The conservation status of Tanimbar corella and blue-streaked lory on the Tanimbar Islands, Indonesia: results of a rapid contextual survey

Paul Jepson, Nick Brickle and Yusup Chayadin

Abstract Two parrot species, Tanimbar corella *Cacatua goffini* and blue-streaked lory *Eos reticulata*, endemic to the Tanimbar Islands, Indonesia, were regularly trapped and sold into the international wild bird trade prior to 1992. Following concerns about numbers entering the trade, but with little knowledge of the remaining wild population or socio-economic role of bird trapping on the islands, international trade in both species was suspended at the 1992 CITES meeting. This paper reports on a rapid survey conducted on the islands in 1993 as a follow-up to the decision on trade. The survey attempted to determine the status of the wild populations, the distribution and activity of the human population, the interaction between Tanimbar corella and agriculture, and the structure of the local commodity-chain for wild-caught parrots. We found that: (a) both parrot species were widely distributed and present at relatively high densities across the largest island in the group, Yamdena; (b) catching of parrots is geographically limited; (c) in the case of Tanimbar corella, at least, the catching is of birds raiding crops and probably involves mainly immature and non-reproductive birds; (d) the international and domestic ban on catching was generally adhered to locally but the reasons for the ban were not widely understood, contributing to a general mistrust of conservationists that still remains. Although not advocating a lifting of the ban on trapping, we do conclude that in this case invoking the precautionary principle without proper consideration of local context may have been counter-productive to conservation goals.

Keywords *Cacatua goffini*, CITES, contextual management, *Eos reticulata*, Indonesia, Maluku, precautionary principle, wildlife trade.

Introduction

In 1989, two species of parrot, the Tanimbar corella *Cacatua goffini* and blue-streaked lory *Eos reticulata*, endemic to the islands of south-east Maluku, Indonesia, were listed as threatened (Collar & Andrew, 1989). This was on the basis that both species were widely trapped for trade and occupied small global ranges (minimum annual net imports to Convention on International Trade in Endangered Species (CITES) member countries between 1983 and 1989 averaged 11,349 for Tanimbar corella and 3198 for blue-streaked lory (Inskipp & Corrigan, 1992)). Based on this threat categorization, the United States delegation proposed both species for listing on Appendix 1 of CITES at the 8th Meeting of the Conference of the Parties in Tokyo, March 1992, thereby banning all international commercial trade.

The US proposal lacked data on wild population figures and the Indonesian delegation presented reports from field staff of the Directorate General of Forest Protection and Nature Conservation of the Republic of Indonesia (PHPA) that both species were still plentiful and that flocks of Tanimbar corella raided the maize *Zea mays* crop. Nonetheless, the contracting parties resolved to put Tanimbar corella on Appendix 1 and accepted a face-saving proposal from Indonesia that a zero catch-quota be placed on the blue-streaked lory pending the results of field surveys.

This management decision was justified by the precautionary principle, but was based on a limited understanding of the local situation. The precautionary principle is a criterion for amendment of CITES Appendices, and states 'The parties shall, in the case of uncertainty, either as regards the status or as regards the impact of trade on the conservation of a species, act in the best interest of the species' (Conf. Res. 9.24). Although conservation practice is increasingly taking a systems perspective for designing management interventions (e.g. Grumbine, 1993; Miller, 1995), the Significant Trade Review process of CITES has insisted that decisions concerning trade in Indonesian parrots should

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Revised manuscript accepted for publication 29 November 2000

be based on the results of a 'scientific' algorithm combining measures of off-take, total population, breeding success, mortality and available habitat. As a result, field surveys have tended to focus on these variables (e.g. Marsden, 1992; Lambert, 1993, 1997).

In 1993, PHPA/BirdLife International Indonesia programme conducted field surveys to ascertain key aspects of the management context of the two species. Our approach was guided by the resource management philosophy of Aldo Leopold (Leopold, 1933), which Norton (1991, 1994) terms 'contextual management'. This states that each management initiative should be considered on at least two levels: first as a cell and then as a cell in context. Our contextual survey approach conceives the 'traditional' demographic and habitat variables as the management cell, which together needs to be considered in the context of wider cultural and economic realities. At a minimum, we considered these to be: the distribution and activity of the human population, the interaction between Tanimbar corella and agriculture, and the structure of the local commodity-chain for wild-caught parrots.

As a result of the preliminary findings of these surveys (Cahyadin *et al*., 1994; Cahyadin 1996) and since reported in Juniper & Parr (1998), both species were removed from the revised list of globally threatened species in Collar *et al*. (1994). The status of both species under CITES is unchanged.

The present paper has three purposes. Firstly, to review the decision to ban capture and export of these parrots from the perspective of the local context; secondly, to report population estimates for both species based on standardized census techniques; and thirdly, to promote the value of contextual survey approaches as a basis for planning species conservation initiatives in remote tropical regions.

The Tanimbar islands and their birds

The Tanimbar corella is endemic to the Tanimbar Islands, whereas the distribution of the blue-streaked lory embraces the Tanimbar Islands and the small islands of Babar and Damar to the west (Fig. 1). This study was conducted on Yamdena island, the largest of the Tanimbar islands, with a land area of 3263 sq km and located at 7°36′ S, 131°25′E. The Tanimbar islands are formed of quartzitic sandstones capped with shallow and deep marine sediments, mainly limestone and

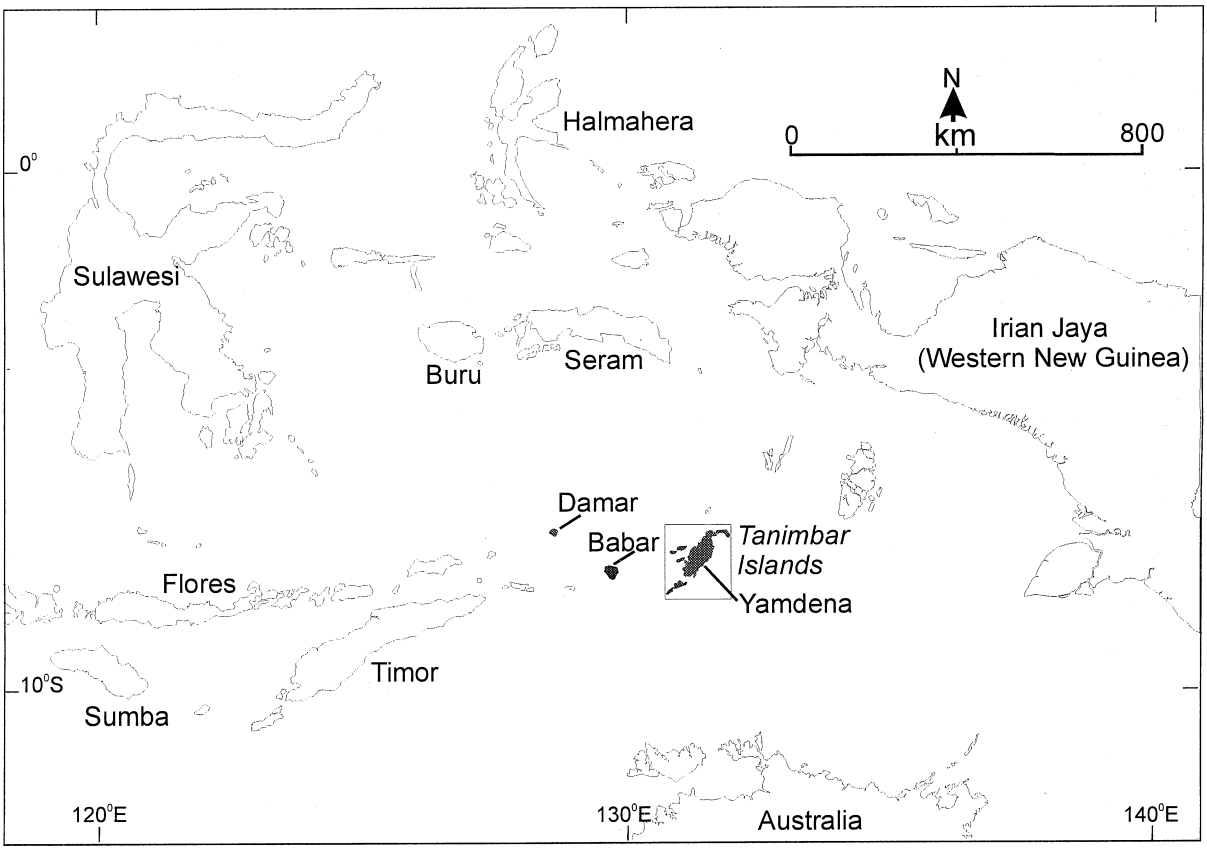

Fig. 1 Map of Wallacea (central area of Indonesia) showing location of Yamdena and other islands mentioned in the text.

karst formations (Monk *et al*., 1997). Yamdena is relatively flat and dry. A low, 120 m-high chain of hills runs down the south-east side of the island. There are two seasons: the humid west monsoon starts in mid-December and lasts until June (Damen, 1983), and the dry east monsoon then prevails. Rainfall in the wettest month (February) averages 380 mm and in the driest month (September) 100 mm. The natural vegetation is tropical dry forest (RePPProT, 1990).

The Tanimbar islands are characterized by high levels of endemism in birds. They are part of the Banda Sea Islands Endemic Bird Area (ICBP, 1992), which encompasses 18 endemic bird species. Thirteen of these occur on Yamdena and seven are endemic to the Tanimbar islands (Jones & Dekker, 1995; Sujatnika *et al*., 1995). In addition to the two endemic parrots that are the subject of this paper, three wider-ranging parrot species occur. These are eclectus parrot *Eclectus roratus*, red-cheeked parrot *Geoffroyus geoffroyi* and great-billed parrot *Tanygnathus megalorhynchus* (Jepson, 1997; Bishop & Brickle, 1999).

The human population of the Tanimbar Islands was 70,000 in 1990 (Anon., 1991), the majority of which is located in two towns, Saumlaki and Larat, and in a string of villages along the south-eastern seaboard. There are only two villages on the north-west facing coast, namely Makatian and Wobar. The principal livelihood on Yamdena is subsistence dry land agriculture, combined with copra production and fishing. The average household income for the Maluku Tenggara regency, of which Yamdena is part, was <US $250 per annum in the late 1980s (MRDP, 1988) and is not believed to have risen significantly since.

Methods

Calculation of areas of major habitat types

The survey aimed to assess the abundance of Tanimbar corella and blue-streaked lory in each major habitat type (MHT) on the island. The range of MHTs present on Yamenda was established by over-laying existing vegetation, rainfall and geology maps (Sukardi & Sutrisno, 1989; RePPProT, 1990) and consulting a standard forest classification for the region (Whitmore, 1984). The distribution and approximate boundaries of each MHT were established by visual analysis of an August 1988 Landsat TM false-colour image exposed on band 2 (blue), 4 (green) and 7 (red). Habitat boundaries were plotted on a sketch map (Fig. 2) and areas measured with a planimeter.

A logging concession was active in South Yamdena and was the target of an activist campaign from 1993 to 1996. The political sensitivity of this issue meant that we were unable to obtain copies of cutting plans for the concession to calculate area of logged-over forest. We, therefore, plotted the area of potentially logged-over forest based on boundaries of forest categorized as production forest in RePPProT (1988).

Selection of transects

Transects were selected to sample the MHTs and also to include areas of selectively logged forest. The first transect crossed the north-central section of Yamdena island. Water limitations in the interior meant that the only practical route was from the village of Tutukembong on the eastern seaboard (7°30′ S 131°39′ E) to the village of Wabar on the west coast (7°21′ S 131°27′ E). The second transect crossed the southern section from Makatian village (7°33′ S 131°13′ E) to the village of Lorulum, but was abandoned before the active logging area was reached because the team ran low on water. The third transect was in mangrove forest near the village of Makatian (7°32′ S 131°13′ E) (see Fig. 2).

Parrot surveys and density calculations

Data were collected in the period 7–24 May 1993; i.e. at the end of the wet season and after the breeding season of both species (reported by villagers to be between December and February). Birds were censused using a point count distance sampling technique known as the variable circular plot method or VCPM (Reynolds *et al*., 1980; Buckland, 1987; Buckland *et al*., 1993). Methods were based on those used in Jones *et al*. (1995) and Marsden *et al*. (1997). Point counts were made at 250 m intervals along each transect. Bird census was carried out between 06.00 and 10.00 hours and between 15.30 and 17.30 hours, when light levels were adequate and only in the absence of rain or strong wind. Two experienced observers censused parrots for 10 min at each station. To promote accuracy in distance estimation, 10 3-h training periods were spent beforehand in the Bogor Botanical Gardens (Java) and four 1-h periods on Yamdena. Accuracy of distance estimation was checked at intervals throughout the census. For each encounter, the species, horizontal distance from the point, and group size were recorded. Records of flying birds were distinguished from stationary ones. At each station the major habitat type was noted.

Additionally, whilst travelling between point counts during morning and evening census periods, all contacts with both parrot species were recorded. Duration and distance walked were noted to enable calculation of basic encounter rates (birds per unit distance per unit time).

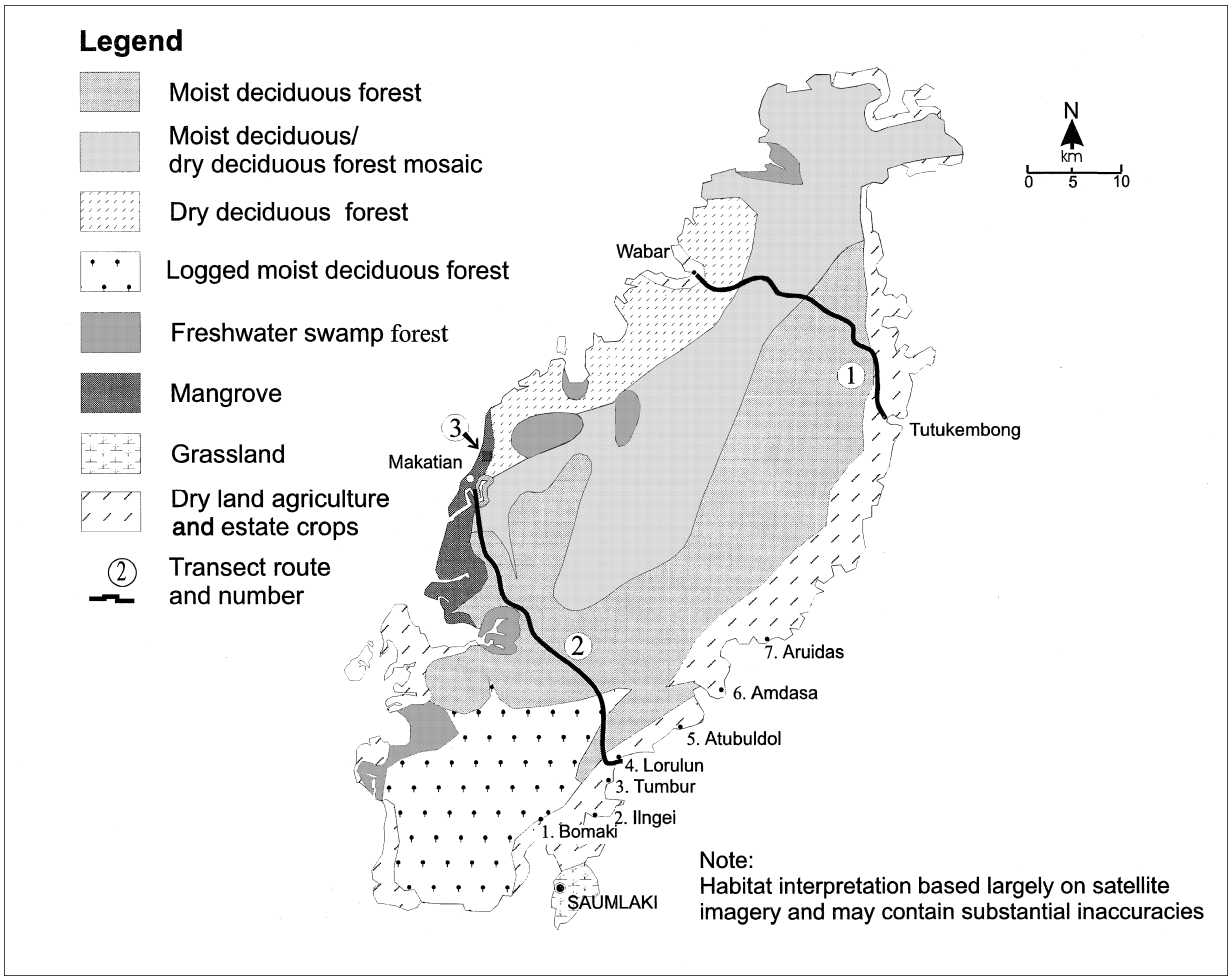

Fig. 2 Map of Yamdena showing boundaries of the major habitat types (derived from interpretation of false colour LANDSAT TM image), transect routes and location of village surveys.

Population density estimates (individuals per sq km) were calculated from the VCPM data using DISTANCE (Laake *et al*., 1993). This program uses the distance measures to estimate a function relating detectability to distance from the observer. The use of data on flying birds violates key assumptions of VCPM and, as a result, can cause serious over-estimation of population density (Buckland *et al*., 1993; Marsden, 1995), and the data were, therefore, analysed without these records. The data set was analysed in two steps. First, the Uniform, Nexpin, Normal and Hazard models were fitted to the data and the best fit defined as the one with the minimum Akaike Information Criteria (AIC) value. Second, the analysis was re-run on the best fit model but adjusted with respect to cosine, polynomial and hermite functions. The best fit model was again chosen, and the resulting densities used in the population estimates.

Investigation of the socio-economic context of parrot catching

In November 1992, PJ visited Yamdena, at the request of PHPA, to provide an independent assessment on the merits of releasing 535 captive corellas, which was being lobbied for by a UK-based charity (Reynolds, 1992; Jepson & Soewoko, 1993). To establish the nature of the local commodity-chain in the species, interviews were conducted in Indonesian, with the Samulaki-based family business who controlled export of parrots from Yamdena.

Between 17 March and 8 April 1992, YC visited seven villages along the south-east coast of Yamdena (Fig. 2), to examine the practice of capturing parrots and the extent and economic impacts of reported crop-raiding by Tanimbar corella. In each village YC first reported to the village head to explain his purpose and request assistance. Other men from the village joined this

meeting and the opportunity was taken to discuss where each species could be found and the month and time of day when they were commonest. During this meeting a villager with swidden fields (shifting-agriculture) on the forest boundary and willing to accompany YC was identified. During the walk to these fields, the villager was asked about general agricultural practices and the impact of the two parrot species on crops and the practice of parrot catching. At least two morning counts of Tanimbar corella were made in the area surrounding the person's fields. The number and flock size of parrots were noted. This process was repeated at the seven villages and also at the village of Makatian on the west coast. At the second village surveyed (Ilgnei) four nights were spent in the fields. At this site, observations were made of Tanimbar corella feeding behaviour on maize, and a parrot catcher was located and interviewed, and his catching techniques studied.

Results

Distribution and area of major habitat types on Yamdena island

Following the habitat classification in Monk *et al*. (1997, p.190–191), we identified nine terrestrial major habitat types on Yamdena from variations in colour tone on the Landsat image (Table 1).

Moist deciduous forest is found along the hills of the south-eastern seaboard and southern areas of the island that capture precipitation from the south-east trade winds (June–December). Dry deciduous forest occurs along the north-east seaboard, between the villages of Makatian and Wabar, and inland for 10–15 km. These major habitat types were generally distinct in the field, with little transitional vegetation. The central area of Yamdena was found to be a mosaic of these two forest types. The pattern of patches was visible on the satellite image and related to aspect – moist deciduous forest occurring on hill tops and dry deciduous forests in the rain shadows. Mangrove forest is found along the sheltered north-western coast (Fig. 2).

Copra is the principal cash-crop on Yamdena, and coconut *Cocos nucifera* plantations extend along the south-eastern seaboard to 2–3 km inland. Dry-land swidden agriculture occupies a band between these plantations and the moist deciduous forest. In the area where the socio-economic impact of parrot catching was investigated, dryland agriculture consisted of a mixture of maize, mixed gardens, scrub and secondary 'alang–alang' *Imperata cylindrica* grasslands.

Parrot densities and total population estimates

The 136 formal VCP counts recorded 207 non-arial contacts with Tanimbar corella and 72 with blue-streaked lory. Densities from VCP stations were calculated for all MHTs where the species occurred (Table 2). DISTANCE selected the Uniform model with cosine adjustment as the best fit for the Tanimbar corella data and the unadjusted Hazard model as the best fit for the blue-streaked lory data.

In the mangrove, contacts with blue-streaked lory on point counts were insufficient to calculate a population density ($n = 2$), and the density estimate for Tanimbar corella was imprecise because of the small number of contacts ($n = 5$). We therefore omitted data from the mangrove MHT when calculating total population estimates. The density estimates of both species in the dry-land agriculture MHT are imprecise for the same reason and were therefore also excluded from the population estimates.

Table 1 Habitat areas on Yamdena Island and their interpretation from an August 1988 false colour Landsat™ image.

Habitat type	Colour & tone on Landsat image	Area (sq km)	Percentage of Yamdena
Dry-land agriculture (A)	Greenish-white	409	13
Estate crops: coconut plantation (CP)	Dull green-blue (near coast)	273	8
Dry deciduous forest (DF)	Pink (orange tint)	312	9
Moist deciduous forest (MF)	Rich green	882	27
Moist deciduous – logged	Rich green	364	11
Dry and moist deciduous forest mosaic	Mottled green and orange-pink	804	25
Freshwater swamp forest (SF)	Very dark blue-green (along rivers)	192	6
Mangrove (M)	Pale pink grading to magenta (near coast)	?	?
Grasslands (G)	Magenta (Saumlaki peninsular)	27	1
Total		3263	100

Note: ? = extent of mangrove too small to measure area.

Table 2 Population density estimates (individuals per sq km) of Tanimbar corella and blue-streaked lory along two transects on Yamdena island calculated from Variable Circular Plot data.

	Agriculture			Dry deciduous forest			Moist deciduous forest			Combined forest types			Mangrove		
Species	D	SE	nc/ns	D	SE	nc/ns	D	SE	nc/ns	D	SE	nc/ns	D	SE	nc/ns
Blue-streaked lory	74	60	2/2	95	14	5/5	97	24	29/24	93	22	34/29	–	–	2/2
Tanimbar corella	57	35	8/6	79	21	18/12	105	17	80/46	98	14	98/58	176	208	5/4

D, Density; SE, standard error; nc, number of contacts; ns, number of stations.

Our techniques precluded separate density estimates for the moist-deciduous and dry-deciduous forest components of the mosaic in the centre of the island, and for the purpose of calculating total population estimates we therefore combined data from these two MHTs. This was on the basis that (a) the two forest types appeared structurally similar in the field, (b) the number of contacts in dry-deciduous forest was relatively low and a larger sample size would improve the accuracy of the population estimates, (c) dry-deciduous forest accounted for less than 15 per cent of the total forest area, (d) our methodology would be easier to repeat.

Quantitative data were not collected from the area of active logging for the reasons described in the methods, but both species were commonly encountered in logged forest during recreational birding excursions at other times. On the basis of this observation, and noting that Lambert (1993) showed that violet-necked lory *E. squamata* and white cockatoo *C. alba* occur in higher densities in logged forest than in un-logged forest in North Maluku, we also attributed the composite density to the area mapped as logged forest. By multiplying the composite density estimates (Table 2) by the total area of forest on Yamdena, excluding mangrove and swamp forest (Table 1), we arrive at a population estimate for Tanimbar corella of 231,500 ± S.E. 33,000) and for blue-streaked lory of 220,000 ± S.E. 52,000) (rounded to the nearest 500).

The standardized encounter rates (Table 3) were higher for blue-streaked lory in dry deciduous forest compared with moist deciduous forest, which may have been a result of greater detection distances in the more open dry deciduous forest. The standardized encounter rates for Tanimbar corella in agricultural areas were significantly higher than for other MHTs. Eighteen non-standardized morning counts during the agricultural surveys confirmed that the species is common in this habitat. Counts ranged from 23 to 305 (average 119) individual Tanimbar corella and, at four of the seven sites, congregations of over 100 birds were observed.

Yamdena island constitutes about 60 per cent of the global range of Tanimbar corella and 55 per cent of the global range of blue-streaked lory. Our findings indicate that within these limited ranges, Tanimbar corella is a common bird of forest and agricultural habitats, and blue-streaked lory a common bird of forest habitats.

The socio-economic context of parrot catching

Villagers of Yamdena clear forest to grow food crops and, later, establish coconut plantations. On recently cleared land they plant maize (in addition to other crops) in small fields averaging 0.02 ha in area with 350–420 maize plants per field. Maize cropping is promoted by the government agricultural department, which sets targets for the area to be planted. Maize is seen as a valuable component of mixed subsistence farming systems because it can be consumed directly by villagers or used as livestock fodder. Our interviews indicated that farmers on Yamdena lacked enthusiasm for the crop, in part because they lack access to markets for maize and have no tradition of eating it. The low value of the crop was confirmed by an incident when the owner of a field appeared while YC was observing a flock of feeding Tanimbar corella. YC offered to buy the standing crop so that he could continue his observations. The villager agreed, and asked for Rp 5000 (less than US $2).

Tanimbar corella were observed feeding on maize, dryland rice and beans (peanut and mung bean) in all seven agricultural areas sampled. Flocks of 2–10 birds were observed flying in to congregate and feed in a particular maize field. On only one occasion was a large flock (of 110 birds) seen flying together. Villagers

Table 3 Standardized encounter rates for Tanimbar corella and blue-streaked lory along two transects on Yamdena island, 7–24 May 1993.

Species	Agriculture	Dry deciduous forest	Moist deciduous forest	Mangrove
Blue streaked lory	2.4/km & 4.7/hr	1.7/km & 5.0/hr	1.3/km & 3.3/hr	7.9/km & 12.4/hr
Tanimbar corella	24.7/km & 4.9/hr	4.4/km & 13.0/hr	5.0/km & 13.0/hr	1.1/km & 1.7/hr

reported that if more than 50 per cent of the crop in a field was damaged they did not bother to harvest it.

At the time of the survey, export of Tanimbar corella and blue-streaked lory from Yamdena was controlled by a Chinese business family based in Saumlaki. Over the 10-year period prior to this study (i.e. from about 1982), they had received requests from traders in Ambon to supply specified numbers of the two species. Using their local networks (family and friends of employees), two people in each village along the island's only road (running up the south-eastern seaboard) were recruited to catch and supply Tanimbar corella and blue-streaked lory. Both species were only caught in the agricultural areas. Tanimbar corella was caught during the period of maize harvest in March and April, and blue-streaked lory when it came out of the forest to feed on the flowers and fruits of the sago palms *Metroxylon* spp. that have been retained in agricultural land. Tanimbar corella were snared with nooses made from nylon fishing line. The snares would be wound round the maize heads or laid on the ground around a tethered decoy bird. Blue-streaked lory were snared around sago fruits or on the branches of a tall tree. A team of two people could catch 30–50 Tanimbar corella in a day during the maize season.

In 1992, when an export market for cockatoos was still open, the price received by local dealers was between Rp 12,500 (US $6.0) and Rp 20,000 (US $9.5). Village catchers reported receiving US $3.75–6.50 per bird with higher prices being paid in 1992/1993 just before the CITES listing. According to Inskipp & Corrigan (1992) net imports into CITES member countries of live Tanimbar corella between 1983 and 1989 averaged 11,350 birds per year. If, for example, 10,000 Tanimbar corella were exported annually through Saumlaki, then local trappers would have received from US $37,500–65,000 per year from the sale of Tanimbar corella alone. This is a significant sum on an island where other sources of cash income are limited to a few poorly paid jobs in government offices, logging, and the sale of copra.

Discussion

Parrot population

The data here provide the first population estimates of two bird species of conservation significance, although on the strength of the evidence collected, neither species appear as threatened as was previously believed.

For both species our combined density estimates in forest (93 ± 22 per sq km for blue-streaked lory and 98 ± 14 per sq km for Tanimbar corella) are higher than parrot density estimates from other islands in the region, but our standard errors are lower, suggesting a more precise estimate. For example, Marsden *et al*. (1997) calculated a density estimate of 44.2 ± 23.4 per sq km for red lory *E. bornea* ($n = 7$) in primary lowland forest on Buru, and Poulsen (1998) calculated a density estimate for the same species of 156.4 ± 52.4 per sq km ($n = 75$) in primary ever-wet forest over limestone on Buru. Jones *et al*. (1995) calculated density estimates of 2.2 ± 1.1 per sq km ($n = 380$) for the yellow-crested cockatoo *C. sulphurea* in forest on Sumba, and Poulsen *et al*. (1998) estimated densities of 72.5 ± 31.1 per sq km ($n = 60$) for violet-necked lory and 53.8 ± 16.1 per sq km ($n = 102$) for white cockatoo in lowland ever-wet forest on Halmahera. The apparent high density of Tanimbar corella relative to other similar Indonesian parrot species may be explained by the still pristine nature of much of the Tanimbar Islands. Alternatively, the depauperate avifauna may have allowed ecological release and hence an increased density. It is also possible that the density of Tanimbar corella was swelled by juvenile birds because the survey coincided with the end of the breeding season.

Trade in Tanimbar corella and blue-streaked lory

The reason for the inclusion of Tanimbar corella in Appendix 1 of CITES and the imposition of a zero catch quota for blue-streaked lory was concern about the sustainability of capture levels for the trade. Our data suggest that, despite a sizeable annual catch quota for the 10-year period from 1982 to 1992, the populations of both species are apparently high. There are two possible explanations for this. Either populations were even more abundant previously and have declined to the present levels, or numbers have been stable and the populations of both species have sustained an annual harvest of several thousand.

At least in the case of Tanimbar corella, the second explanation seems most plausible. Flocking and crop raiding behaviour occurs in other corella taxa (Forshaw & Cooper, 1989; Higgins, 1999), and in the two species where this has been studied in detail, flocks consist largely of immature and non-breeding birds (Smith, 1991; Smith & Moore, 1992; Emison *et al*., 1994). We have reported that the harvest of Tanimbar corella was from congregations in agricultural lands. If these congregations also contained large numbers of immature birds then the harvest would have been predominantly from the non-reproductive portion of the population.

Similar data for species closely related to the blue-streaked lory are not available. It is pertinent to note, however, that the area of suitable habitat on Yamdena is still substantial and that human access is constrained by limited fresh water. This may have limited capture of blue-streaked lory to forest margins.

A relatively small number of people on Yamdena seem to have benefited directly from past capture and trade of Tanimbar corella and blue-streaked lory, but because these people were distributed across the villages it is likely that there was broader benefit through trickle-down economics. Coupled with the low value of the maize crop, this may explain why villagers expressed little concern about crop damage from Tanimbar corella congregations.

The reason for suspending the trade in this species and the proposals to buy and release the 535 captive Tanimbar corella were, at the time, largely beyond the comprehension of the people of Yamdena (Jepson & Soewoko, 1993), most of whom view the Tanimbar corella as an abundant, ugly and stupid bird. The trade ban created a mistrust of conservationists and a misunderstanding of their purpose on Yamdena.

This mistrust extended to the provincial forestry department, which, as a result of the trade ban and activist campaigns against logging, became highly suspicious of NGO activities on Yamdena. This situation compromised BirdLife's plans to pursue a larger conservation goal, namely the establishment of a major ecosystem reserve on Yamdena (Jepson, 1995). Government trust concerning the intentions of NGOs was crucial to the process of protected area establishment under the Suharto regime. Because this was lacking with respect to Yamdena, PJ re-orientated the focus of the BirdLife programme and withdrew from South Maluku in favour of North Maluku (the islands of Halmahera and Buru).

Because this study was conducted 7 years ago it is relevant to summarize subsequent events. Following the CITES ban in March 1992, Tanimbar corellas started to appear in the domestic trade in Java. We believe these came from an exporter on Bali who was holding 1000 corellas when trade was suspended. Corellas are still being sold in Java but are not popular. Vendors try to pass them off as juveniles of the better known and more attractive yellow-crested cockatoo (PJ, unpublished data).

Based on the data reported in this paper, PHPA took a down-listing proposal to the 1994 CITES meeting in Fort Lauderdale but were forced to withdraw this in the face of vehement NGO opposition. Ironically, the fact that the BirdLife-Indonesia Programme, as much as the PHPA, bore the brunt of vitriolic criticism concerning the survey findings, generated a new level of trust among the small community of Indonesian bureaucrats, scientists and traders involved in wildlife trade issues. This facilitated some important conservation gains. BirdLife was invited to join the government committee that sets annual trade quotas, thus setting a precedent for NGO participation. Through this involvement trade quotas of parrots have been steadily reduced and PHPA itself has taken up-listing proposals to CITES. A relevant example is the red and blue lory *E. histrio*, which Indonesia proposed for inclusion on Appendix I in 1994 (listed 16.2.1995).

Between 1996 and 1997, the Government of Indonesia and the World Bank prepared a Maluku Regional Development Project (MRDP) and a sister Maluku Conservation and Natural Resources Project (MACONAR) to be financed with a Global Environment Facility (GEF) grant. BirdLife successfully advocated that the primary goal of MACONAR should be establishment of a protected area system for the province. Yamdena was identified as one of five priority reserves to be established under MACONAR. Although the project was approved by GEF the project was subsequently dropped because of the escalating civil unrest in Maluku that started in February 1999.

During project preparation (July–August 1998) brief visits were made to Yamdena. It was found that villagers remained angry over the trade bans, that maize is being phased out in favour of beans, for which there is a local market, and that people have started burning tyres to deter Tanimbar corella from raiding the bean crop (D. Purmasi, pers. comm.).

It would be inadvisable to argue for re-opening of international trade in either species on the basis of the findings of this study. Apart from the preliminary nature of our survey, the CITES parties would only sanction the re-opening of international trade if Indonesia could commit to the monitoring of trade, species population and habitat variables. It is unrealistic to believe that the Indonesian authorities could conduct such monitoring in Maluku, to an acceptable standard, in the foreseeable future.

Our hope is that the findings of this case study will promote greater caution in the use of CITES schedule listings as a conservation tool. The findings of our surveys indicate that the Tanimbar corella did not meet criteria for inclusion on CITES Appendix 1 and that the export bans of both species were unnecessary. We have discussed how this event compromised plans to establish a reserve on the island, which would have protected critical habitat of globally important assemblages of endemic fauna, including both parrot species. Although there is no certainty that this goal would have been achieved, it is relevant to note that during the same time period BirdLife succeeded in persuading local and national government to establish a new national park on Sumba that protects habitat of the endangered yellow-crested cockatoo (Jepson *et al.*, 1997). We suggest that the conservation context of Yamdena would now be healthier if this rapid contextual survey had been conducted prior to the decision over trade bans being taken. As a consequence, we urge animal welfare and conservation

agencies to avoid invoking the precautionary principle alone to justify up-listing proposals, and suggest that such agencies have a responsibility to conduct similar surveys before advocating up-listing of parrot species.

Acknowledgements

The authors extend their thanks to three anonymous reviewers and the following people who kindly reviewed earlier drafts of this paper: R. Grimmett, C. J. Bibby, T. O'Brien, S. Broad, A. Brautigam, G. Dandliker, R. Dennis, S. Edwards, A. Gosler, G. Harrington, D. Holmes, M. Jones, T. Inskipp, L. Joseph, H. Jenkins, F. Lambert, T. Soehartono, W. Siswanto and R.J. Whittaker. Adrian Long assisted with the map.

Clemmens Bulurdity helped to collect field data. The authors would also like to thank heads of villages in South Tanimbar for hospitality and assistance during the surveys and staff of Balai and Sub Balai KSDA in Ambon for their help and assistance in the field.

The study was a collaborative activity between PHPA and the BirdLife International Indonesia Programme. We gratefully acknowledge financial support for this study from The Suntory Fund for Bird Conservation, The International Loridae Society, The World Parrot Trust and W. Lantermann.

References

Anon. (1991) *Maluku Tenggara Dalam Angka 1990*. Kantor Statistik Kabupaten Maluku Tenggara, Maluku.

Bishop, K.D. & Brickle, N.W. (1999) An annotated checklist of the birds of the Tanimbar Islands. *Kukila*, **10,** 115–150.

Buckland, S.T. (1987) On the variable circular plot method of estimating density. *Biometrica*, **43,** 363–384.

Buckland, S.T., Anderson, D.R., Burnham, K.P. & Laake, J.L. (1993) *Distance Sampling: Estimating Abundance of Biological Populations*. Chapman & Hall, London.

Cahyadin, Y. (1996) The status of *Cacatua goffini* and *Eos reticulata* on the Tanimbar Islands; a preliminary analysis of field data. In *Proceeding of the First International Conference on Eastern Indonesian-Australian Vertebrate Fauna, Manado, Indonesia, November 22–26, 1994* (eds D. J. Kitchener and A. Suyanto), pp. 117–121. LIPI, Bogor.

Cahyadin, Y., Jepson, P. & Mamoppo, B.I. (1994) *Status* Cacatua goffini *dan* Eos reticulata *de Kepulauan Tanimbar/The Status of* Cacatua goffini *and* Eos reticulata *on the Tanimbar Islands*. Report no. 1. PHPA/BirdLife International-Indonesia Programme, Bogor.

Collar, N.J. & Andrew, P. (1989) *Birds to Watch: The World List of Threatened Birds*. International Council for Bird Preservation, Cambridge.

Collar, N.J., Crosby, M.J. & Stattersfield, A.J. (1994) *Birds to Watch II: The World List of Threatened Birds*. BirdLife International, Cambridge.

Damen, M.J.C. (1983) *Physiographic Land Types of the Tanimbar Archipelago, Maluku, Indonesia*. International Institute for Aerial Survey and Earth Sciences, Enschede, Netherlands.

Emison, W.B., Beardsell, C.M. & Temby, I.D. (1994) The biology and status of the long-billed corella in Australia. *Proceedings of the Western Foundation of Vertebrate Zoology*, **5,** 211–246.

Forshaw, J.M. & Cooper, W.T. (1989) *Parrots of the World. 2nd edn*. David & Charles, Newton Abbot & London.

Grumbine, R.E. (1993) What is ecosystem management? *Conservation Biology*, **8,** 27–38.

Higgins, P.J. (ed.) (1999) *Handbook of Australian, New Zealand and Antarctic Birds, Vol. 4*. Oxford University Press, London.

ICBP (1992) *Putting Biodiversity on the Map: Priority Areas for Global Conservation*. International Council for Bird Preservation, Cambridge.

Inskipp, T. & Corrigan, H. (eds) (1992) *Review of Significant Trade in Animal Species Included in CITES Appendix II*. WCMC, Cambridge.

Jepson, P. (1995) *Summary Report of an Evaluation of Boundaries for a Protected Area in the Tanimbar islands, South-east Maluku*. Technical Memorandum no. 1, PHPA/BirdLife International – Indonesia Programme, Bogor.

Jepson, P. (1997) Distributional checklist of the birds of Nusa Tenggara and Maluku, Annex 5.10. In *The Ecology of Nusa Tenggara and Maluku* (eds. K.A. Monk, Y. De Fretes & G. Reksodiharjo-Lilly), pp. 439–456. Periplus Editions, Singapore.

Jepson, P., Rias, S., Ora, A.B. & Raharjaningtrah, W. (1997) *Evaluation of a Protected Area Network for the Protection of Forest Values on Sumba Island, Indonesia*. Report 1, PHPA/BirdLife International-Indonesia Programme, Bogor.

Jepson, P. & Soewoko, S. (1993) *An Evaluation of the Conservation Merit of Returning 500 Captive Goffin's Cockatoos* Cacatua goffini *to the Wild on Pulau Yamdena, Tanimbar, Maluku*. Internal Report, PHPA/ICBP Indonesia Programme, Bogor.

Jones, D.I.N. & Dekker. R.W.R.J. (1995) *The Megapodes: Megapodiidae*. Oxford University Press, Oxford.

Jones, M.J., Linsley, M.D. & Marsden, S.J. (1995) Population sizes, status and habitat associations of the restricted-range bird species of Sumba, Indonesia. *Bird Conserveration International*, **5,** 21–52.

Juniper, T. & Parr, M. (1998) *Parrots: A Guide to Parrots of the World*. Pica Press, Sussex.

Laake, J.L., Buckland, S.T., Anderson, D.R. & Burnham, K.P. (1993) *DISTANCE User's Guide*, Version 2.0. Colorado State University, Fort Collins.

Lambert, F.R. (1993) *The Status of and Trade in North Moluccan Parrots with Particular Emphasis on* Cacatua alba, Lorius garrulus *and* Eos squamata. IUCN/SSC Trade Specialist Group, Gland and Cambridge.

Lambert, F.R. (1997) *Field Assessment of the Conservation Status of Red-and-blue Lorry* Eos histrio *in Indonesia*. IUCN/SSC Trade Specialist Group, Gland, Switzerland and Bangkok, Thailand.

Leopold, A. (1933) *Game Management*. Charles Scribner's Sons, New York & London.

Marsden, S. (1992) The distribution, abundance and habitat preferences of the Salmon-crested cockatoo *Cacatua moluccensis* on Seram, Indonesia. *Bird Conserveration International*, **2,** 7–14.

Marsden, S.J. (1995) *The ecology and conservation of parrots of Sumba, Buru and Seram, Indonesia*. Unpublished PhD thesis, Manchester Metropolitan University, Manchester.

Marsden, S.J., Jones, M.J., Linsley, M.D., Mead, C. & Hounsome, M.V. (1997) The conservation status of the restricted-range lowland birds of Buru, Indonesia. *Bird Conservation International*, **7,** 213–233.

Miller, K. (1995) *Balancing the Scales: Guidelines for Increasing Biodiversity's Chances through Bioregional Management*. World Resources Institute, Washington D.C.

Monk, K.A., De Fretes, Y. & Reksodiharjo-Lilley, G. (1997) *The Ecology of Nusa Tenggara and Maluku*. Periplus Editions, Singapore.

MRDP (1988) *Tanimbar Islands: Pilot Area Study. Summary*. Maluku Regional Development Project, Ambon.

Norton, B.G. (1991) *Toward Unity among Environmentalists*. Oxford University Press, New York & Oxford.

Norton, B.G. (1994) Thoreau and Leopold on science and values. In *Biodiversity and Landscapes: A Paradox of Humanity* (eds K.C. Kim and R.D. Weaver), pp. 31–46. Cambridge University Press, New York.

Poulsen, M.K. (1998) *Prioritas konservsi keragaman hayati di Pulau Buru: dengan acuan tentang usulan Suaka Margasatwa Kapalat Mada/Biodiversity Conservation Priorities on Buru with Special Reference to the Proposed Kapalat Mada Wildlife Sanctuary*. Report no. 8, PHPA/BirdLife International – Indonesia Programme, Bogor.

Poulsen, M.K., Lambert. F.R. & Cahyadin, Y. (1998) *Evaluation of the Proposed Lalobata and Ake Tajawe National Park in the Context of Biodiversity Conservation Priorities in Halmahera*. Report no. 7, PHPA/BirdLife International – Indonesia Programme, Bogor, Indonesia.

RePPProT (1988) *Land Use/Forest Status Maps. Maluku Map Sheets 2808 and 2809*. Regional Physical Planning Programme for Transmigration, Jakarta.

RePPProT (1990) *Atlas. The Land Resources of Indonesia: A National Overview*. Regional Physical Planning Programme for Transmigration, Jakarta.

Reynolds, M. (1992) Emergency in Indonesia: World Parrot Trust seeks to achieve release of 535 Goffin's Cockatoos. *Psittascene*, **4,** 1.

Reynolds, R.T., Scott, J.M. & Nussbaum, R.A. (1980) A variable circular plot method for estimating bird numbers. *Condor*, **82,** 309–313.

Smith, G.T. (1991) Breeding ecology of the western long-billed corella, *Cacatua pastinator pastinator*. *Wildlife Research*, **18,** 91–110.

Smith, G.T. & Moore, L.A. (1992) Patterns of movement in the western long-billed corella *Cacatua pastinator* in the South-west of Western Australia. *Emu*, **92,** 19–27.

Sujatnika, Jepson, P., Suhartono, T.R., Crosby, M.J. & Mardiastuti, A. (1995) *Melestarikan Keanekaragaman Hyati di Indonesia: Pedekatan Daerah Burung Endemik/Conserving Indonesian Biodiversity: the Endemic Bird Area Approach*. PHPA/BirdLife International – Indonesia Programme, Bogor.

Sukardi & Sutrisno (1989) *Peta Geologi Lembar Kepulauan Tanimbar, Maluki (Geology Map of the Tanimbar Islands Quadrangle)*. Pusat Penelitian dan Pengembangan Geologi, Bandung.

Whitmore, T.C. (1984) *Tropical Rain Forests of the Far East*, 2nd edn, Clarendon Press, Oxford.

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