Threatened Birds of Asia:

The BirdLife International Red Data Book

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Recommended citation
BirdLife International (2001) *Threatened birds of Asia: the BirdLife International Red Data Book.* Cambridge, UK: BirdLife International.

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BirdLife International is a UK-registered charity

ISBN 0 946888 42 6 (Part A)
ISBN 0 946888 43 4 (Part B)
ISBN 0 946888 44 2 (Set)

British Library-in-Publication Data
A catalogue record for this book is available from the British Library

First published 2001 by BirdLife International

Designed and produced by the **Nature**Bureau, 36 Kingfisher Court, Hambridge Road, Newbury, Berkshire RG14 5SJ, United Kingdom

Available from the Natural History Book Service Ltd, 2–3 Wills Road, Totnes, Devon TQ9 5XN, UK. Tel: +44 1803 865913 Fax: +44 1803 865280 Email nhbs@nhbs.co.uk
Internet: www.nhbs.com/services/birdlife.html

SALMON-CRESTED COCKATOO

Cacatua moluccensis

Critical □ —
Endangered □ —
Vulnerable ■ A1c,d; A2c,d

This cockatoo qualifies as Vulnerable because, like its congeners, it is a very popular cagebird and has suffered a rapid population decline as a result of trapping for trade, combined with deforestation in its small range. This decline is projected to continue and perhaps accelerate.

DISTRIBUTION The Salmon-crested (Moluccan or Seram) Cockatoo is chiefly known from and perhaps endemic to Seram in the south Moluccas, Indonesia, with records from the adjacent islands of Haruku, Saparua and Ambon (which might all relate to birds of captive origin, although these islands are treated here as part of the natural range). The history of records from Ambon was covered by Poulsen and Jepson (1996), who doubted that the surviving population is the product of escaped birds, as indicated by (e.g.) Smiet (1985). Nevertheless, captive birds have escaped and survived for periods of time in several parts of the world (see below). On Seram, it appears that the bulk of the population may be distributed in the east of the island (Isherwood *et al.* 1998). In the following account, the localities Roho, Wasa, Kanikeh, Solumena, Milinane, Manusela, Solea, Sinahari, Hatuolo and Kaloa are known to be inside Manusela National Park (according to the sources for each record). Records from the south Moluccas are from:

■ ***INDONESIA*** *Seram* **Wae Sala**, May 1998 (Kinnaird *et al.* in prep.; also O'Brien 1999); **Gunung Sahuwai Wildlife Reserve**, Hua Moal peninsula, March 1998 (D. Purmiasa verbally 1999); **Lokki**, November and December 1881 (Blasius 1882b); **Kawa**, May–June 1998 (Kinnaird *et al.* in prep.; also O'Brien 1999); **Seriholu** (Syriholo), June 1998 (Kinnaird *et al.* in prep.; also O'Brien 1999); within 45 km of **Masohi**, August 1996 (B. F. King verbally 1998); Muria-Separusie-Waili (= **Wailulu**), May 1911 (Stresemann 1914a); **Wae Sune**, 230–400 m, July 1998 (Kinnaird *et al.* in prep.); **Rumasokat**, September 1911 (Stresemann 1914a); **Sawai**, May 1911 (Stresemann 1914a); **Tamilau** (Tamilouw), July 1998 (Kinnaird *et al.* in prep.; also O'Brien 1999); between **Roho** and Kanikeh, August/October 1990 (Taylor 1991a) and at Roho in July 1994, September 1995 and 1998 (F. Verbelen *in litt.* 1999, MKP, Kinnaird *et al.* in prep.; also O'Brien 1999); between **Wasa** and Roho, August/October 1990 and July 1994 (Taylor 1991a, F. Verbelen *in litt.* 1999); **Kanikeh** (Kineke), July–September 1987 and July 1994 (Bowler and Taylor 1989, F. Verbelen *in litt.* 1999), July 1995 (Field and Bagnall 1996); **Wahai**, undated (Vorderman 1898b), November 1909 (Stresemann 1914a), but unrecorded there in the 1990s (S. J. Marsden *in litt.* 1999); **Solumena** (Selumena), August 1991 (Charpentier and Guerquin 1991); **Milinane**, study station in the 1990s (S. J. Marsden *in litt.* 1999); **Manusela**, May 1995 (MKP); **Solea**, July–September 1987 and July 1994 (Bowler and Taylor 1989, F. Verbelen *in litt.* 1999), a study station in the 1990s (S. J. Marsden *in litt.* 1999); **Sinahari**, August 1991 (Charpentier and Guerquin 1991); **Hatuolo**, May 1995 (MKP); **Pasahari**, August–September 1998 (Kinnaird *et al.* in prep.; also O'Brien 1999); **Kaloa**, study station in the 1990s (S. J. Marsden *in litt.* 1999), May 1995 (MKP); between **Moso** and Sinahari, November 1992 (N. Bostock *in litt.* 1999); **Wae Isal** (Waaisala), 1863 (Schlegel 1862–1873); **Kissa laut**, near the east end of the island, 1859 (Wallace 1861); **Hoti**, study station in the 1990s (S. J. Marsden *in litt.* 1999), fairly common, July 1996 (Isherwood *et al.* 1997, Willis 1997); **Wae Fufa**, August 1996, common, with 40–60 individuals along the river valley at 300–1,000 m, mostly 300–800 m (Isherwood *et al.* 1997, Willis 1997, Isherwood and Willis 1998);

Bula, study station in the 1990s (S. J. Marsden *in litt*. 1999); **Wae Tanabotik** (Wae Tana), May 1911 (Stresemann 1914a); **Wae Bolifar**, January 1990 (S. J. Marsden in Willis 1997);

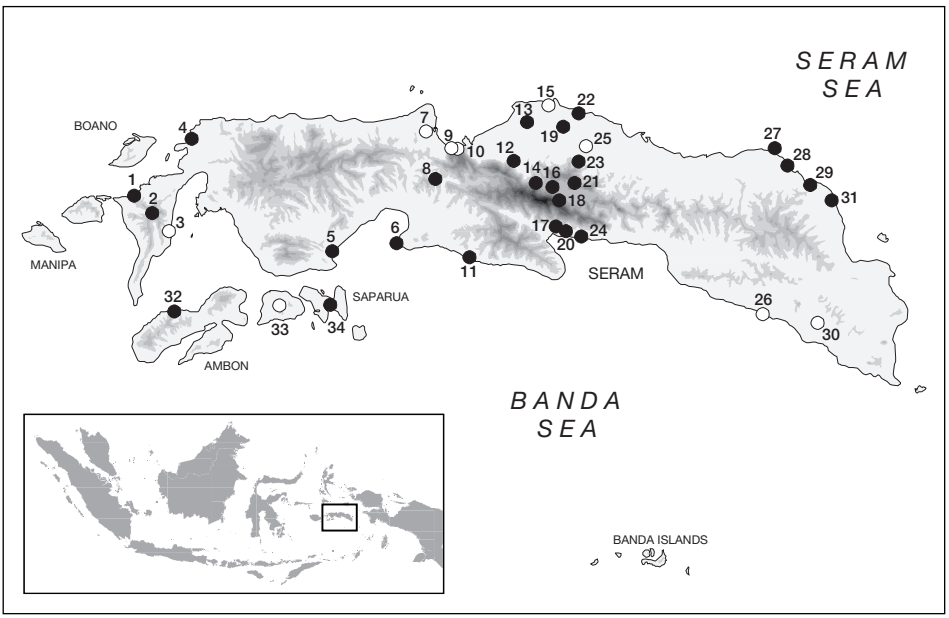
Ambon behind **Hila**, north coast of the Hitu peninsula (to which the species is confined, by local report), May and June 1995 (Poulsen and Jepson 1996), October 1995 (J. O. Gjershaug and N. Rov *in litt*. 1999);

Haruku unspecified locality or date (Stresemann 1934), but not found in 1994 or 1996 (Poulsen and Jepson 1996);

Saparua unspecified locality, November 1923 (female in RMNH).

In Indonesia captive birds have been released into Bogor Botanic Gardens, Java or have escaped on various islands including Sangihe, north of Sulawesi (F. R. Lambert *in litt*. 1999). A female was collected at Tandu-Banak, Sibutu Island, in the Sulu archipelago, Philippines, in November 1971 (female in DMNH; duPont and Rabor 1973a). There is also a record from Hawaii (Long 1981).

POPULATION ***Evidence before 1998*** Although Wallace (1861) suggested that all birds on Seram were extremely scarce, he soon after described this species as "abundant on Seram" but much less so on Ambon (Wallace 1864). In 1911 it was fairly common in coastal regions (Stresemann 1914a), and around 1979–1981 it was still locally common in the interior (10–16 birds gathering for the night in undisturbed areas) but rare near human habitation; local reports suggested that up to around 1970 it was common on Ambon and in western Seram, the decline presumed to be attributable to trapping pressure (Smiet 1985). In 1980 small flocks were seen in the south of the island (White and Bruce 1986) and the species was then frequent in the proposed area of Manusela National Park, although not common in the



The distribution of Salmon-crested Cockatoo *Cacatua moluccensis*: (1) Wae Sala; (2) Gunung Sahuwai Wildlife Reserve; (3) Lokki; (4) Kawa; (5) Seriholu; (6) Masohi; (7) Wailulu; (8) Rumasokat; (9) Sawai; (10) Tamilau; (11) Roho; (12) Wasa; (13) Kanikeh; (14) Wahai; (15) Solumena; (16) Milinane; (17) Manusela; (18) Solea; (19) Sinahari; (20) Hatuolo; (21) Pasahari; (22) Kaloa; (23) Moso; (24) Wae Isal; (25) Kissa laut; (26) Hoti; (27) Wae Fufa; (28) Bula; (29) Wae Tanabotik; (30) Wae Bolifar; (31) Hila; (32) Haruku; (33) Saparua.
○ Historical (pre-1950) ● Recent (1980–present) □ Undated

southern part of the Mual plains in the centre of the area (Smiet and Siallagan 1981). However, rangers in the park referred to a dramatic decline in the species in the mid-1980s (Collar and Andrew 1988), and only 57 sightings were made there in 40 days of fieldwork in 1987, considered to refer to a mere 20 individuals; encounter rates were 0.3 birds per hour around Solea and 0.1 per hour near Kanikeh (Bowler and Taylor 1989; see Remarks 2). In July 1995, at an elevation of around 820 m inside Manusela National Park, a single observation of the species was made in 12 days of fieldwork (Field and Bagnall 1996). In 1996 the highest encounter rates, c.1.5 records per hour, were found in primary lowland forest at Wae Fufa, with c.0.8 records per hour in primary lower montane forest (also at Wae Fufa) and c.0.75 records per hour in logged lowland forest (at Hoti) (Willis 1997). Encounter rates from other localities are c.0.3 records per hour in primary forest at Solea in 1987 (Bowler and Taylor 1989); c.0.5 records per hour in cultivation/disturbed lowland forest at Solea in 1990 (Taylor 1991a); c.0.1 records per hour in 1987 and c.0.2 records per hour in 1990 in cultivation/disturbed montane forest at Kanikeh (Bowler and Taylor 1989, Taylor 1991a). Thus all encounter rates from Manusela National Park are significantly lower than results from north-east Seram (Willis 1997); this is attributed to trapping pressure (F. Verbelen *in litt*. 1999).

Marsden (1995) combined 1989 data from Central and East Seram and calculated encounter rates to be 0.6 records per hour (seven records) in primary lowland forest, 0.7 records per hour (14 records) in secondary forest, and 0.3 records per hour (five records) in logged forest. Marsden (1995, also 1999b) also estimated population densities for primary forest and secondary forest to be 8.3 individuals per km^2 and for recently logged forest to be 1.9 individuals per km^2; he further broke this down into 12 per km^2 in unlogged forest at 180 m, 0 per km^2 in unlogged forest at 300 m, 1.0 per km^2 in logged forest at 180 m, and 2.9 per km^2 in logged forest at 300 m (Marsden 1998), which greatly indicates the value of *unlogged lowland forest* for this species. The different densities in primary and logged forest suggest that, with every 1 km^2 of primary forest that is selectively logged in lowland Seram the island loses seven cockatoos, while conversion of disturbed secondary forest to plantation results in the loss of six birds (Marsden 1992).

Evidence in 1998 Joint surveys by the Wildlife Conservation Society Indonesia Program (WCS-IP), BirdLife International Indonesia Programme and PKA in May–September 1998, working with GIS data on forest cover and type, resulted in the determination of an overall density value of 7.87 birds per km^2, and an estimated 14,026 km^2 of lowland forest (below 600 m) remaining on Seram, thereby yielding a population estimate of 110,385 birds (with confidence limits resulting in a minimum 62,416 and a maximum 195,242), although on a precautionary basis the figure of 62,400 is chosen as the appropriate population figure to accept (Kinnaird *et al.* in prep.). Despite these relatively encouraging statistics, current plans for forest conversion, which are likely to be fulfilled within 25 years, predicate a loss of at least 31,000 birds, leaving c.30,400, a significant rate of decline which will only be intensified by continuing and predictable small-scale illegal logging, land clearance and trade (Kinnaird *et al.* in prep.).

ECOLOGY ***Habitat*** Undisturbed primary forest up to 900 m was the source of Smiet's (1985) most encouraging records, and this accords with the perceptions of others (Stresemann 1914a, Bowler and Taylor 1989); but unlogged lowland (below 300 m) forest is clearly the most productive habitat (Marsden 1992, 1995, 1998). Birds fly daily between roost sites and feeding areas (Isherwood *et al.* 1997). At Wae Fufa, birds were particularly frequent close to the river (Isherwood and Willis 1998). Studies in 1998 suggested (but confirmation is still needed) that habitat rich in strangler fig trees and the key nest-tree *Octomeles sumatranus* holds the highest densities of cockatoos (Kinnaird *et al.* in prep.).

Food The diet has been generalised as consisting of seeds, nuts (including coconuts: see Threats), berries and insects and their larvae (Forshaw 1989). A stomach contained forest

fruits (Vorderman 1898b), birds have been seen eating (and may in fact heavily exploit) the fruit of strangler figs (Kinnaird *et al.* in prep.) and they are suspected of taking *Pandanus* fruits (K. D. Bishop in Kinnaird *et al.* in prep.). In 1996 birds were commonly observed apparently searching for insect grubs by tearing at the bark of dead and live trees and at the soft bark of rattan, pulling at dead branches, removing small climbers, and dislodging dead leaves on branches (Isherwood *et al.* 1997).

Breeding A nest was found in a hole 25 m up in a live tree-trunk adjacent to a river in May (Stresemann 1914a). In July and August 1996 birds were exhibiting "continual sexual interactions" (Isherwood *et al.* 1997). Nest-trees are bound to be large, and local people reported that *Canarium* is an important species in this regard (S. J. Marsden *in litt.* 2000); in 1998 it appeared that *Octomeles sumatranus* is the favoured nest-tree (Kinnaird *et al.* in prep.).

THREATS The Salmon-crested Cockatoo is one of (now) three threatened members of the suite of 14 bird species that are entirely restricted to the "Seram Endemic Bird Area", threats and conservation measures in which are profiled by Sujatnika *et al.* (1995) and Stattersfield *et al.* (1998). The relative resilience of this and other Moluccan species under trade pressure has been attributed to combinations of factors which include (a) considerable reproductive capacity, (b) adaptability to habitat alteration (which tends to produce superabundant fruiting and flowering plants), (c) persistence of patches of original habitat on most islands, and (d) lack of predators and competitive species (Smiet 1985). However, it is certainly not the case that the Salmon-crested Cockatoo is impervious to anthropogenic factors.

Habitat loss Logging on Seram is likely to have affected and be affecting the species seriously, as it requires large trees in which to nest and, as noted under Habitat above, is most numerous in unlogged lowland forest (Marsden 1995, Marsden and Fielding 1999). In most lowland areas of the island logging has been in progress for several decades, but it has become increasingly intense in the 1990s and since around 1998 it has even occurred inside Manusela National Park (D. Purmiasa, L. Louis and Y. Persulessy verbally 1999); at present the Indonesian Department of Forestry is renewing a concession "that includes some tens of thousands of hectares of Manusela's primary lowland forest" (D. Ivereigh *in litt.* 2000). In 1996 the island in general appeared to contain no primary forest below 300 m, at least in the north-east (Isherwood *et al.* 1997). Most of eastern Seram has been granted to logging concessions and an oil-drilling concession (Willis 1997); altogether logging concessions cover 48% of Seram's forests (Kinnaird *et al.* in prep.). Currently logging is estimated to affect over 120 km^2 of primary forest on Seram each year, but this is a minimum figure since habitat is also constantly being cleared for agriculture, transmigration and plantation forest (M. F. Kinnaird *in litt.* 1999); indeed some 6,220 km^2 of lowland forest is slated for clearance (45% within logging concessions), and it is probable that this will occur within the next 25 years, leaving no habitat for the cockatoos (Kinnaird *et al.* in prep.). With serious political problems in Maluku province in general since 1998, it has been claimed that major industrial companies are scrambling to intensify their exploitation of the natural resources of the region, since regulation and enforcement are now minimal (D. Ivereigh *in litt.* 2000). Lowland forest outside logging concessions amounts to under 5,096 km^2, and apart from the danger of illegal logging and clearance, there is the serious possibility of fire spreading through these remaining areas as logging and conversion in adjacent areas renders them drier and more flammable (Kinnaird *et al.* in prep.).

Trade Trade was a significant influence on this species at the start of the twentieth century (Heinroth 1903). In January 1978 "large numbers" were seen in captivity especially in "the villages in the northern lowland Wasa, Solea, Alimata and Hatuola in the neighbourhood of the Way Mual reserve" (*sic*) (Wind and Amir 1978). A total of 6,415 birds (but see below for another figure) were recorded as traded out of the Moluccas in 1983, accounting for 15% of

the islands' psittacine exports (Smiet 1985). The species was, throughout the 1980s, extensively trapped for the cagebird market, and it was estimated late in that decade that 4,000–9,000 birds might be leaving the north coast of Seram each year, bound for Ambon (Bowler and Taylor 1989). According to official CITES reports, exports from Indonesia per year, 1981–1990, were: 3,069 in 1981 and 4,801 in 1982 (Inskipp *et al*. 1988), 9,736 in 1983, 9,736 (*sic*) in 1984, 8,861 in 1985, 9,580 in 1986, 11,681 in 1987, 8,935 in 1988, 6,916 in 1989 and 1,194 in 1990 (M. F. Kinnaird *in litt*. 1999; see Remarks 1), i.e. a *minimum* of 74,509 in a 10-year period. Imports from Indonesia 1983–1988, as reported to CITES, averaged 9,571 per year (Marsden 1992, 1995), and, allowing for unrecorded international trade, domestic trade and mortality, it is judged that *at least* 10,000 birds were being taken on Seram annually in the 1980s (Kinnaird *et al.* in prep.). At that stage, trade remained within harvest quotas, but the fact that the population then appeared to be declining suggested that the quotas were too high (Inskipp *et al*. 1988). In 1990 it was felt that PHPA rangers had had an impact in reducing trade in the species, and that fewer households on Seram were acquiring birds as pets (Taylor 1991a).

Despite this view, and the fact that CITES Appendix I listing in 1989 was followed by a rapid drop to zero in official figures of internationally traded birds, the domestic consumption of the species remained high. In July 1994 trappers were observed (and filmed) snaring a cockatoo inside Manusela National Park, and many birds were seen being transported on buses, held at docks, and openly on sale in Ambon market (F. Verbelen *in litt*. 1999, F. R. Lambert *in litt*. 1999). In 1996 this was not a common cagebird in the coastal villages of north-east Seram, possibly reflecting the fact that most birds caught on the island were destined for the international trade (Isherwood *et al*. 1997). In every village in which interviews were conducted in 1998 parrot trappers admitted to being active, indicating that a significant covert trade persists, with agents from Ambon, Wahai and Masohi regularly visiting them to make purchases (M. F. Kinnaird *in litt*. 1999); indeed, extrapolation from figures obtained by interviews in villages suggests that possibly thousands of birds (perhaps as many as 4,000, or 6.4% of the current estimated total) are still being captured each year (Kinnaird *et al.* in prep.). Shipment from Ambon to Jakarta continues, with papers sometimes identifying birds as White Cockatoos *Cacatua alba*, a legally traded species (M. F. Kinnaird *in litt*. 1999). Unattributable sources in 1999 indicated that, despite its Appendix I status, officials in Jakarta were still issuing permits for the export of birds to non-CITES countries. Reports also indicate that in recent years traders have taken to transporting these cockatoos inside bamboo sections rather than in cages, making their detection much more difficult, and that much trade involves the use of small boats which can move between islands without scrutiny (Kinnaird *et al.* in prep.).

Persecution In 1859 and again in 1911 the species was considered a harmful pest in coconut palms around villages on Seram, gnawing through the shells of young nuts to reach the pulp and water within (Wallace 1864, Stresemann 1914a). Moreover, it was still being hunted with arrows for food, a practice that had been noted 200 years earlier (Stresemann 1914a). Even in 1998 it was discovered that hunting of the species for food continues, although this was not judged to constitute a serious threat by comparison with the problem of trapping for trade (Kinnaird *et al.* in prep.).

MEASURES TAKEN ***Trade*** The species was placed on CITES Appendix II in 1981 (Inskipp *et al*. 1988), in March 1988 the European Union banned its importation (Isherwood *et al*. 1997), and in October 1989 it was transferred to Appendix I of CITES (in effect on 18 January 1990), which curtailed trade at the international level (Marsden 1992, T. P. Inskipp *in litt.* 2001). It was, in 1988, unprotected by Indonesian law, but legislation had then recently come into force to require government permits for catching, owning, breeding or transporting all unprotected wildlife species (Inskipp *et al*. 1988). This may explain the statement (P. Jepson in Collar *et al*. 1994) that the species had been given protected status in Indonesia, apparently in

1989, although this was also the year in which the species was upgraded on CITES. In January 1999 it was placed on the list of Indonesian protected species (M. Indrawan *in litt*. 1999).

Other measures Manusela National Park—which covers 1,860 km^2, over 10% of the entire island of Seram (Kinnaird *et al.* in prep.)—harbours a population of the species but it was not evident in the 1980s or 1990s that it conferred any great protection on birds within its boundaries (Bowler and Taylor 1989, F. Verbelen *in litt*. 1999). Nevertheless this park and the Gunung Sahuwai Wildlife Reserve (123 km^2, of which 119 km^2 are lowland forest) contain between them some 7,300 cockatoos (Kinnaird *et al.* in prep.).

Research Joint surveys by WCS-IP, BirdLife International and PKA in mid-1998 (funded by a variety of sources including S. Metz in the USA and the Loro Parque Foundación, *Papageien* and ZGAP in Europe) sought to establish a baseline dataset for monitoring trends in cockatoo numbers, by conducting standardised counts at seven locations in western and central Seram, along with a GIS analysis to determine land use and likely distribution (Kinnaird *et al.* in prep.).

MEASURES PROPOSED (See Remarks 3) ***Habitat conservation*** The critical need is to secure tracts of habitat where the species can survive. In part this would be achieved by the establishment of one or several further protected areas of forest on Seram: in north-east Seram the area delineated as protection forest should be extended to encompass more primary forest in the Wae Fufa and adjacent watersheds, and gazetted as a nature reserve (Isherwood *et al*. 1997, D. Purmiasa, L. Louis and Y. Persulessy verbally 1999)—this area now being identifiable as comprising the proposed Wae Bula Nature Reserve, which is 596 km^2 in area (including 560 km^2 of lowland forest) and is estimated to hold 3,300 cockatoos (Kinnaird *et al.* in prep.). In part, it would be achieved by the extension of Manusela to embrace logged but recovering forest (F. R. Lambert *in litt*. 1999), and it must certainly involve the exclusion of logging concessions currently within the park boundaries, backed up by regular boundary monitoring and satellite image ground-truthing to identify attempted or actual intrusions (Kinnaird *et al.* in prep.). However, it must also in part be achieved by a rigorously enforced policy of leaving nesting trees throughout the areas currently being logged, so that the birds can continue to occupy the logged-over habitat.

Control of trade Greater control of trapping activities is needed. As part of this control, a provincial decree from the governor asserting strict protection of the species would strengthen existing legal measures, and firm but fair deterrents need to be imposed on local trappers (light fines) and middlemen and exporters (heavy fines) (M. F. Kinnaird *in litt*. 1999, Kinnaird *et al.* in prep.). A PKA post is needed in Bula to help enforce the law in north-east Seram (Isherwood *et al*. 1997). It is particularly important that illegal trapping inside Manusela National Park is eradicated immediately, and it is highly desirable that the population is monitored rigorously to detect trends (it may be that, released from trapping pressure, numbers in Manusela could multiply many times to reach optimal levels) (Isherwood *et al*. 1997, M. F. Kinnaird *in litt*. 1999).

There is confusion over the protection status of the Salmon-crested Cockatoo at the local (provincial) level: it was still possible, at least until 1999, to purchase birds under *oleh-oleh* permits (permits for souvenirs, allowing private individuals to transport two birds per journey away from Seram), despite the fact that the zero quota *includes* such permits; even the new protection status bestowed in 1999 does not explicitly mention *oleh-oleh* (Kinnaird *et al.* in prep.). This loophole needs to be addressed by ministerial decree (Kinnaird *et al.* in prep.).

Research More research is required on the distribution of the species (priority areas including Gunung Sawai and the eastern ridges inside Manusela, the Wai Bobot watershed and the Hua Moal peninsula) and various elements in its life history—such as feeding ecology, breeding success, mortality rates, etc.—so that a clearer understanding of its management in logged forest and elsewhere can be reached (Isherwood *et al*. 1997, Kinnaird *et al.* in prep.).

The eastern third of the island merits particular attention to complement baseline datasets established in 1998 in the west and centre, and island-wide surveys are required every five years (Kinnaird *et al.* in prep.). There is a general need to review plans for forest conversion on Seram and model its impact on cockatoo populations (Kinnaird *et al.* in prep.).

Awareness The cockatoo would make an ideal emblem for Manusela National Park (Bowler and Taylor 1989)—*manusela* meaning "bird of freedom" (Kinnaird *et al.* in prep.). A strong awareness campaign should be targeted on officials, police, local NGOs and communities concerning the legal and conservation status of the species (M. F. Kinnaird *in litt.* 1999). A programme of local awareness, linked with the promotion of ecotourism, was reported as recently launched (Metz 1998) but apparently did not proceed; it appears appropriate.

REMARKS (1) These figures overlap and part-supersede ones provided in Collar and Andrew (1988) for 1984–1986 (7,398, 7,525 and 7,360 respectively), and Inskipp *et al.* (1988) for 1983–1985 (9,581, 9,542 and 8,632 respectively). It is worth noting, however, that the figure for 1990 is very different from that of 4,614 (despite a zero quota) reported in Edwards and Nash (1992). (2) Bowler and Taylor (1989) are now judged to have been working mainly at higher elevations in Manusela, and based on more recent studies their results cannot be taken as particularly indicative (Kinnaird *et al.* in prep., R. F. A. Grimmett *in litt.* 2001). (3) Captive breeding as a means of replacing demand for wild birds has been advocated (Bishop 1992b), but this well-intentioned idea could easily result in many unpoliceable activities and abuses (not least the over-harvesting of wild birds under the guise of initiating such work), and therefore is not recommended here.