ST VINCENT AMAZON *Amazona guildingii* **R**[11]

Endemic to moist forest on the upper west and east ridges of St Vincent, this parrot has declined owing to habitat loss, hunting, hurricanes and trade, but following recent action by government and non-government agencies the species is now relatively secure, with some 440-500 individuals extant.

DISTRIBUTION The St Vincent Amazon was evidently always confined to areas of moist forest on St Vincent, this habitat now (and evidently for most of this century) surviving on the upper slopes to the east and to the west of the central ridge of the island (Lawrence 1879, Lister 1880, Anon. 1904, Clark 1905, Lack *et al.* 1973, and references below; see map in Butler 1988: 49; for possible genetic variation between the the two areas, see the third paragraph under Population). Although once reported to be most numerous in the north of the island (Bond 1928b), only one recent report refers to the species's presence on the dominant northern Mount Soufrière (Andrle and Andrle 1975), others indicating its absence even before the 1979 eruption (see Threats) (Gochfeld 1974, Laidler 1977, Nichols 1981, Lambert 1984). A record of birds coming down to feed in a garden among the hills (apparently near Chateaubelair) and of breeding near Kingstown (see Ecology for both), combined with Lister's (1880) report that in the late 1870s forest covered peaks and, on the western side, reached almost to sea level, indicates that the species's range on the island must have contracted and fragmented substantially in the past hundred years. Major localities where the species concentrates are listed under Population.

POPULATION Assessments of population status have varied not only with real variations in numbers resulting from adversities but also, evidently, with observer judgement. The earliest appraisal seems to have been that of a resident in the early 1870s who, in seeking to procure specimens for London Zoo, found it "now scarce" and only obtained a bird "after many inquiries" (*Proc. Zool. Soc. London* 1874: 324). Against this it was regarded as "formerly very numerous, and... still common at the time of the great hurricane (1898)", but this storm, along with the eruption of Soufrière four years later (see Threats), led to its being "not at all abundant" and even "now decidedly rare" in 1903–1904 (Anon. 1904, Clark 1905; but see Remarks 1), which was possibly the reason that Rothschild (1905) regarded it as "almost extinct". However, in 1908 it was found to occur "in sufficient numbers... to make its preservation a matter of certainty if proper care is exercised", with several large flocks known and the impact of the eruption being thought "moderate" (Lowe 1909). Despite Knobel (1926) calling it "exceedingly rare" and Phillips (1929) reporting (at second hand) "only one or two flocks left" in 1924, Bond (1928b) found it "not as rare as expected" and guessed that several hundred still existed, this being the first attempt at indicating a total population size; Porter (1930a) also had evidence that it was still to be "found in small numbers" in the 1920s, but by the 1950s it was reported to be "becoming less and less", such that without protection it would be extinct before the Imperial Amazon *Amazona imperialis* (Frost 1959).

A succession of studies in the 10 years from 1973 to 1982 sought to achieve clarity on the numbers of birds remaining. In April and May 1973 the species was seen in small numbers, though with flocks of up to 50 reported, so that a total of some 200 birds seemed possible (Andrle and Andrle 1975). In September 1973 observations in the upper Buccament valley yielded a conservative estimate of 100 birds (Snyder 1973). Estimations based on surveys in 1975 and 1976 were of "several hundred to a thousand" (Laidler and Laidler 1977) or of "a few thousand" (Laidler 1977; see Remarks 2), although another team in 1974 gave an estimate of 400 (Nichols 1975), in 1975 450 (Nichols 1976), while further fieldwork by the same team to 1978 arrived at a figure of 525±75, distributed in the various valley-head forests as follows: Buccament 80, Wallilabou 50, Cumberland 60, Linley 50, Richmond 50, Wallibou 30, Locust valley to Colonarie valley 150, Mesopotamia 30, scattered elsewhere 25 (Nichols 1981).

In 1982, the total estimated was 421±52, distributed as: Buccament 85±20, Cumberland–Wallilabou 186±12, Linley–Richmond–Wallibou 50, Locust valley to Colonarie valley 100±20, Mesopotamia 0, scattered elsewhere 0 (Lambert 1983, 1984); this 20% decline since 1978 was attributed to the 1979 Soufrière eruption and the 1980 Hurricane Allen (see Threats). The 1982 survey disclosed that the small windward (eastern) population (perhaps only 80 birds) might be genetically somewhat isolated from the leeward birds, since while some birds might cross (or be blown) from east to west there seemed little opportunity for the reverse passage; windward birds had a higher frequency of green morphs and higher-pitched voices (Lambert 1983, 1984; also Butler 1990). The 1982 survey also noted, however, that little exchange might occur between birds in the various leeward valleys, whose lateral ridges formed greater barriers than those of windward valleys (Lambert 1983, 1984).

In 1988 two censuses were undertaken, using a methodology that could be repeated to detect trends even if the absolute totals could be no more than "guesstimated": in March, results were Buccament 100, Cumberland 125, Colonarie 65, Congo–Jennings–Perseverance 80, Richmond 45, scattered elsewhere 25; in August and September a second census, which was intended to train forest officers in the methodology, detected no significant differences in the frequency of records from the various watch-points, establishing the view that during that year the total wild population of St Vincent Amazons lay between 440 and 500 (Butler 1988).

ECOLOGY Although clearly a bird of mature moist forest (e.g. Lister 1880, Lack *et al.* 1973) that extends from between 125 and 500 m up to c.1,000 m, the St Vincent Amazon shows some preference within this for lower elevations where trees grow that are large enough to nest in (Andrle and Andrle 1975). Reports exist of occasional visits to partially cultivated sectors outside the main mountain core (Andrle and Andrle 1975), and birds were said to come regularly to a garden among the hills to feed (Lowe 1909), but clearly the species remains directly allied to the island's forest habitat.

Food includes the flowers, fruit and seeds of *Cordia sulcata*, *Dacryodes excelsa* (tabonuco), *Mangifera indica*, *Krugiodendron ferreum*, *Micropholis chrysophylloides*, *Pouteria multiflora*, *Dussia martinicensis*, *Talauma dodecapetala*, *Inga ingoides*, *Chione verosa*, *Simaruba amara*, *Ixora ferrea*, *Sloanea*, *Richeria grandis*, *Psidium guajava*, *Clusia*, *Annona muricata*, *Calophyllum brasiliense*, *Andira inermis*, *Cordia alliodora* (flowers only), *Aiphanes erosa*, *Acrocomia aculeata*, *Euterpe globosa*, *E. hagleyi*, *Ficus clusiifolia*, *F. insipida*, *F. trigonata* and *F. citrifolia* (Nichols 1981). Of these it appears that *Pouteria multiflora* is especially favoured (Nichols and Nichols 1973, Gochfeld 1974, Laidler 1977) and that tabonuco, important for breeding (see below), is also much utilized, at least in August (Lambert 1983). The report that *Manilkara bidentata* is taken (Laidler 1977, also Forshaw 1989) could not be confirmed (Nichols 1981), but local woodsmen identified *Byrsonima coriacea* var. *spicata* and *Rudgea caribea* in addition to *Clusia alba*, *Sloanea massoni*, two *Ficus* and an *Inga* as food-plants, although *Clusia* was rejected by captive birds (Lambert 1983); Butler (1988) added *Cecropia peltata* and *Meliosma virescens* to the list of food-plants.

Birds "mate" in February/March, and breed in April/May (Lawrence 1878a, Lister 1880), and although in rainy years (such as 1974) the breeding season may be curtailed (many pairs evidently not even attempting to nest), in dry ones (such as 1975) eggs may be laid through into July (Nichols 1974, 1976); eggs may even be laid as early as January and February (Butler 1988). Nests are holes in trees, chiefly tabonuco owing to its propensity to become hollow with maturity and the consequent brittleness of its limbs, which after falling leave natural cavities; of 20 nest-trees inspected, 17 were this species (Laidler 1977; also Nichols and Nichols 1973, Lambert 1984, and tabulation of nest-site data in Silva 1989a); one nest examined was 6.35 m deep and pitch dark at the bottom (Snyder *et al.* 1987: 108). A pair was reported breeding in an old estate chimney near Kingstown (Clark 1905). In the breeding season "loose nesting assemblages of approximately a dozen birds" form, and although each constituent pair defends its own nest-site (sometimes in spectacular battles) from the others, it also tolerates the close proximity of other constituent pairs, often feeding or roosting with them (Nichols 1975); there is a record of two active nests in the same tabonuco, only 5.6 m apart (Snyder *et al.* 1987: 100). Nest-site fidelity is strong (Butler 1988). Clutch-size is two, very rarely three (Frost 1959, Nichols 1981 *contra* Laidler 1977). In captivity, incubation was around 24 days and fledging 67-69 days (Forshaw 1989, Silva 1989a). In the wild only one or two young are raised even in the best years (Nichols 1974; also Low 1984), and a 50% nest failure owing to natural causes was estimated (Nichols 1976), figures which accord well with the evidence of slow breeding rate advanced in Porter (1930a). In captivity, pairs seldom lay fertile eggs before they are five years old (Butler 1988).

Birds show flight activity from 06h15 to 08h00, after which they become quiet and feed in the canopy; after a minor peak in flight activity soon after midday, birds remain quiet again until around 16h00 when activity again increases, lulling after 17h15 before a final peak just before dark (Butler 1988). Rain can disrupt this pattern, with birds remaining quiet throughout downpours but calling and flying short distances as soon as they stop (Butler 1988). Daily dispersal is outwards to the periphery of the forest during the day, inwards to the centre for the night (Butler 1988).

THREATS The chief threats to the species, identified over the years, are habitat destruction, the cagebird market, hunting and a variety of natural causes.

Habitat destruction The retreat of St Vincent's moist forests appears to have been poorly documented; while Lister (1880) could write of forest reaching the peaks and extending to near sea level on the leeward side, Lack *et al*. (1973) referred to "rather small areas" remaining at the heads of the main valleys; and although Andrle and Andrle (1975) considered some 100 km^2 of such forest to remain, they thought only 30 km^2 to be suitable for breeding habitat, in disjunct areas. Studies in 1982 showed that moist forest still occupied much the same area as that documented in 1949 (Lambert 1983), tending to vindicate the report in Forshaw (1978) that the situation was stable; nevertheless, Lack *et al.* (1973) had witnessed some clearance in 1971, Andrle and Andrle (1975) noted that commercial lumbering and local people had reduced the habitat considerably, and Lambert (1983) found that agricultural developments for banana production had resulted in the loss of almost all forest at Mesopotamia by 1982, when in 1978 the region had supported 30 parrots. Because it concentrates on middle-aged tabonuco, charcoal production was seen as a threat that had eliminated many potential nest-trees in the Colonarie valley in 1982 (Lambert 1983, 1984), and trappers had also damaged or destroyed nest-sites (five out of 12 examined in 1973, with only one of the five being reoccupied) by cutting open the trees to obtain the young (Snyder 1973, Snyder *et al.* 1987: 127). A study in 1984 determined that of the island's 340 km^2, only 16 km^2 were under primary forest, with 37 km^2 and 35 km^2 under secondary and young secondary forest respectively, and another 40 km^2 under palm, elfin or dry scrub forest; and the trend of steady forest loss was continuing (Butler 1988).

Trade The species has for many years been in demand as a cagebird, as much locally as internationally; Porter (1930a) remarked that natives sometimes caught the birds asleep in their roost-trees (although this could equally well have been in order to eat them) and sometimes also took young birds to hand-rear them. Over-exploitation by trapping was identified as a problem as long ago as 1964, when birds were known to be held on Martinique, Grenada and Trinidad as well as St Vincent itself (Vincent 1966-1971). Demand from private zoos and aviaries was still obvious in 1972, when 23 birds were found at two local hotels (Gochfeld 1974). The following year, 29 birds were found in captivity on the island and two trappers in one area admitted taking 10 young that year and knew of five others caught elsewhere (Andrle and Andrle 1975); another researcher had similar results and considered trade an increasing problem as more local people realized its value (each young sold for the equivalent of a week's wage) (Snyder 1973); and a third researcher then estimated that 30-40 were lost annually to collectors, through both the taking of nestlings and the wing-shooting of adults (Nichols 1977a). In 1974 two out of four nests being monitored had their young stolen for either food or the pet trade (Nichols 1974) and an illegal shipment of 20 birds apparently went to the pet markets in Trinidad (Nichols 1975). In 1976 "the entire population of a small valley – fifteen birds" were shot dead by a hunter in an attempt to capture one alive for a foreigner – see Threats: Trade under Imperial Amazon – offering (presumably US) $1,000 for a bird (Nichols 1986). In 1980 between 30 and 40 birds were believed to be in captivity on the island (Low 1984), and in 1982 23 were found, at least eight having been taken that year from nests; it was then reported that many young go to the Grenadines, especially Bequia, to be sold to tourists (Lambert 1983, 1984).

Hunting "Illicit gunning" remained a threat in the 1920s to all Lesser Antillean parrots (Bond 1928b); it was still considered the prime cause of the St Vincent Amazon's decline from the late 1950s to the early 1970s (Frost 1959, Bond 1961, Sjögren 1963, Vincent 1966-1971, Nichols 1974). One hunter was reported to have shot 20 in one valley in 1971 (King 1978-1979), and in 1974 a hunter reported shooting about a dozen each year (Nichols 1975), but owing to the growing exploitation of young in the early 1970s the trappers themselves began to restrict hunting activities (Snyder 1973), and by 1982 the problem was not judged serious (Lambert 1983).

Natural causes St Vincent is only 345 km^2 and is dominated by Mount Soufrière, which erupted 4,000 years ago with the force equivalent to that of Mount St Helens in 1980, and in 1718 with sufficient violence to leave a mile-wide, 500 m deep crater (Sigurdsson 1982): how the amazon survived such events is mystifying. In 1902 an eruption that killed 1,500 people (Sigurdsson 1982) "probably killed many" parrots, as that part of the island best suited to them was destroyed (Clark 1905), and in 1979 gas and ash from an eruption caused the death of some birds as far south as Buccament valley (Nichols 1981). The island is also prone to being struck by hurricanes, e.g. in 1898, when many parrots were killed outright (two even being found dead on beaches in St Lucia), others dying later seeking food in towns or else being captured by locals for food (Thompson 1900, Clark 1905). The temporal proximity of eruption and hurricane, as in 1898 and 1902, and 1979 and 1980 (Hurricane Allen), would appear particularly

dangerous; yet the species seems to have the capacity to survive and recover quite rapidly. Porter (1930a) was told that the 1898 eruption did not kill birds but that a "recent" hurricane, presumably that of 1928 (see, e.g., Threats under Imperial Amazon or Puerto Rican Amazon *Amazona vittata*), had swept "quite a few... to their doom". Non-human predators of birds or their nests are (or may be) opposums *Didelphis marsupialis*, Broad-winged Hawks *Buteo platypterus*, thrashers *Margarops* and black rats *Rattus rattus* (Laidler 1977). Only the first of these was regarded seriously by Nichols (1981) (see also Nichols 1975), but Lambert (1983) reported swoops at flocks of parrots by the hawk; certainly the thrasher in question (Scaly-breasted *M. fuscus*) is not known to pose a problem (Lambert 1983). There may be some nest-site competition from bees (Laidler 1977), which were reported in one case to have taken over a parrot nest while it still contained nestlings (Snyder *et al.* 1987: 175), and if the commonly imported Orange-winged Amazon *A. amazonica* becomes feral on the island this may become a general competitor (Lambert 1983) or spread disease to the more vulnerable insular congener.

MEASURES TAKEN The species was for long protected by law from capture or export (the latter since 1920: Nichols 1977a), but the law was not enforced (Porter 1930a, Andrle and Andrle 1975). Registration of all captive birds on St Vincent was a recommendation of the 1982 expediton that was immediately implemented, with the result that seven birds (four of them in the process of being smuggled via a yacht) were confiscated in the second half of the year (Lambert 1983). A captive breeding consortium was established in 1980 (Jeggo 1984) and ecological studies, funded by SAFE International (a branch of JWPT), were conducted in the mid-1970s (Nichols 1974, 1977a).

Some detailed proposals for forest conservation were made by Andrle and Andrle (1975), these stressing in particular the need to preserve large trees at lower altitudes. Laidler and Laidler (1977) also offered detailed proposals and identified the Buccament valley as a potential reserve. Lambert (1983) likewise proposed a reserve to embrace the entire upper Buccament, upper Cumberland and Wallilabou catchments, pointing out that this area (a) comprises a major watershed of great importance for human populations in that part of the island, (b) then supported over half the island's parrots, (c) is remote from Soufrière, (d) remains accessible for nature tourism, and (e) holds a wide variety of the island's wildlife. In order to curb trade and promote conservation education, in line with the earlier recommendations of Gochfeld (1974) and Laidler (1977), Lambert (1983) also called for the improvement and enforcement of laws, with larger fines, compulsory registration and the building of a large aviary to breed from existing captive stock, with a concomitant public awareness campaign and further habitat surveys. Butler and Charles (1982), in response to WWF interest in a 1981 proposal from the St Vincent government itself for a parrot reserve and aviary, complemented Lambert's (1983) proposals with the case for an island-wide forest reserve (basically embracing all existing forest).

All these ideas were duly accommodated in a far-reaching conservation programme for both the forests and the parrot developed by the St Vincent government with the various support of CIDA (forestry management plan), WWF (drafting of a wildlife protection ordinance, promotion of ratification of CITES, provision of vehicle, training and other funds), JWPT (support for central captive breeding aviary) (all of which are documented in Butler and Charles 1986) and RARE (environmental education campaign) (Butler 1988, Johnson 1988). The initial achievements of this programme have been detailed in Butler (1988), which outlines the 1987 Wildlife Protection Act (which provides a complete framework for conservation on St Vincent) and describes a year (1988) of intensive activity (coordinated and fronted by P. J. Butler, funded by RARE Center) addressing the implementation of this act, registering all captive parrots on the island, creating a breeding centre for some of them, censusing the wild parrots (see Population), demarcating and drawing up a management plan for a 40 km^2 parrot reserve in the middle of the island, undertaking an island-wide campaign of public education and sensitization to the problems of forest and wildlife conservation, with particular emphasis on the parrot, and not least bringing these developments to international attention so that the position and commitment of the St Vincent government (which in due course became a party to CITES) would be clearly understood not only by conservationists but also by bird-fanciers with an interest in adding the St Vincent Amazon to their collections.

MEASURES PROPOSED Continued monitoring of the wild parrot population, and strong enforcement of CITES so that illegally held birds can be returned to St Vincent whenever requested by the government, are among the measures needed to maintain the relatively secure status of the St Vincent Amazon at present.

Captive breeding One of the declared intentions of the fieldwork initiated in the mid-1970s was to take a sufficient number of birds to "establish a viable captive population", and two birds were taken in 1974 to Houston Zoo (Nichols 1974, 1975). However, at that time the government was making small numbers available to various institutions, a policy considered mistaken (Nichols 1977a) for, as noted by Jeggo (1981), "there is a grave danger that uncoordinated attempts will only be to the detriment of the species"; meanwhile, the owner of a facility on Barbados with the largest collection of captive birds was "completely uncooperative" (Nichols 1977a), although evidently not with Vogelpark Walsrode (see Robiller and Trogisch 1985). However, in 1980 an international captive breeding consortium for the St Vincent Amazon was established to foster cooperation between holders of the species, and seven institutions, holding 15 birds between them, joined (Paradise Park [U.K.], Houston Zoo, JWPT, the National Zoo in Washington, New York Zoo, T. D. Nichols of the James Bond Research Foundation, and the St Vincent government), although several others that then held or subsequently acquired birds (e.g. W. Miller on Barbados, R. Noegel of Life Fellowship, Vogelpark Walsrode and Loro Parque) have remained outside the formal agreement (Jeggo 1990), Walsrode joining in late 1991 (D. F. Jeggo verbally 1992). The rearing of a bird at Paradise Park in 1991 was the first breeding success within the consortium (D. F. Jeggo *in litt*. 1992). An amnesty on St Vincent in 1988 resulted in the registration of some 80 birds in captivity on the island, of which 20 are in a new government facility in the Botanical Gardens, Kingstown (four young were reared in 1991: D. F. Jeggo *in litt*. 1992); in 1990 there were an additional 50 birds in captivity outside St Vincent (Jeggo 1990; for the Kingstown facility, see Amberger 1989b). It is clear that further efforts are needed to involve other holders of the species and to begin breeding birds in numbers before the captive population indeed becomes viable.

REMARKS (1) The value of these post-hurricane assessments from so long ago is always open to doubt; and another testimony, that of Thompson (1900), is that although the species suffered losses in the 1898 storm the species had already shown itself well recovered by 1900, birds being seen "in their usual numbers in their usual haunts". (2) Estimates of a thousand or more were disputed by Nichols (1981) on the grounds that they resulted from extrapolation from estimates of numbers in upper Buccament valley, already shown in September 1973 to be an area of unusually high density.