWPT throughout, WWF in the early stages, and RARE throughout the 1980s. CIDA has funded forest conservation work in relation to the island's water requirements (Jeggo 1987), and a map of the present government forest reserves (total area 7,507 ha) is provided in Butler (1991).

MEASURES PROPOSED Clearly the major initiatives have already been taken, but a scattering of points deserve attention (see Remarks 5). A "Parks and Protected Areas System Plan" is in preparation by the St Lucia National Trust, and the passage of the appropriate legislation deserves priority treatment (Butler 1991). The study of the St Lucia Amazon's ecology is still basically lacking, and this needs to be rectified, particularly in respect of feeding and breeding requirements, so that forestry planning (and planting) can be refined. With regard to this last, Jeggo (1987) anticipated the phasing out of plantations in important forest areas and their reversion to natural forest, with timber needs on the island being met by the planting of suitable yield trees in degraded areas on the periphery of the forest; given this, there seems all the more reason for the ecological study of the parrot (and in fact a two-year JWPT/St Lucia Forestry Division field study of the bird's behaviour and ecology is to begin in September 1992: D. F. Jeggo *in litt*. 1992). Moreover, there is a need to understand better the relationship between the Pearly-eyed Thrasher and the St Lucia Amazon so that any future conflict between the two species can be managed with maximum efficiency.

Captive breeding The establishment of a captive breeding programme for the St Lucia Amazon was considered vital for the species's survival in 1975 (Jeggo 1976a,b), a sentiment fully endorsed by Low (1980b) and Silva (1980). However, developments on St Lucia since then have tended to marginalize this JWPT-funded and -run programme, which now justifies itself more as a reservoir against total failure in the wild population (Jeggo 1981, 1991). The continuing recovery of the wild population, the championing of which is greatly to JWPT's credit, certainly calls into question the authority with which certain pronouncements ("captive breeding will be the only way to save them from extinction": Silva 1980) have been made. Between 1975 and 1978 JWPT assembled nine birds on Jersey, seven nestlings from the wild (Jeggo 1976a, 1977) and two on loan from Bermuda and Britain respectively (details of their care are in Jeggo 1981, 1991), and bred one in 1982 (Jeggo 1983), one in 1985, two in 1986, four in 1987 (Jeggo 1987) and further subsequent successes such that as many as 10 offspring a year were hoped for by 1994 (Jeggo 1991); unfortunately, however, in the period 1990–1992 no young were reared and currently there

are 13 in Jersey (seven wild-caught, six captive-bred) and three in St Lucia (two captive-bred in Jersey, returned in 1989, and one wild-caught) (D. F. Jeggo *in litt*. 1992).

REMARKS (1) Silva (1989a) gave incorrect values in square kilometres for the former range. (2) Phillips (1929) referred to a visit by P. Lowe and S. Braach in 1901 from which he apparently derived the view that the bird was rare, but the source for this is not known. (3) Butler (1980, 1981a) gave Frost (1959) as the source for asserting that the species was then rare and declining rapidly, which is mistaken. (4) The view that birds fly *to* their feeding grounds in the late afternoon (Bond 1928b) seems mistaken. (5) While the achievements on St Lucia have been excellent and what is here proposed remains important, it must be pointed out that other birds on the island deserve attention, notably two in their own genus: Semper's Warbler *Leucopeza semperi*, sadly perhaps already extinct, and the White-breasted Thrasher *Ramphocinclus brachyurus*, which desperately needs human intercession (see relevant accounts).