

The Imperial Amazon is highly endangered on its native Dominica, where it occurs now only in the forests of Morne Diablotin, and, having suffered from a combination of habitat loss, hunting, trade and hurricanes, now numbers only around 80 individuals, although in recent years it has benefited from joint government and non-government efforts to protect its habitat and sensitize local citizens to its needs.

DISTRIBUTION The Imperial Amazon is endemic to Dominica, West Indies, where it is now seemingly confined to the east, north and west slopes on the upper reaches of Morne Diablotin (1,421 m) in the north of the island (see Figure 4 in Evans 1991). Its centre of abundance may have always been Morne Diablotin, where it was “found more commonly than in any other part of the island” by Bond (1941b), but vague early records of its presence “in the very centre and most mountainous part of the island” (*Proc. Zool. Soc. London* 1865: 437) doubtless reflect accurately its original distribution throughout the mountain chain of Dominica as far south as Morne Anglais, in the region of which (together with Morne Watt and Morne Jaune) an ever-dwindling population, separated from that on Morne Diablotin well before 1950 (see Figure 2 in Evans 1991, based largely on localities cited in Nichols *et al.* 1976), finally appeared to have died out in the early 1980s, the last verified sighting being around 1983 (Evans 1988a, 1991).

On Morne Diablotin itself, there has been a steady if uneven retreat upwards. Bond (1928b) referred to birds in the forests to the south and south-east of the mountain. Around 1945 the range followed a line running just above Syndicate Estate, along Morne Turner Ridge, between Foundland and Chilenbain Estate, north of Chaudière Estate, to Grand Bambou, Never Fail and Gros Bois, just north of a peak (670 m) between Gros Bois and Coffee, west of Main Ridge, to Entwistle, south to include Dleau Gommier, just north of Bambou Etor, to Fond Trouve, including McFarlin to the heights of upper Petit Macocoucheri, between Jean and En Haut Jean, to Kachibona, Savanne Gommier, and back to Syndicate, this being something like double the area occupied in 1975 (Nichols *et al.* 1976). Even in 1981 the species was being reported from the south slopes of the mountain (Anon. 1981b), but accumulated evidence through the decade indicates its absence there now, with the area north-west of the mountain in the upper Picard river valley (or Devil's valley), notably the Morne Plaisance and Dyer estates, being critically important (Anon. 1981b, Nichols 1981c, Evans 1988a, 1991). Fieldwork in early 1992 indicated the population was still chiefly confined to elevations between 450 and 1,000 m, but with regular sightings within the newly acquired nature reserve (see Measures Taken: Habitat protection) at 300 m and one observation as low as 200 m above Wesley in the north-east (P. G. H. Evans *in litt.* 1992).

POPULATION Estimates and assessments have varied with observer, in part at least in relation to degree of penetration of habitat; however, a comment by the guide used by Gochfeld (1974), that the species was to be found in relatively few, discrete areas of montane forest, suggests that human judgement of its abundance would depend on the extent of penetration of those particular areas of habitat. Even today there are areas of forest that require investigation (see Measures Proposed) and about which assumptions have been made that influence recent and current estimates (see below).

It was surely the inaccessibility of the Imperial Amazon's habitat that gave rise to the earliest account of its status as “very rare” and “seldom seen”, with “only one or two... caught during the year” (*Proc. Zool. Soc. London* 1865: 437), for in fact when properly investigated it was described as abundant in the high mountains in the 1870s (Lawrence 1878) and common in the interior and on the windward side, 1890 (Verrill 1892). Despite Verrill's (1905) observation that the species had become rarer than the Red-necked Amazon *Amazona arausiaca* and the gloomy prognostications in Beebe (1912), much the same situation appears to have obtained into the 1920s, with investigators worrying whether the species survived at all and being told that it was “excessively rare” (e.g. Porter 1929), only to conclude that, despite being so poorly known to Dominicans themselves, the species had maintained itself in its fastnesses “in limited numbers” (Wood 1924) or “in some numbers” (Bond 1928b). A flock of 100-200 seen in a valley after a hurricane in 1928 was judged possibly to have been the entire population of the species (Porter 1929), although there seems to be no good reason why this should have been so; nor does there seem to be anything more than guesswork in the view that there were 200-275 birds on the island in 1918 (Anon. 1981b). A non-specialist's remark that the bird was “scarce” at this time (Howes 1929) would be much as

expected. Once again, although described as very rare by an outside observer in the 1950s (Frost 1959), “small flocks... sparsely distributed” still remained in 1966 (Gochfeld 1974), and D. Lack (*in litt.* 1971 to P. Barclay-Smith) found it “in reasonably large numbers on Diablotin and reasonably safe”.

Fieldwork targeted at or at least encompassing the species has been more or less continuous since the mid-1970s, resulting initially in informed guesses by three observers of 250, 150 and 150 birds remaining in 1975 (Nichols *et al.* 1976), the latter figure gaining the greater currency through several repetitions (e.g. in Nichols 1976, 1977b; see Remarks 1). The isolated southern population based around Morne Anglais was believed to have suffered a marked decline since around 1970, when as many as 15 had been seen together at one time, and it was agreed that no more than 24 and probably only about eight remained there (Nichols *et al.* 1976); but either the population there recovered somewhat, or the observers had simply overlooked the birds (evidently extremely easy; but it throws into doubt all attempts to put figures on the population), or the following report was mistaken, for in early 1979 16 were reported in one valley near Morne Anglais and possibly more were still extant in another near Morne Watt (Snyder and Snyder 1979; *ICBP Newsletter* 2[1], 1980; see Remarks 1).

The effect of hurricanes in 1979 and, to a lesser degree, 1980 (see Threats), was to reduce the southern population to unviable status (“possibly not more than a dozen birds”) (Snyder and Snyder 1979, Anon. 1981a,b) and indeed, although some lingered for a few years, it appears that by 1985 all birds away from Morne Diablotin had disappeared (Evans 1986a). The northern population was thought to have been halved, so that 70-100 was the figure for 1980 and 1981 (Anon. 1981a,b), although another fieldworker put the figure at 75 in 1979 and, following clear-cutting of feeding areas in the upper Picard valley (see Threats), 40-60 in 1981 (Nichols 1986; for upper Picard valley, 1978-1990, with the clear effect of the 1979 hurricane, see Figure 6 in Evans 1991). By 1985 preliminary analysis of survey data indeed suggested that as few as 50 survived (Evans 1986a), but further work showed that in 1987 some 60 birds could be estimated (Evans 1988a), with a slight recovery to 80 in 1990 (Evans 1991) and possibly more (but still less than 100) in 1992 (P. G. H. Evans *in litt.* 1992).

ECOLOGY The Imperial Amazon occupies the canopy of primary rainforest on interior mountain slopes; it has always been regarded as a montane species (e.g. Verrill 1892, Porter 1929, Gochfeld 1974, Nichols *et al.* 1976), and more recent work has confirmed that it occurs primarily between 600 and 1,300 m (Evans 1988a, 1991). However, Lawrence (1878) reported that “it descends to the valleys in the rainy season to some extent”; three skins dated September 1899 in AMNH are marked as taken at 1,000 feet (300 m), and even in the 1980s there have been observations from as low as 150 m (see Figure 9 in Evans 1991), all such records presumably resulting from either food shortages (Evans 1988a) or at least foraging preferences. There is, nevertheless, evidence that the species's range has retreated upwards in recent years (see Distribution). Birds may also penetrate elfin forest at 1,200 m and above (Nichols 1981c). Ecological separation from the also threatened Red-necked Amazon (see relevant account) is partially altitudinal, the latter chiefly occurring between 300 and 800 m (Evans 1988a, 1991), and partially dietary (see below and under Red-necked Amazon), but there is considerable overlap in both variables which renders the issue problematic (indeed, the two species show maximum densities at the same altitudes, 500-600 m: Evans 1991). Moreover, studies have shown that certain parts of the forest (with associations of particular tree species such as mature gommiers *Dacryodes excelsa*) are much more important than others for both species, so that no easy assumptions can be made based purely on the amount of habitat remaining (Evans 1986a). However, the Imperial Amazon seems much less able to tolerate disturbance of habitat than the Red-neck (Nichols *et al.* 1976).

Both species eat the fruits of gommier (an important item for both), bois diable *Licania ternatensis*, bois bande *Richeria grandis*, carapite *Amanoa caribaea*, bois blanc *Simarouba amara*, mangle *Symphonia globulifera*, bois rivière *Chimarrhis cymosa* (also flowers) and balate *Pouteria (Oxythece) pallida* (this apparently being the *Manilkara bidentata* of other authors), with Imperial Amazon alone taking also bois cote *Tapura antillana*, the palm *Euterpe globosa* and kaklin *Clusia venosa* (Evans 1988a). Of these, the three last and *S. globulifera* appeared to be favoured, plus the palm *E. dominicana* (Anon. 1981b), a plant also identified as food by Ober (1880) and Nichols *et al.* (1976). Verrill (1892) indicated that the species particularly favoured areas where mountain palms and gommiers grew, consuming (as “a

large part of its diet”) their seeds and fruit, plus the young shoots of the former; Lawrence (1878) reported much the same, adding bois diable to the list. In the months following Hurricane Allen, birds were seen feeding on vines and shrubs near ground level (Anon. 1981a). As evidence that the species seemed adapted to cope with food shortages as might occur on any island, but particularly one prone to storm damage, Porter (1929) recorded a wounded bird that went 13 days without food before making a near-full recovery.

The main breeding season for both species of Dominican amazon is February–June (particularly March–May), coinciding with the dry season and perhaps therefore related to greater food abundance during the nestling and fledgling period (Evans 1988a). In the Imperial Amazon, defence of a nesting territory probably occurs throughout the year (P. G. H. Evans *in litt.* 1992) and has certainly been witnessed as early as mid-December; data from 1980 and 1981 suggest that pairs rarely leave this territory for long periods, and indeed occupy it (with self-advertising display-flights) throughout the year, but with more frequent absences from September to mid-December (Anon. 1981b). Although reported generally to place the nest in the top of a dead (broken shaft) palm (Ober 1880, Verrill 1892) this has not been confirmed; instead, records of nest-sites are from high in the trunks of the dominant forest trees chataignier *Sloanea berteriana* and gommier (Nichols *et al.* 1976, Evans 1988a), although breeding was also reported from a spur high enough to be in the elfin forest zone (Bond 1941b). The reproductive rate is low, with two eggs being laid perhaps only every second year and pairs seldom raising more than one young per clutch (Gregoire 1981; also Frost 1959, Evans 1988a); comments by locals that only one egg is laid (Porter 1929) might be based on the usual number of young seen. Age of first breeding and whether nest-sites are limiting remain unknown (Evans 1988a). From July (and certainly September: P. G. H. Evans *in litt.* 1992) to November, birds are very unobtrusive, feeding quietly (Anon. 1981b). Activity is greatest 06h00–10h00 and 16h00–19h00, with 95% of feeding observations being made within these periods, although the birds' relative silence between the two means that feeding activity may then go unobserved (Evans 1988a). Roosting is at traditional sites, commonly large gommier or chataignier trees, but although used from year to year they are not necessarily used throughout the year (Evans 1988a).

THREATS The most important threat by far at this stage is habitat destruction, but hunting played a major part in suppressing numbers when habitat was still extensive, and by 1981 hunting for the pet trade was considered a threat of only slightly less significance than deforestation (Anon. 1981a); meanwhile, another hurricane with the force and path of David in 1979 could be conclusive. Some of these factors work to promote others, of course: hurricanes kill birds, destroy habitat and promote habitat destruction; a road through the forest in the 1880s allowed hunters in “and one collector shot a dozen specimens” (Beebe 1912). The following enumeration includes two headings for “natural causes”, but it is particularly worth stressing in this instance that in most cases what is *prima facie* “natural” has behind it the insidious influence of man, by reducing habitat to the critical point where it or its constituents become vulnerable to natural processes, by suppressing natural population levels in a way that lends competitive advantage to other species, by introducing species whose natural activities affect the habitat or its constituents, or a combination of any of these.

Habitat destruction “The remoteness and inaccessibility of its native haunts” was a reason to regard the species as relatively secure “for many years” (Wood 1924, Bond 1928b, 1961, Porter 1929), and even as late as the mid-1970s this impregnability of habitat lay behind the belief that “this species will undoubtedly survive in the wild” (Nichols 1977b). The excessive expense of transporting timber down from the mountains led to a Canadian company abandoning rights to extract timber from the island in the 1960s (Gochfeld 1974). In the 1970s this scenario seems to have been repeated, with “irreparable damage” being avoided only by failure to reach agreement between the government and a logging company to clear-cut a very large area of the island (Nichols *et al.* 1976). However, at that time it was the piecemeal destruction of forest through selective logging, charcoal production and agricultural clearance that caused greater concern, being more relentless and more difficult to control (Nichols *et al.* 1976). Selective felling of the patchily abundant gommier (important for parrots: see Ecology above, and under Red-necked Amazon) in large quantities was a practice thought likely to disrupt links in the ecosystem (Evans 1986a). Since 1980, interest has focused on the high-quality forests (and their high-quality

agricultural soils) north-west of Morne Diablotin (details in Evans 1988a, 1991). Thus in early 1980, prime forest land bordering Imperial habitat at Syndicate was sold and converted to agriculture, affecting birds' foraging ability and increasing hunting pressure (Zamore 1980), this presumably the feeding area lost to banana production after 1978 referred to by Nichols (1981c). A planned feeder road in the Syndicate area would result in the loss of 540 ha of forest to agriculture, depriving the species of a major feeding area and eliminating a necessary buffer between it and agricultural holdings (Anon. 1981b). Then in 1982 attention shifted to the 375 ha Morne Plaisance Estate, part of which has now been logged in what was recommended as the least ecologically damaging manner (see Evans 1991). Pressure then built up to clear the neighbouring Dyer Estate, and in July 1989 a timber company began selectively felling gommiers there, at which point national and international forces coalesced in successful opposition (Evans 1991; see Measures Taken: Habitat protection). It has been estimated that in the decade of the 1980s a greater area of forest was destroyed on Dominica than in the previous thousand years (Evans 1989). As a further twist in the forest-to-farm development, aerial spraying of banana crops next to foraging areas has led to reports of poisoning and blindness in parrots (Anon. 1981a; also Nichols 1981c).

Hunting Hunting was possibly the most serious factor limiting the population through into the 1970s. In the nineteenth century birds were much hunted for food, especially in the rainy season when they were very fat and excellent eating, occasionally reaching Roseau market (Lawrence 1878, 1880a, Verrill 1892). Porter (1929), in remarking that they used to be shot and eaten in fair quantities, added that this happened occasionally in the present, but in fact what he then related suggests considerable continuing exploitation: apart from stories of many birds being shot while he was on the island (some in attempts to capture them alive), he discovered that 38 were killed or captured between October 1928 and February 1929 in the wake of a major hurricane. Hunting was blamed for the species being (as was believed) almost extinct in the 1950s (Frost 1959) and, despite the reassurance that the cost of cartridges had reduced pressure on the bird in 1966 (Gochfeld 1974), in 1973 hunting was again perceived as the major problem, with almost everyone met admitting to being a former or current shooter of parrots, and with one instance of a pair being killed while young were in the nest and in spite of pleas from a local guide (Snyder 1973). Subsequent workers (Nichols *et al.* 1976) agreed that hunting continued to be the most serious threat, with evidence that in 1975 another pair had been shot. Even after the 1979 hurricane and in spite of Forestry Division efforts, there were believed to be "strong hunting pressures" on the species (Snyder and Snyder 1979; *ICBP Newsletter* 2[1], 1980; Zamore 1980, Gregoire 1981), and in November 1981 four Frenchmen from Guadeloupe were apprehended while hunting in the Forest Reserve (Anon. 1981b); nevertheless, throughout the rest of the 1980s there was little evidence of other than occasional shooting (P. G. H. Evans *in litt.* 1992).

Trade Owing at least in part to the inaccessibility of nests from which to take young, hunting for cagebirds involved the highly destructive practice of "wing-shooting", which resulted in the accidental deaths of many birds (as reported, e.g., by Lawrence 1878, Porter 1929). An offer, apparently in the early 1960s, of US\$300 for a live bird led to many islanders going out and attempting to wing-shoot individuals (Gochfeld 1974), and Gregoire (1981) estimated that 40 birds (of each species) were being shot every year (i.e. even in the 1970s) as a consequence of this practice; much of this was apparently from local rather than international interest (Nichols *et al.* 1976), but Nichols (1986) reported that in 1976 C. Cordier was involved in obtaining Imperials (and simultaneously St Vincent Amazons *A. guildingii*: see relevant account) by implication for Vogelpark Walsrode in (West) Germany. This appears to be unrelated to the story in Butler (1989) of the importation into (West) Germany in 1979 of a number of both Red-necked and Imperial Amazons with incorrect papers via Guadeloupe, which, however, had a satisfactory outcome (see Measures Taken). The fact that illegally exported birds had been able to remain in foreign hands (Christian 1991) had been noted by other European aviculturists, and this was thought to be likely to contribute to further attempts to capture and smuggle birds abroad (Nichols 1981c). However, the situation is now considered under control (see Measures Taken).

Natural causes: hurricanes Clearly the wildlife of the Caribbean islands is to some extent adapted to the effects of hurricanes, and the long-term damage to species on pristine islands was perhaps always negligible. However, when species become isolated by habitat destruction or rare through human exploitation, their immunity to hurricane damage is greatly reduced (Nichols *et al.* 1976); moreover,

hurricanes affecting developing countries result in such things as (a) local people taking the chance to clear and cultivate badly damaged land, and (b) foreign aid programmes directed at rapid recuperation, irrespective of long-term environmental costs (Evans 1988a). On 29 August 1979 the exceptionally powerful Hurricane David struck directly across Dominica from south-east to north-west, destroying five million trees in the southern forests, halving the parrot populations (see Population), stripping trees of fruit and eliminating many nest-sites (see Gregoire 1981, Evans 1991). Even on the relatively sheltered north-west slopes of Morne Diablotin, four out of five known nest-trees of Imperial Amazon were rendered unfit, with similar evidence elsewhere (Zamore 1980). A second, less damaging hurricane (Allen, on 3 August 1980) shook fruit off trees and caused both parrot species to forage on buds and shoots near the ground again (Anon. 1981a), and this may have contributed to the apparent failure of Imperials to breed for two successive years after David (Anon. 1981b, Nichols 1981c).

Natural causes: predators and competitors Possible predators include opossum *Didelphis marsupialis*, rats *Rattus*, boas *Constrictor constrictor* and Broad-winged Hawks *Buteo platypterus*, although only the first, believed introduced in the later nineteenth century, has been thought in any way serious (Nichols *et al.* 1976). Competition for nest-sites from Pearly-eyed Thrashers *Margarops fuscatus* was thought probably insignificant, as the latter seemed not to be as common in the Imperial's as in the Red-necked Amazon's range (Nichols *et al.* 1976; also Evans 1991). The idea that Red-necked Amazons might be in direct competition with Imperials (see, e.g., King 1978-1979) could not be confirmed, with no interactions when seen feeding together ("feeding and living in harmony": Porter 1929) and evidence that both were in steep decline (Nichols *et al.* 1976), although nest-site competition between the species (won by Imperials) was witnessed twice in 1981 and attributed to Red-necks being forced into higher altitudes by habitat destruction below (Anon. 1981b), observations discounted by Evans (1988a), who (reassuringly, since his work is almost all post-1981) has found "no evidence as yet to suggest that one species interferes with the other". Escape of exotic parrot pets might pose a threat in the future (Nichols *et al.* 1976).

MEASURES TAKEN For any measures to be taken they generally first have to be proposed, and it is worth recording that Nichols *et al.* (1976), Snyder and Snyder (1979) and Gregoire (1981) all made recommendations, some of which were implemented, some modified, some superseded, some ignored, and some still relevant; this and the next section conflates these and other current or possible measures. While those already taken are best broken down into separate issues, it is important to credit individuals and organizations that have contributed to these various initiatives: the Dominican Forestry Division for its long-term efforts on all fronts; SAFE International (part of JWPT/WPTI) and WWF-U.S. for support of work by Nichols (1976, 1977b), *et al.* (1976), etc.; WWF-U.S. for emergency support for post-hurricane conservation work; ICBP Pan American Section for support of several key surveys including one that prompted WWF's post-hurricane intervention; P. G. H. Evans (and his many co-workers) for his long-term study (see, e.g., Evans 1986b, 1989) aimed (since 1982) at finding ways to integrate conservation and development needs (something originally called for by Nichols *et al.* 1976), now within the programme of ICBP but receiving the support of many different interest groups, including the James Bond Research Foundation (see Nichols 1986) and Loro Parque (see Low 1988), but always with the full support of the Dominican government (see Gregoire 1987); and RARE (now RARE Center), for providing various types of support through the 1980s culminating in the education and awareness programme "Project Sisserou" conducted by P. J. Butler in 1989.

Legal protection Lawrence (1878) reported the existence of "a very beneficent law" that prohibited hunting of parrots except between September and February, "thus ensuring protection during the breeding season"; evidently this law was replaced with full protection in 1914 (Swank and Julien 1975), although it was further upgraded and defined in 1976 (Porter 1930b took what steps he could to have it enforced). Following Hurricane David, a total ban was imposed on hunting of all wildlife and the Forestry Division recruited (with a grant from WWF-U.S.) four conservation officers to patrol the forests and enforce the law (Anon. 1981a,b, Gregoire 1981, and as recommended by Snyder and Snyder 1979). A significant decrease in the problem of hunting has resulted (Evans 1991), and the compulsory registration (using an amnesty as inducement to declare) in early 1989 of all captive birds on the island has closed the

local market in the species (Butler 1989). In 1979 an illegal consignment of both Red-necked and Imperial Amazons was returned from West Germany to Dominica after the latter government's intervention (Butler 1989). Illegal smuggling of birds to the international market, which was investigated by U.S. State Department special agents in 1981 (Anon. 1981b), is currently discounted as a major threat (Evans 1988a). Details of national laws are provided in Butler (1989). The species is listed on Appendix I of CITES.

Habitat protection The protected area system in Dominica, welcome as it is, fails to cater for the parrots of the country: Morne Trois Pitons National Park (for which see Wright 1985) is not the most important area ecologically (the Red-necked Amazon has not been recorded there since 1973: Evans 1991), and the Northern Forest Reserve (for which see Gregoire 1981) does not include the important, relatively flat area of climax forest that occupies the Syndicate, Dyer, Milton, Jude and Morne Plaisance estates and which is an important area for both species (Evans 1988a). Attempts in Washington in 1983 by the Director of Forestry and Wildlife, C. Maximea, to raise the funds to acquire these estates for conservation met with no success (Nichols 1986, Evans 1991). Actual and prospective loss of forest in the upper Picard valley (see Threats: Habitat destruction) became so serious that in August 1988 the government of Dominica, ICBP and RARE Center signed a memorandum of agreement to seek to protect the area, and in July 1989 a vitally important and imminently threatened tract of 80 ha was acquired by the three signatories, to become government property as a nature reserve after three years (Rands and Foster 1989, Evans 1991). Nevertheless, much more needs to be done to protect a wider area of forest (see Measures Proposed).

Environmental education and awareness This was urged as likely to "produce beneficial effects" (Swank and Julien 1975), and since 1980 there have been various initiatives aimed at creating a new conservation consciousness in Dominica, particularly in relation to parrot protection and habitat conservation. Following Hurricane David, the Forestry Division (funded by WWF-U.S.) stepped up its customary educational work with school visits, public lectures, radio broadcasts, the distribution of a RARE-funded poster (with the same motif on tee-shirts), and a play called "Parrot Poachers" (Anon. 1981a,b, Gregoire 1981, Low 1984, Christian 1991, Evans 1991). A conservation education newspaper, "VWA Diablotin", was circulated to every school for several years in the mid-1980s, and the recent creation of an Environmental Education Unit has led to its revival (Christian 1991, Evans 1991). From January to August 1989 P. J. Butler of RARE Center conducted a further campaign of public awareness, promoting the fact that the Imperial Amazon is the country's national bird and emblem, and organizing an amnesty for illegally held parrots, all as part of "Project Sisserou" (Butler 1989, Evans 1991; see Measures Proposed: Captive Breeding).

Ecotourism Development of nature tourism to Dominica was recommended by Nichols *et al.* (1976) and Evans (1986, 1988a) as one step towards underpinning the foundations of conservation in the country; at least one British company now runs specialist tours to the island.

Survey, study and monitoring of birds In response to a recommendation by Snyder and Snyder (1979), WWF-U.S. funded the training of personnel, the construction of forest observation posts, and the subsequent study and monitoring of the two parrot species by Forestry Division staff (cited, e.g., in Ecology from Anon. 1981a,b).

MEASURES PROPOSED Four of Evans's (1988a) nine recommendations (those concerning the protection of the upper Picard valley, the creation of an education unit, the revival of a newspaper and the promotion of ecotourism) have been at least partly fulfilled (see above). The others relate to survey and study of the parrots and are outlined in the following paragraph, with additional points carried over from Nichols *et al.* (1976). Subsequent paragraphs refer to points not addressed by or arising subsequently to Evans (1988a).

Survey, study and monitoring of birds Evans's (1988a) five further recommendations (with parentheses for those of Nichols *et al.* 1976) are (1) to survey the remote eastern slopes of Morne Diablotin to establish the relative abundance of both parrot species; (2) to survey certain mountain areas in the south of the island to establish whether either parrot is present; (3) to determine more precisely the habitat requirements and food preferences of both species (also to clarify the extent and nature of interspecific interactions); (4) to investigate by use of radio-tagging the effects of forest fragmentation on both species

(and to assess the extent and causes of seasonal movements); (5) to gather life-history data on both species with particular emphasis on population parameters (and with some emphasis on the problem of possible nest-site competition from Pearly-eyed Thrashers); while a further point (6) is that regular monitoring of the populations, with the involvement of appropriately trained forestry officers, is of critical importance (Butler 1989).

Morne Diablotin National Park The Dominican government and ICBP have now drawn up a proposal to convert lands in the upper Picard valley and the western sector of the existing Northern Forest Reserve, in total an area of over 3,800 ha including the most important area for both parrots and the best tracts of forest with the richest wildlife in the country, into a national park, at a cost of approximately US\$800,000 (N. Varty verbally 1992). The idea of a national park in this area, albeit somewhat grander in scope, was first made in Nichols *et al.* (1976); the management plan for the proposed park was expected to be completed in September 1992 by N. Varty and G. Mendelssohn (ICBP), R. Charles and D. Williams (government of Dominica).

Replanting The rapid replanting of areas lumbered for timber or charcoal with slow-growing native climax dominants such as gommier, pommier, penipice and carapite, would be both useful to parrots and valuable economically (Nichols *et al.* 1976); although most such logged areas appear to be converted to agriculture, there are some places where replanting in this way would be feasible.

Captive breeding Consideration of this option was urged by Snyder and Snyder (1979) and Gregoire (1981) in the wake of Hurricane David, and later by Low (1984). The 1989 amnesty (see Measures Taken: Environmental education and awareness) resulted in the surrender of one Imperial and eight Red-necked Amazons, for which an aviary was officially opened in May 1992 in the Botanical Gardens in Roseau, with JWPT providing the appropriate training (D. F. Jeggo *in litt.* 1992, M. G. Kelsey *in litt.* 1992; see Remarks 2); Low (1984), however, felt that birds should not be held on Dominica but placed with experienced aviculturists. While any attempts to breed birds either on or away from Dominica should not distract attention from the other needs outlined in this section, it is clearly worth trying to use existing captive stock throughout the world (if holders will admit to possessing them) in a concerted effort to maximize genetic variation and generate sufficient numbers for more public education programmes. In this regard the crossbreeding experiments of D. Green (as indicated in Nichols 1981b, Gerstberger 1982 and Amberger 1989a) should be stopped as the participation of his birds would be valuable.

Vigilance over trade Attempts to acquire both species of parrot continue to be made by unscrupulous foreign bird fanciers, so control of capture and export must remain a high priority, for which purpose Dominica is urged to accede to CITES (Evans 1991). Linked with this is the recommendation in Nichols *et al.* (1976) to impose stricter rules on the importation of exotic parrots (see Threats: Natural causes: predators and competitors).

REMARKS (1) Anon. (1981a) cited “Nichols and Nichols” as the source of information that there were 150-200 birds present in 1972, something which hence crops up even in Evans (1988a); and Anon. (1981b) referred to the southern population as being estimated at over 50 in 1972 (which crops up in Evans 1991), obviously implying that the Nichols were involved in arriving at this figure; but there is no evidence in any writing by any Nichols that 1972 was a year used for estimating numbers or that “150-200” or “50” were used as population figures as indicated. These figures may therefore be forestry personnel assessments (P. G. H. Evans *in litt.* 1992). (2) According to Butler (1989), a facility of some sort already existed in the 1980s and housed the birds returned from West Germany in 1979 (see Measures Taken).