2003

Megapode Newsletter 17(1)-21(2) (2003-2008)

World Pheasant Association

BirdLife International

SSC Megapode Specialist Group

BirdLife/WPA/SSC Megapode Specialist Group
Megapode Newsletter, Vol. 17, nr. 1
April 2003

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Dr. René W. R. J. Dekker, National Museum of Natural History, P.O. Box 9517, 2300 RA Leiden, The Netherlands.
Tel. 31 71 5687623; Fax 31 71 5687666; e-mail dekker@naturalis.nnm.nl
Dr. Darryl N. Jones, Australian School of Environmental Studies, Griffith University, Nathan, Australia.
e-mail: d.jones@griffith.edu.au

Dear megapoders

It has already been a year ago that you received the last issue of the Megapode Newsletter. We apologize for the long delay. Last years' newsletter was the last issue which was distributed as a printed copy. Now, 17 years after the foundation of the Megapode Specialist Group and the publication of the first Megapode Newsletter, the Megapode Specialist Group has changed its logo and the way in which we hope to stay in touch with you: we have the pleasure of offering you the first electronic Megapode Newsletter. Our new logo, the head of the endangered Maleo *Macrocephalon maleo*, was especially made for this purpose based on skins and colour photographs by Bas Blankevoort, scientific illustrator of the National Museum of Natural History, Naturalis, Leiden. It replaces the black-and-white logo which was made in 1986 by Dirk Moerbeek.

We hope that this new step forward will stimulate our members to contribute to future issues, e.g. by sending short notes for publication in the newsletter or even offering reports for electronic distribution to all our colleagues, just like we did last February with the "Vanuatu Megapode Report". As you will notice in this issue, photos are welcome as well. It will give additional opportunities to tell our story.

The editors of the Megapode Newsletter hope to return to a frequency of two newsletters a year, one in April and one in October, but that depends on you: without your input, your requests, your contributions, we have less to say. Use this opportunity to show your work and results to other megapoders.

In this issue Iwein Mauro and Kees Moeliker et al. will update you on Bruijn's Brush-turkey *Aepypodius bruijnii*. Darryl Jones reports on succcessful cohabitation between Australian Brush-turkeys *Alectura lathami* and man. Gillian Baker will tell you of her planned megapode DNA studies and K. Sivakumar of his long-term monitoring of the Nicobar Megapode *Megapodius nicobariensis*. A survey by Dick Watling on two small islands in Tonga where the Polynesian Megapode *Megapodius pritchardii* was reintroduced in the early 1990's has just been completed. The first results are included in this newsletter. Finally, the Amsterdam Zoo Artis was so kind to allow us to add to this newsletter a photo of a newly hatched chick of the Wattled Brush-turkey *Aepypodius arfakianus*: a rare event in captivity.

BirdLife/WPA/SSC Megapode Specialist Group
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Viable population of Bruijn's Brush-turkey *Aepypodius bruijnii* discovered

Iwein Mauro

After a very successful opportunistic visit to Waigeo Island, Papua province, Indonesia in May 2002, which resulted in the first field observations ever of the endemic and rare Bruijn's Brush-turkey *Aepypodius bruijnii* and discovery of its nest mound, Belgian birder Iwein Mauro returned to Waigeo in October 2002. During an extensive two-month survey, sponsored by The Netherlands Foundation for International Nature Protection (Van Tienhoven Foundation), Mauro discovered an incredible 28 incubation mounds in a relatively small area and frequently observed the species there. Hence at long last the existence of a viable population has been brought to light, enabling down-to-earth assessment of population size and conservation status of this nearly mythical species. Mauro, who is still in Indonesia, will further report in the October issue of the Megapode Newsletter.

The surveys executed by Mauro are under the auspices of the Megapode Specialist Group. Full results will be published in scientific and conservation journals. For further information you can contact René W.R.J. Dekker at dekker@naturalis. nnm.nl

A new, a forgotten and a lost specimen of Bruijn's Brush-turkey *Aepypodius bruijnii*

C.W. Moeliker, C.J. Heij, J.N.J. Post & E.J.O. Kompanje

Natuurmuseum Rotterdam, P.O. Box 23452, 3001 KL Rotterdam, the Netherlands. e-mail: natuurmuseum@nmr.nl

Two months after Iwein Mauro announced his sensational observations of Bruijn's Brush-turkey working at a mound on the highest mountain of Waigeo (Mauro 2002), the sought-after bird raised its head again. On 12 August 2002, the Sorong based Indonesian Kris Tindige, chairman of the Papua Bird Club, was presented a living Bruijn's Brush-turkey that was incidentally trapped about three weeks earlier in a snare placed by a local hunter in hill forest in the south of Waigeo. The bird - in reasonable condition, but with a broken leg - was kept out of the pot by Tindige, and a close-up of its head featured as the first-ever photograph of a living individual of the species. The picture (Fig. 1), taken by Tindige, was published in the Dutch newspaper *NRC-Handelsblad* (Moeliker 2002a), *Dutch Birding* (Moeliker 2002b), *Straatgras* (Moeliker 2002c) and *OBC Bulletin* (Anonymus 2002). Despite the care of the Tindige family, the Brush-turkey lost its broken leg, died a few days later and was preserved in a freezer.

Figure 1. Bruijn's Brush-turkey *Aepypodius bruijnii*, female; the first photograph of a living bird of this species, 12 August 2002. (photo © Kris Tindige).

The Natuurmuseum Rotterdam, already in possession of the complete head (Fig. 2) and some skeletal material of the specimen that proved the species' ongoing existence on Waigeo (Anonymus 2001; Post 2001; Heij & Post 2001), decided to secure the first specimen in-the-flesh available for science. In October 2002, Heij (CJH) and Moeliker (CWM) mounted the 'Waigeo Expedition 2002', travelled to Sorong to study and preserve the bird, and subsequently made it to Waigeo to find out more about its provenance (Moeliker & Heij 2002). Here we present information on this specimen and - following a surprising discovery in the literature - an up-to-date overview of all known specimens of *Aepypodius bruijnii* kept in zoological collections.

Figure 2. Bruijn's Brush-turkey *Aepypodius bruijnii*, female, complete head preserved in alcohol, collection Natuurmuseum Rotterdam, NMR 9989-01605. (photo © Hans van Middelkoop).

The new specimen

Careful attention by Papua Bird Club members had prevented the bird from decay, and in Sorong on 5 October 2002 it was handed over in a deep-frozen state to CJH and CWM. They took the following notes and measurements of the defrosted specimen:

GENERAL STRUCTURE: complete specimen with the left leg missing just below the tibio-tarsal joint, apparently due to a severe inflammation of a wound caused by the snare (incomplete tarsometatarsus [length 90 mm, proximal joint missing] and four phalanxes present as clean bones). Right tibio-tarsal joint rather flattened posteriorly, probably due to sitting on one (healthy) leg while in captivity. Thighs thick and fleshy, feathered down to tibio-tarsal joint. Plumage damaged, apparently due to struggle while hanging in the snare and subsequent stay in captivity: longest (central) tail feathers heavily worn, outer webs of outer primaries abraded or even missing, tips of most primaries missing or heavily worn. Right wing moulting: outer six worn primaries (P10 [outermost] - P5) present, others (P4 - P1) shed, and new ones just emerging; outer secondaries (S1 [outermost] - S5) shed, others present, new ones just emerging; no moult in left wing. BARE PARTS (names of colours beginning with a Capital are after Smithe 1975): iris brown (Amber), orbital ring grey (Olive-Grey); tarsus Dark Grayish Brown in front, gradually merging into a dull yellowish green on the upper three frontal scutes, the tibio-tarsal joint and the rear (of the tarsus); toes Dark Grayish Brown, claws Dark Grayish Brown, lighter towards the tip and silver-grey (Pearl Grey) below; culmen blackish-grey (Olive), darkest at the sides, tip silver-grey (Pearl Grey); lower mandible blackish-grey (Olive) on the sides, cutting edge, tip and underside silver-grey (Pearl Grey); palatum and tongue yellowish (Straw Yellow); nostril round, diameter 3.6 mm; ear opening oval, 4.0 x 2.7 mm; (bare) skin of head and neck Pink, sparsely covered below the eye, around the ear, on the chin, throat and hindneck, with grey thin hair-like bristles; on the forehead, crown, nape and especially just above the eye the bristles are blackish, more numerous and have a feather structure; on the forehead and centrally on the crown an emerging (?) 'comb' of pink papillae runs over a length of 42 mm; at both ends of the 'comb' the papillae are more numerous, fleshy and 4-5 mm high, in between they are more wart-like, tiny and structured in a single (4 mm wide) dense row; an (emerging?) inconspicuous wart-like thickening of the skin (grown with two rows of thin hair-like bristles) runs horizontally in a wide U-shape on the nape; down the foreneck at 64 mm below the base of the lower mandible the skin loosens and at a distance of 86 mm from the base of the lower mandible a small wattle emerges, coloured more reddish (Geranium Pink), 11 mm long and 8 mm wide (at the base); wattle sparsely covered with thin hair-like bristles.

MEASUREMENTS: weight 920 g; tarsus 97.9 mm; mid-toe 59.4 mm; mid-claw 20.5 mm; total head-length 76.6 mm; exposed culmen 28.8 mm; bill to nostril 21.6 mm; total bill-height at nostril (bill depth) 19.1 mm; height upper mandible at nostril 12.6 mm; wings incomplete, not measurable; tail worn, shortest outer feather 93.0 mm, longest (T5) 146.0 mm. PLUMAGE: upperparts, wings and tail Dusky Brown (woolly underlying feathers of rump and back Dark Greyish Brown); upper tailcoverts Dusky Brown, with broad reddish chestnut (Maroon) edges; chest dark grey (Blackish Neutral Grey), tinged olive with some centrally located feathers edged Chestnut; remainder of underparts gradually becoming lighter grey (Glaucous 80), feathers on the lower breast faintly edged Chestnut; thighs darker (Glaucous/Blackish Neutral Grey). ECTOPARASITES: at least 200 relatively large 'feather lice' fell down from between the plumage while the bird was being examined, all were collected and preserved in 70% alcohol; nits are only present on the upper surface of the greater under wing-coverts, neatly cemented in rows left and right of the shaft.

Figure 3. Bruijn's Brush-turkey *Aepypodius bruijnii*, study skin, collection Natuurmuseum Rotterdam, NMR 9989-01606; left: ventral view, right: dorsal view. (photo © C.W. Moeliker).

Blood samples were taken and the specimen was injected with and completely soaked in 70% alcohol. Before being dissected and prepared as a skin, both MRI and three-dimensional CT scans of the complete specimen were made at the Erasmus Medical Center, Rotterdam, revealing anatomical and osteological data that need further study. The specimen is kept in the collection of the Natuurmuseum Rotterdam, catalogue number NMR 9989-01606. It is preserved as a skin with both wings spread (Fig. 3), together with cleaned (incomplete) post-cranial skeleton (skull, left tarsometatarsus, all left phalanxes, radius, ulna, carpal and metacarpal bones remain in the skin), and all internal soft parts preserved in 70% alcohol. Dissection revealed a completely ossified skull (having a low but clearly visible bony comb), a well-developed ovary (17 x 8 mm, not in breeding-condition), no internal pathology, no subcutaneous fat and no fat between the organs; stomach empty (besides some sandy debris), crop filled with small cubes of coconut (fed during stay in captivity). Ectoparasites (feather lice) are being studied by Eberhard Mey and a first look at the material yielded a single species of *Lipeuroides* (Phthiraptera: Ischnocera, Philopteridae s.l.) a genus hitherto not known from *Aepypodius bruijnii* (E. Mey *in litt*. 25 January & 23 March 2003).

On 7 October 2002 CJH and CWM reached Waigeo where - in the village of Mumes, situated in the south of the island on the eastern bank of the mouth of Mayalibit Bay (for a map see Post 2001 or Heij & Post 2001) - they met Domi Kotem, the man who had trapped the bird. Like many other local inhabitants, he grows some vegetables and catches (coral) fish and forest birds for his own consumption. Kotem had trapped the Brush-turkey in an area where he normally only caught Dusky Megapodes *Megapodius freycinet* and Western Crowned Pigeons *Goura cristata.* In the 25 years he has lived in the south of Waigeo, he recalls having trapped about five Bruijn's Brush-Turkey's. Next day, Kotem guided CWM and CJH to the site where the bird was trapped (Fig. 4),

located at about 3 km east of Mumes[1] and 1500 m inland from the beach in the foothills at an altitude of c. 80-100 m (GPS coordinates 00° 20' 60'' S, 130° 58' 83'' E). The snare (a thin blue nylon rope) was still there, attached to the top of a sapling. The area has a surface of calcareous soil, (sharp) weathered limestone rock(s) and the vegetation consists of rather dry mature (but disturbed) forest with scattered old trees (height c. 40 m), open canopy, and undergrowth of young trees and numerous saplings. Mounds of *Megapodius freycinet* were common.

Figure 4. The site near Mumes, south Waigeo where *Aepypodius bruijnii* was trapped. (photo © Waigeo Expedition 2002).

The habitat where Bruijn's Brush-turkey was trapped differs considerably from the (breeding) habitat as discovered by Iwein Mauro. CJH and CWM visited that area on Mount Nook on 9 and 10 October. Up there, the forest floor has outcrops of consolidated rock (no limestone) and the habitat is undisturbed, lush, moist and resembles cloud-forest. The three locations where Bruijn's Brush-turkey has been encountered in recent years (Yenbekaki, Mumes and Nook) are all situated east of Mayalibit Bay, lie c. 30-50 km apart and represent three different habitat types. Both recent specimens are females, obtained outside the known breeding habitat in disturbed forest.

The forgotten specimen

While browsing through some old megapode literature, we came across Shufeldt (1919) which, among others, gives a detailed account of the megapodes present in the collection of the United States National Museum, Washington. In that publication, our eye was caught by a nice photograph of a right tarsus and foot of *A. bruijnii*, and further reading revealed that - to our surprise - the leg belongs to a specimen housed in the USNM-collection: [we cite Shufeldt (1919)] "… of these two [species of *Aepypodius*] the National Museum has but the first represented in a skin; it is a fairly good specimen. No. 146,767 (sex ?) – Waigiou. Museum Boucard. Coll., Bruijn.". In recent literature (Jones *et al.* 1995; Voisin *et al*. 2000), this museum is not known to hold any specimen of *A. bruijnii*. The skin is however still present in the Smithsonian Institution, National Museum of Natural History, Division of Birds, Washington. Gary R. Graves, Christopher Milenski and Brian K. Schmidt kindly provided us with label data, measurements and pictures from which we distilled the following details:

[1] Earlier reports (Moeliker 2002abc) mentioned Warsambin as location, but this proved to be wrong.

Catalogue number USNM 146767, entered in the USNM catalogue August 14, 1895. The specimen is a skin (with the left leg missing) bearing an original Museum Boucard label with '*Aepypodius bruijni*' [sic!], 'Bruijn' and 'Waigiou' written on it in black ink. Sex and date of collection not noted on the label. On a new label the following note is written: 'ulna and leg removed (to skel. coll'n) May 1986 J P Angle'. Measurements: wing right (flat) 304 mm; wing left (flat) 310 mm; head length (from tip of bill till outermost part of skull) 78.2 mm; exposed culmen 32.3 mm; nostril to bill tip (from distal end of nostril) 22.3 mm; tarsus (right) 102.5 mm; middle toe (right) without nail 60.3 mm; nail middle toe right 24.5 mm; tail 137.4 mm. Clean bones: tibiotarsus 150.9 mm; tarsometatarsus 108.6 mm; ulna c. 82.0 mm (based on picture). Wattles: one ventrally near the furculum, two dorsally on neck where bare skin meets feathers.

The Museum Boucard label is exactly the same as the one attached to the skin kept in the collection of the Zoologisches Museum und Institut, Hamburg (ZMH 42423). The label itself, the written information and the handwriting are identical, including the (usual) misspelling *bruijni*. The date of entry in the USNM catalogue is in accordance with what is known about the history of the Boucard collection: Adolphe Boucard, natural history dealer and plumassier, one of the great accumulators of 19th century bird collections, retired from business in 1894 and disposed the bulk of his private collection to MNHM-Paris and USNM-Washington (Mearns & Mearns 1998). The bones, skilfully taken from a wing and the left leg by Phil Angle, former manager of the USNM bird collection, were (at that time) the first skeletal material available for the species.

The first who gave an overview of the numbers and whereabouts of museum specimens of *Aepypodius bruijnii* was Meyer de Schauensee (1940). He had traced 12 specimens: two in Paris, one in London (now Tring), seven in New York, one in the Turati collection in Italy and one in Philadelphia, but he apparently overlooked the one 'next door' in Washington. Jones *et al.* (1995) added the museums of Leiden, Frankfurt, Hamburg and Dresden (each with one specimen) to the list, but erroneously reduced the number in New York to six. So by the end of the 20th century there were 15 specimens known to science. Recently, Voisin *et al.* (2000) discovered an astonishing six overlooked mounted specimens in the Paris collection and, shortly after, Dekker (2000) reported on a mounted specimen on display in the public galleries of The Walter Rothschild Zoological Museum in Tring. Since October 2001, this specimen is kept (next door) in the bird collection of The Natural History Museum, Tring (Mark Adams *in litt*. 22 April 2002). The (incomplete) specimen that proved the species' on-going existence on Waigeo in 2001 (Heij & Post 2001) is kept in the Natuurmuseum Rotterdam (Fig. 2), as is the complete specimen described in this paper (Fig. 3). At the moment, including the forgotten USNM specimen, there are 26 museum specimens of *Aepypodius bruijnii* known to science. They are all listed in Table 1.

The lost specimen

In the past four years we have examined all specimens of *Aepypodius bruijnii* ourselves, or studied pictures, x-ray images, label data and measurements, all kindly supplied by the curators in charge. Only one specimen, from the Turati collection kept in Milan, remained a mystery for a long time. However, on 11 March 2003 Giorgio Chiozzi, curator of birds at the Museo Civico di Storia Naturale in Milan e-mailed us the following: "… the specimen existed. It is listed in Turati's catalogue under the name *Epipodius bruynii* (sic!) (cat. no. 19644). It came from Papua (Waigiou). I have no information about the collector. Unfortunately this specimen was destroyed together with nearly 20,000 others in the fire following an RAF air raid over Milan in August 1943." So now we end up with 25 existing specimens. Who will locate the next?

Acknowledgements

We thank Kris Tindige for his loyal friendship and hard work during the Waigeo Expeditions, for his care of the captive bird and the way in which he managed to keep it frozen. The Waigeo Expeditions were financially supported by Stichting Moluccan and Papuan Wildlife Conservation Ecoguide Fund and Stichting Marinus Plantema. Getting reliable information on more than 20 specimens of *Aepypodius bruijnii* would not have been possible without the loans, help or hospitality of those in charge of bird collections in the United States and Europe: Mary LeCroy and Paul Sweet (AMNH-New York), Gary R. Graves, Christopher Milenski and Brian K. Schmidt (USNM-Washington), Leo Joseph (ANSP-Philadelphia), Jean-François & Claire Voisin (MNHN-Paris), Mark Adams (BMNH-Tring), Gerald Mayr (SMF-Frankfurt), Siegfried Eck (SMTD-Dresden), Harald Schliemann, Cordula Bracker and Nelson Mascarenhas (ZMH-Hamburg), Giorgio Chiozzi (MCSN-Milan), Martien van Oijen, René W.R.J. Dekker and Hein van Grouw (National Museum of Natural History/Naturalis, Leiden) and Cees S. Roselaar (ZMA-Amsterdam). Eberhard Mey (Naturhistorisches Museum, Rudolstadt) supplied preliminary information on the feather lice hosted by the new specimen. Theunis Piersma and Anneke Bol-den Heijer (NIOZ-Texel) did the molecular sex determination of NMR 9989-01605. Willem Schaftenaar (Rotterdam Zoo) took the x-rays of the specimens of ANSP, RMNH and ZMH, the other specimens were x-rayed by Peter Capainolo, Shannon Kenney and Kathleen Earls (AMNH), Jean Pierre Gasc and Eric Pellé (MNHN),

Mark Adams (BMNH), Siegfried Eck (SMTD) and Gerald Mayr (SMF). Gabriël P. Krestin, John J. Hermans and Filippo Cademartiri (Erasmus Medical Center, Rotterdam) took the MRI and CT scans of both NMR specimens. Jelle W.F. Reumer (Natuurmuseum Rotterdam) critically read the manuscript.

Table 1. Overview of all known specimens of *Aepypodius bruijnii* kept in zoological collections, with remarks on available data. [examined = specimen studied and measured by authors; pictures = photographs, label data and measurements received; label = label data and measurements received; x-rayed = x-ray pictures taken for further study; scanned = MRI and CT scans taken for further study].

collection and catalogue nr.	preserved as	status	remarks
MNHN C.G. 1880-1551 *	skin, previously mounted	present	examined, x-rayed
MNHN C.G. 1880-1553	skin	present	examined, x-rayed
MNHN C.G. 1886-12	mount	present	examined, x-rayed
MNHN C.G. 1887-416	mount	present	examined
MNHN C.G. 1887-417	mount	present	examined
MNHN C.G. 1999-3023	skin	present	examined, x-rayed
MNHN C.G. 1999-3024	skin	present	examined, x-rayed
MNHN C.G. 1999-3025	skin	present	examined, x-rayed
AMNH 539405	skin	present	examined
AMNH 539406	skin	present	examined
AMNH 539407	skin	present	examined
AMNH 539408	skin	present	examined
AMNH 539409	skin	present	examined
AMNH 539410	skin	present	examined, x-rayed
AMNH 539411	skin	present	examined
BMNH 1888.4.3.1	skin	present	examined, x-rayed
BMNH 1996.41.3517	mount	present	pictures, x-rayed
USNM 146767	skin, tarsus, tibia, ulna	present	pictures
SMTD 8228/9000	mount	present	label, x-rayed
ZMH 42423	skin	present	examined, x-rayed
RMNH cat.nr.1	skin	present	examined, x-rayed
SMF 27576	skin	present	label, x-rayed
MCSN / TURATI 19644	unknown	lost	G. Chiozzi *in litt.*
ANSP 140581	skin	present	examined, x-rayed
NMR 9989-01605	head, bones of wings and legs	present	examined, scanned
NMR 9989-01606	skin, post-cranial skeleton, all internal soft parts, blood	present	examined, scanned

MNHN = Muséum national d'Histoire naturelle, Paris; AMHN = American Museum of Natural History, New York; BMNH = The Natural History Museum, Tring; USNM = Smithsonian Institution, National Museum of Natural History, Washington; SMTD = Staatliches Museum für Tierkunde, Dresden; ZMH = Zoologisches Museum und Institut, Hamburg; RMNH = National Museum of Natural History/Naturalis, Leiden; SMF = Forschungsinstitut Senckenberg, Frankfurt; MCSN = Museo Civico di Storia Naturale (Turati collection), Milan; ANSP = Academy of Natural Sciences, Philadelphia; NMR = Natuurmuseum Rotterdam; * = type specimen.

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Successful synanthropy in an Australian megapode

Darryl Jones

Australian School of Environmental Studies, Griffith University, Nathan, Australia. E-mail: d.jones@griffith.edu.au

Despite a century of hunting pressure and habitat destruction, the Australian brush-turkey remains one of the most abundant and secure of all megapodes. In southern Queensland, Australia, the species is virtually ubiquitous in rainforest patches and is well-known in the suburbs of Brisbane, the largest city in the state. Indeed, its presence in suburbia has lead to a remarkable human-wildlife conflict, with many householders complaining to the wildlife authorities about the loss of valuable plantings and the destruction of entire houseyards as male brush-turkeys construct their mounds during the months of August and November.

To gain some idea of the distribution of the species in the Brisbane area, a study was conducted in 1989-90. Jones and Everding (1991) found the species to be present in 39 suburbs, mainly those clustered around the largest area of forest, Brisbane Forest Park. In the decade since this time, anecdotal observations have suggested that the species may have increased its presence within the city. To assess this, Birds Queensland (the largest ornithological organization in the state) initiated a survey aimed at determining the current distribution of the Australian brush-turkey with Brisbane.

Data was collected by Birds Queensland members and the general public and reported by dedicated telephone line or email to a central collation point. Information was obtained on the number of birds sighted, the presence of juveniles or wattled males, and the presence of incubation mounds. Locations were identified as accurately as possible in terms of street addresses as well GSP data which was obtained either on-site or remotely via a *Geoscan* program of Brisbane.

In the eight month period August 2002 – March 2003, a total 228 separate sightings of brush-turkeys were made from with the Brisbane area. This compares to about 110 reports for the earlier period. The distribution of these sightings was also far greater than the earlier study; breeding birds were no longer concentrated only around Brisbane Forest Park but were found throughout most areas, including some relatively far from large forest remnants.

These results indicate that the species appears to have very successfully adapted to living with humans in the suburban environment, a process known as synanthropy. Typically, synanthropic birds tend to be generalist foragers and scavengers (such as corvids, pigeons, sparrows and starlings) or species able to successfully exploit particular features of the urban landscape (such as thrushes and swallows)(Marzluff *et al*. 2001). The Australian brush-turkey appears to belong to the latter group: its reproduction requires the construction of a 'compost heap' of material suitable for the generation of heat. Many householders in Brisbane enhance the sub-tropical nature of the region and fill their gardens with a variety of rainforest species. This practice appears to have greatly favoured the brush-turkey.

These findings are, nonetheless, surprising in that Jones & Everding (1991) predicted that the enormous predation pressure on hatchlings (from domestic cats and dogs as well as urban foxes etc) would seriously constrain the spread of the species in this human-dominated. The question of how these apparently extremely vulnerable young birds are surviving remains to be investigated.

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Monitoring the Nicobar Megapode *Megapodius nicobariensis*

Phase I: Current status and conservation of the Nicobar Megapode *Megapodius nicobariensis*

K. Sivakumar

Wildlife Institute of India, P.O. Box # 18, Chandrabani, Dehradun – 248001, India.
e-mail: ksivakumar@wii.gov.in

Summary of the proposed study

The Nicobar Megapode *Megapodius nicobariensis*, endemic to the Nicobar islands, is considered vulnerable. Although its distribution, status and ecology are generally known, information on population trends are essential for understanding its survival. Hence, a long term study for the next 30 years has been proposed to the Government of India. The first phase of six months will document the current status and identify permanent sample sites for long-term monitoring. During this phase, forest officials will be trained to monitor the populations and their habitat. This phase has been approved by the Training, Research and Academic Council (TRAC) of the Wildlife Institute of India. It will be initiated by the end of 2003. The results will help to identify permanent sites for long-term monitoring. The final output will be used to prepare a long-term conservation plan for the Nicobar Megapode.

Introduction

The Nicobar Megapode, endemic to the Nicobar Islands, is considered vulnerable by habitat destruction (Sankaran, 1995; Dekker *et al*. 2000). The last systematic survey was carried out between 1992 and 1994 (Sankaran, 1995). After a detailed study of the ecology of the species it was understood that information on population trends is essential for the long-term conservation of the species (Sivakumar, 2000). Hence, this study is proposed with the following objectives.

Objectives

Phase I: (6 months: approved)

1. To study the current status of the Nicobar Megapode
2. To identify permanent sample sites for long-term monitoring
3. Training forest officials to monitor populations and habitat of the Nicobar Megapode

Phase II:

1. Long-term monitoring of populations and habitat of the Nicobar Megapode

Methods

The study period is scheduled for the next 30 years, starting with phase I lasting six months. The first phase was recently approved by the Training, Research and Academic Council (TRAC) of the Wildlife Institute of India. During phase I field surveys will be conducted, starting December 2003 and lasting until March 2004. Data analysis and report writing will be in April and May 2004. After 2004, monitoring will be executed one month per year. During this month, the first 10 days will be spent on field surveys by forest officials. The next 10 days the data will be gathered and transferred to the headquarters in Port Blair and Campbell Bay. The last 10 days will be used for data analysis and interpretation by forest high officials including the Chief Wildlife Warden of Andaman & Nicobar Islands. As my previous study on the breeding biology of the Nicobar Megapode revealed that the peak period of egg-laying is between February and March, this period will be used for continuous monitoring the permanent sample sites. All mounds in these sites will be geo-referenced and changes in habitat will be plotted in the remote-sensed maps using GIS.

As mounds are stationary, inanimate and represent breeding, the best way to estimate and monitor the populations is by assessing the number of active mounds. The coastline of 16 islands where the species is present will be surveyed for mounds following previous survey methods (Sankaran, 1995) which will make the results of this study comparable with the data collected in the early 1990's. Line transects will vary in length between 0.5 and 2 km depending upon size of the islands. The census will be executed by three observers walking at a distance of 20 m, 40 m and 60 m parallel to the seashore. Some transects will be in the interior of the islands to check for megapode mounds there. To estimate the total number of active mounds, the coastline of each island will be divided into segments based on similarity of habitat. While counting the mounds, information on human impact on the habitat will be collected. Type of habitat, size of the island and level of anthropogenic disturbance will be considered while selecting the permanent sampling sites.

Alternative method

If yearly monitoring will not be approved by TRAC, sites might be monitored once every three years as they suggested. This will depend on the result of phase I.

Expected output

Phase I:

1. Current status of the Nicobar Megapode
2. Locations of permanent sites from where continuous monitoring will take place
3. Trained forest staff for Nicobar Megapode population monitoring

Phase II:

Long term conservation plan for the Nicobar Megapode.

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BirdLife/WPA/SSC Megapode Specialist Group
Megapode Newsletter, Vol. 17, nr. 1
April 2003

Megapode Genetics Project Proposal

Gillian C Baker

Dept. of Biodiversity and Conservation Biology. University of the Western Cape, Private Bag X17, Bellville, 7535, Cape Town, South Africa. Tel: ++27 21 9593544. e-mail: gbaker@uwc.ac.za

For the past nine years I have worked in the field of molecular biology and have conducted my megapode conservation fieldwork during holidays and sabbaticals. I have now finally been offered the opportunity to combine my passion for megapodes with my expertise in the laboratory. I am managing the molecular zoology laboratory at the University for the Western Cape and am able to begin answering some of the many questions about megapodes that can be addressed using molecular methods. Currently I am addressing two questions, as pilot studies:

- Can megapode eggshell membranes be used reliably as a source of DNA for population studies?
- Are any of the molecular population markers designed for other galliforms applicable for amplification of megapode DNA.

During 2003-2004, I shall be embarking on my primary research project on Maleo *Macrocephalon maleo* conservation genetics (see below). I am also keen to develop a research group to work on wider aspects of megapode genetics and have the possibility of recruiting students to conduct further molecular megapode studies. I am eager to hear from other megapode researchers who have specific questions that they would like answered using molecular methods and look forward to successful collaborations with other members of the MSG. I would also be happy to hear from anyone who has comments on my proposed studies or would like to be involved in my work.

Primary Project for 2003 – 2004: Do nesting grounds have discrete populations of Maleos using them and does the Maleo exhibit nesting site philopatry?

Background and Justification

Of the 142 Maleo nesting grounds reported in Sulawesi, 48 have already been abandoned and a further 51 are severely threatened. One of the primary reasons for nesting ground abandonment is habitat disturbance, both at the nesting ground itself and along the corridors linking foraging habitat to nesting grounds. Maleos are weak flyers and, especially when gravid, rely on movement between trees rather than flying long distances over open areas. As nesting grounds become more isolated from each other gene flow between populations may decline until they become genetically unviable. Radio-tracking and classical tagging studies have been attempted in the past to ascertain the movements of both adult Maleo and their chicks. These studies have been unsuccessful due to the poor durability of tags and the terrain over which birds must be tracked. Maleo are a relatively long-lived species (three decades in captivity), and are thought to take several years to reach reproductive maturity. It is thus logistically difficult to follow the behaviour of chicks that are tagged upon hatching. Molecular methods have been used elsewhere to infer the behaviour of animal populations. For example, using maternally inherited mitochondrial DNA markers and biparentally inherited nuclear markers researchers have been able to conclude that female turtles exhibit nesting site philopatry, and gene flow between populations at different nesting grounds is mediated by males that do not return to the nesting ground at which they hatched. A study of mitochondrial and nuclear markers in Maleo would provide information on their nesting behaviour and the extent of gene flow between populations. If Maleos do exhibit nesting site philopatry it would be possible to move eggs from endangered nesting grounds to safe areas and gene flow could be mediated by transferring eggs between nesting grounds. In order to conduct a molecular study DNA or protein samples are required. Traditionally blood or tissue samples were required. In recent years however successful studies have been conducted using non-invasive sampling methods, such as collection of urine, faeces, moulted feathers and eggshell membranes. Communal nesting grounds are an excellent source of Maleo eggshell membranes and may be used as a source of DNA. Eggshell membranes have been collected from two nesting grounds by Martin Christy of WCS during his MSc research on Maleo in North Sulawesi. Members of another Indonesian NGO (PALS) are also working at Maleo nesting grounds and may be able to provide samples from other nesting grounds. At present, molecular markers are available for other galliforms, but none have been used or tested on Maleo. Testing of known markers and development of new markers will thus form an integral part of this project.

Request for molecular material

In order to conduct my research I will need access to the following material:

- Genomic DNA from *Macrocephalon maleo*

- Reliable avian-specific primers that amplify approx 300bp to check positive amplification of megapode DNA from eggshells.
- Mitochondrial D-loop primers specific to Aves or preferably Galliformes.
- Microsatellite, RAPD, AFLP primers designed for other galliformes that may amplify megapode DNA.

If anybody can donate aliquots or can provide primer sequences for any of the above I would be most grateful.

Acknowledgements

Thank you to those people who responded to my email and Galliform listserv requests: Sharon Birks, John Carroll;, Brant Faircloth, Gernot Segelbacher. Also many thanks to Martin Christy and Stephen Lentey of WCS for their invaluable role in the field.

Polynesian Megapode *Megapodius pritchardii* status survey on Late and Fonualei

René Dekker

The Polynesian Megapode *Megapodius pritchardii* is the rarest of all 22 megapode species (Megapodiidae, Galliformes, Aves). With an estimated 188-235 pairs in 1991-1993 restricted to the tiny volcanic island of Niuafo'ou, Kingdom of Tonga, it is listed as critically endangered (B1 + 2e: IUCN-criteria) in the Megapode Action Plan 2000-2004 (for more information see p. 17-18; 24-25) and in various publications by BirdLife International. From 1991 to 1993, 60 eggs were buried at volcanically heated sites on Late, and an additional 35 eggs and chicks were transferred to Fonualei, both uninhabited and rarely visited by humans. Surveys in 1995, 1996, and 1997 *claimed* that the re-introduction to these islands (where according to the fossil record the species occurred in pre-human times) was successful, but no written evidence was published.

Dick Watling, conservation expert for the region and living in Fiji, will bring short visits to the small islands of Late and Fonualei in March 2003 to survey both for the presence of Polynesian Megapodes. His findings will prove whether or not new populations of this critically endangered species have indeed been established and thus whether or not re-introduction is a useful tool in the conservation of this species. If it turns out to be successful, it might also downgrade the species status from critically endangered to endangered as their numbers will not only be higher than estimated for Niuafo'ou alone, but even more important, their distribution will be expanded to two or three islands instead of one. Also, when the re-introduction turns out to have been successful (this was the first ever re-introduction of megapodes by means of eggs and/or chicks alone – not by transferring adults) it could be expanded for this species as well as for other endangered megapodes as described in the Megapode Action Plan 2000-2004.

Watling will visit Late (3 days) and Fonualei (2 days) and, with the use of play-back recordings, estimate the density of Polynesian Megapodes on these islands. The use of play-back territorial calls did work extremely well when Dekker visited Niuafo'ou in 2001, with birds strongly reacting, coming close towards the recorder. It is also of great interest to see whether these birds, which hatched or were released as chicks on Late and Fonualei, and therefore never experienced human presence (other than the chicks who were handled shortly after hatching), are as shy as their parents on the island of Niuafo'ou. We hope to report on Watling's expedition in the next issue of the Megapode Newsletter.

STOP PRESS: Dick Watling, who just returned from Fonualei and Late, reported Polynesian Megapodes to be common on Fonualei, but seemingly absent on Late (he indicated that his stay there was perhaps too short; a return trip is planned for 2004). These results prove that the translocation of eggs to Fonualei by Dieter Rinke and the Brehm Fund in the early 1990's has been very successful indeed. Re-assessment by BirdLife International of the conservation status of the species based on this new information resulted in it being downlisted from Critically Endangered to Endangered. Dick Watling's full report will be in the October issue of the Megapode Newsletter.

BirdLife/WPA/SSC Megapode Specialist Group
Megapode Newsletter, Vol. 17, nr. 1
April 2003

Successful hatching of a Wattled Brush-turkey *Aepypodius arfakianus* in the Amsterdam Zoo *Artis*

René Dekker

On June 21st, 2002, a chick of the Wattled Brush-turkey *Aepypodius arfakianus* hatched from a mound in an aviary of the Amsterdam Zoo *Artis*. After years of unsuccessful attempts, this was the first *Aepypodius* chick ever to hatch in Amsterdam. Unfortunately, none of the remaining eggs hatched. After successful breeding of this species in the Rotterdam Zoo, The Netherlands, in the 1980's (Anon, 1986. Dieren, 3: 106-108), in Vogelpark Walsrode, Germany (Kloska & Nicolai, 1988. J. f. Orn. 129: 185-204), and in Mallorca, Spain, this constitutes the fourth record of successful breeding in captivity of the Wattled Brush-turkey. As pictures of *Aepypodius arfakianus* chicks are very rare, *Artis* allowed us to publish a picture here, for which the Megapode Specialist Group is extremely grateful.

Aepypodius arfakianus, *Artis Zoo, Amsterdam 26 June 2002. Age 5 days. Photo © Artis/Goos van der Sijde.*

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[2] The Megapode Specialist Group has emailed you this report in February 2003 as pdf file. If you have not received it, please reply to dekker@naturalis.nnm.nl.

BirdLife/WPA/SSC Megapode Specialist Group
Megapode Newsletter, Vol. 18, nr. 1
October 2004

Megapode Newsletter Vol. 18, nr. 1

October 2004

Dr. René W. R. J. Dekker, National Museum of Natural History, P.O. Box 9517, 2300 RA Leiden, The Netherlands. Tel. 31 71 5687623; Fax 31 71 5687666; e-mail dekker@naturalis.nnm.nl
Dr. Darryl N. Jones, Australian School of Environmental Studies, Griffith University, Nathan, Australia. e-mail: d.jones@griffith.edu.au
Dr. Gillian C. Baker, Dept. Biodiversity & Conservation Biology, University of Western Cape, Private Bag X17, Modderdam Road, Bellville 7535, Cape Town, South Africa. e-mail: gbaker@uwc.ac.za

Dear megapoders

Finally, after one-and-a half years, we can present you with a new issue of the Megapode Newsletter. It is not that nothing has happened. On the contrary, we would like to say. The Megapode Specialist Group participated at the Third International Galliformes Symposium, 5-10 April 2004, India, organised by the World Pheasant Association. Here we held a small, but much appreciated mini-symposium on our group. A summary of the papers presented at the symposium are included in this newsletter. At that same meeting Gillian Baker, involved in megapode studies and conservation for more than 15 years now, was elected co-chair of our Specialist Group. Her first and also major task is to compile the third edition of the Megapode Action Plan (2005-2009). As in the previous two Action Plans, the imput and help of the World Pheasant Association is substantial.

After last years' spectacular discovery of a thriving population of Polynesian Megapodes *Megapodius pritchardii* on Fonualei, Tonga, Dick Watling went to the island of Late, to see whether a population of the same species was established there following the translocation of eggs and chicks there in the 1990's.

The Philippine Megapode *Megapodius cumingii* is still very poorly known, especially populations on offshore islands between Sulawesi, the Philippines and Kalimantan. In fact, other than skins in museum collections, no one has ever reported about these small island populations. Guntram Meier visited one of these islands off the east coast of Kalimantan, Indonesia, for a project on rat eradication. During his visit to the island of Sangalaki, he observed the birds and reports about his finding here.

Finally, Sander Pieterse, a student of the Leiden University, discusses the systematic position of the Maleo *Macrocephalon maleo*. Sharon Birks, who studied megapode phylogeny based on nuclear and mitochondrial DNA sequences, gives her reaction.

The editors

BirdLife/WPA/SSC Megapode Specialist Group
Megapode Newsletter, Vol. 18, nr. 1
October 2004

Megapode Symposium Dehra Dun, India

Abstracts

Non-invasive genetic methods for the study of megapodes and other Galliformes

Gillian C Baker, Department of Biodiversity and Conservation Biology, University of the Western Cape, Private Bag X17, Bellville, 7535, South Africa. (e-mail: gbaker@uwc.ac.za)

There is a paucity of information regarding megapode behaviour and distributions away from nesting grounds. Radio-tracking has been successfully employed to follow brush-turkey chicks in the wild, but attempts to monitor the movements of adult megapodes have been largely ineffective. Capturing gravid adult females has been reported to cause death through egg breakage, and disturbance of birds at nesting grounds may affect reproductive behaviour. Genetic methods offer a means to make inferences about certain aspects of animal behaviour without the need for radio-tracking. Developments in molecular biology now also allow genetic studies to be conducted non-invasively. Over the past ten years many researchers have used DNA from feathers, hair and faeces for genetic studies, and more recently membranes from hatched eggs have been exploited as a source of DNA. Megapode nesting grounds and mounds are a wonderful source of discarded egg membranes, and thus a source of DNA for genetic studies. Here we explore methods for preserving and extracting DNA from megapode egg membranes and discuss methodologies for inferring information about megapode and other Galliform populations using non-invasive genetic methods.

Dr. Gillian C. Baker, 6 April 2004 (Photo: Philip McGowan/WPA)

The secrets of success: a megapode thriving in urban environments in Australia

Darryl N Jones, Australian School of Australian Environmental Studies, Griffith University,
Nathan, Qld 4111, Australia. (e-mail: d.jones@griffith.edu.au)

Most of the 22 extant species of megapode are of considerable conservation concern, some critically so. During the first half of the twentieth century, the Australian brush-turkey *Alectura lathami* was extremely shy and rarely seen, largely due to habitat destruction and over-hunting. Since the 1970s, however, the species has made a dramatic recovery and has returned to some of its previous range. Its recovery has been especially remarkable in suburban environments of southeast Queensland. This region has the fastest growing human population in Australia, and the associated urbanisation is destroying significant amounts of native vegetation annually, with many negative biodiversity outcomes. Nonetheless, the Australian brush-turkey continues to thrive. A series of surveys of the distribution of the species throughout the period of its recovery (in 1979-81, 1989-90 and 2002-3) has allowed changes in its presence to be investigated in detail. Factors enabling the species to prosper include: the legal protection of the species in 1972; the existence of many forested areas within the suburban matrix; the species' ability to utilise many sources of organic matter for the construction of its incubation mounds; the remarkable tolerance of developing embryos to variable thermal conditions; and the construction of sub-tropical gardens by large numbers of householders. What remains a mystery is how hatchlings are able to survive so well, despite the many predators and other hazards.

Surviving without parents – the life of megapode chicks

Ann Göth, Animal Behaviour Lab, Dept. of Psychology, Macquarie University,
Sydney, NSW 2109, Australia. (e-mail: ann@galliform.psy.mq.edu.au)

Megapodes share a feature unique amongst birds: they neither incubate their eggs nor look after their young. This talk will show how their chicks survive without assistance from their parents, and is based on several years of research on chicks of the Polynesian megapode *Megapodius pritchardii* and predominantly the Australian brush-turkey *Alectura lathami*. The talk will focuss on the following themes: 1) the behaviour of chicks following hatching in an underground nest; 2) the survival and spatial distribution of chicks in the wild; 3) the behavioural development of hatchlings studied in large outdoor aviaries, in particular their ability to recognise predators, food and social companions. Implications of these results for the management of endangered megapode species will also be discussed.

2000-2004: Summary of results of five years megapode research and conservation

René W.R.J. Dekker, National Museum of Natural History, P.O. Box 9517,
2300 RA Leiden, The Netherlands. (e-mail: dekker@naturalis.nnm.nl)

During the Action Plan Period 2000-2004 our knowledge of megapodes has increased dramatically while the conservation status of some rare and threatened megapodes has changed due to new information and results of conservation projects from the past. Through the activities of both academic and volunteer researchers, sometimes under very harsh conditions, we have gained spectacular results varying from studies into the behaviour of megapodes chicks under laboratory conditions to the rediscovery and surveys of the enigmatic Bruijn's Brush-turkey *Aepypodius bruijnii* on the West Papuan island of Waigeo. The conservation status of the Critically Endangered Polynesian Megapode *Megapodius pritchardii* from Niuafo'ou, Tonga, has been downgraded to Endangered due to the establishment of a second population on the uninhabited island of Fonualei, Tonga. Local initiatives have been stimulated and implemented in the Solomon Islands and in Vanuatu to protect the Melanesian and Vanuatu megapodes *Megapodius eremita* and *M. layardi*. The Maleo *Macrocephalon maleo*, however, seems to be in more serious trouble despite continuing conservation projects. Its conservation status has recently been upgraded from Vulnerable to Endangered due to rapidly decreasing conditions these endemic megapodes have to face in Sulawesi.

Note: full papers will be published by the World Pheasant Association in the Proceedings of the Conference.

No sign of translocated Polynesian Megapodes on Late Island, Kingdom of Tonga

Dick Watling

In 2003, a survey of Fonualei island in Tonga's Vava'u Group confirmed that the future of the Malau or Polynesian Megapode *Megapodius pritchardii* appeared much more secure after a breeding population was established on this uninhabited volcanic island. Unfortunately, a follow up survey, just completed, of the much larger Late Island has failed to find any sign of the Malau on the island. The 2004 survey of Late, July 20-25th, was again funded by the Van Tienhoven Foundation for International Nature Protection and undertaken by Fiji-based ornithologist, Dick Watling, with assistants Eva Taumalolo and Siua Maile.

The Polynesian Megapode was categorised as 'Critically Endangered' on the World Conservation Union's 'IUCN Red List of Threatened Species' after a survey by Ann Göth and Uwe Vogel (1991-1993) found an estimated population of about 200 pairs. Their study revealed that this very special Tongan bird was suffering continuing predation from cats, dogs and human activity.

Late has an area of nearly 19 km^2, is almost completely forest-covered and has had no recent volcanic activity. As such, Late has been considered much more likely to provide a secure translocation site than Fonualei which is a vigorously active volcanic island of less than 5km^2.

The survey on Late concentrated around the brackish inland lake where the eggs were buried in 1993. No sign of Malau nesting was found here or elsewhere. In addition, calls of the Malau were repeatedly broadcast from sites giving a good view of the surrounding area – but no Malau responded and none were seen. On Fonualei, this method had been very successful in attracting curious Malau to come to the broadcast site. The survey confirmed the apparently very suitable habitat of the island, but also noted the remarkable devastation caused by Cyclone Waka in 2001 – it is estimated that 30-50% of all large trees on the island were lodged. Movement on the island is currently very difficult with dense regeneration and extensive tangles of vines around the myriad of fallen trees.

In June 1989, the Government of the Kingdom of Tonga initiated a bird conservation programme with the Brehm Fund for International Bird Conservation based in Germany. The Tongan project was directed by Dr Dieter Rinke and in 1993 Dr Rinke's associates Ann Göth and Uwe Vogel undertook the translocation of 63 Malau eggs from Niuafo'ou to Late in two separate visits.

For further information contact: Dr Dick Watling at watling@connect.com.fj or www.pacificbirds.com
and/or Dr Ann Göth at ann@galliform.bhs.mq.edu.au

Contributions to the Annual Review of the World Pheasant Association: news from Australia

Darryl N. Jones

Insights into megapode speciation from ectoparasite studies of Australian brush-turkeys

Workers interested in speciation have long been interested in the comparing animals hosts and the parasites they carry. Megapodes carry a remarkable diversity of feather-dwelling parasites, particularly feather lice and mites. However, the usual means by which parasites infect the next generation is through contact with parents, a relationship effectively absent in megapodes, a fact making this group especially interesting. Heather Proctor and Darryl Jones studied the feather mites on Australian Brush-turkeys *Alectura lathami* in sites spread over more than 2000 km of their range in eastern Australia. Geographical clustering of mites species was evident but generally the ectofaunal diversity was much more homogenous than expected (see Proctor & Jones, 2004).

One urbanised megapode is thriving

Whereas many species of megapode are facing an extremely uncertain future, the Australian Brush-turkey *Alectura lathami* is doing unexpectedly. Although the species is abundant throughout many urban areas in southern parts of its Australian range, evidence of massive juvenile mortality due to predation by feral cats

and other predators suggested that perceptions of abundance may be coloured by conflicts with suburban residents. However, a recent detailed survey by Jones, Sonnenburg and Sinden has found that the species has increased its presence – though not its range – with suburban areas of the large city of Brisbane, Queensland. This strongly suggests that chicks are managing to survive in numbers despite very high rates of predation. Part of the increased presence in previously uninhabited locations appears due to illegal human translocations rather than natural dispersal.

Great community interest in the arid-zone megapode

In the remote rural areas of Western Australia, the seriously threatened Malleefowl *Leipoa ocellata* has become a major issue for an entire community. Through the endless energies of the Malleefowl Preservation Group, school children, townsfolk and farmers have combined to revegetate land, remove predators, report sightings and rehabilitate chicks. This community-based programme is now recognised nationally as a model for practical conservation.

The Philippine Megapode *Megapodius cumingii* on Sangalaki, East Kalimantan, Indonesia: observations and conservation through rat eradication

Guntram G. Meier

Invasive Animal Controller / Member IUCN-SSC Rodent Specialist Group, InGrip-Consulting, Strassmannstr. 46, D – 10249 Berlin, Germany. e-mail: contact@ingrip.com

Introduction

Between June 16th and July 30th, 2003, eradication of invasive Black Rats *Rattus rattus* took place on the island of Sangalaki, Derawan-Islands Group, East Kalimantan, Borneo, Indonesia. The circular island, measuring 13.2 ha and part of a group of half a dozen of islands with a few thousand inhabitants, is situated almost 100 km east of the coastal town of Tanjung Redeb. Considering its small size, Sangalaki is relatively well forested with mature secondary forest surrounded by sandy beaches. A small diving-station and diving-resort as well as a monitoring station mainly financed by the German-based Turtle Foundation, which cares for the conservation of the Green Turtle *Chelonia mydas*, is all that is found on the island. The Turtle Foundation, with the assistance of local conservation authorities, has achieved that since January 1st, 2002, the island is fully protected and collecting of turtle eggs and hunting of birds has stopped since.

Black Rats were once introduced to the island, assumingly and unintentionally by local fishermen. Their impact on the island flora and fauna was only fully recognized after the islands' full protection in early 2002. Rats were preying heavily on sea turtle eggs and hatchlings, but also on birds, eggs, as well as invertebrates, native flora, and of course the resorts' tourist supplies. Therefore rat eradication was seen as an inevitable solution – a work my company executed within six weeks.

In the preparation phase, a risk-assessment with regard to the island's native wildlife was made. Non-target species were identified to avoid damage to their populations. It soon turned out that megapodes occurred on Sangalaki. Although initially believed to be an unknown species, they were later identified as Philippine Megapodes *Megapodius cumingii*, of which the subspecific status is not fully clear though (see Jones et al., 1995: 166; R.W.R.J. Dekker, pers. comm.). During my work on the island observations were made and many aspects of the megapode's behaviour were recorded. A summary is given here.

General observations

Although shy, the Philippine Megapodes on the island were seen regularly and sometimes from a very close distance. They are similar in size to the nominate form *M. c. cumingii* as illustrated and described in Jones et al. (1995) but their plumage is rather different, being very dark overall, with only a few dark brown parts on their hind neck and head. Their dark plumage was especially remarkable on the wings and flanks. No red bare parts as illustrated in Jones et al (1995: plate 6) were visible on the head. Juvenile and immature birds were almost uniformly black. These observations were confirmed by various people on the island, including staff of The Nature Conservancy (TNC), a German TV-crew and Prof. Jonathan Kingdon, Oxford, who

incidentally paid a visit to this place while I was there. Jones et al. (1995: 166) already indicated that the subspecific status of the Philippine Megapode in this part of their distribution area is still unclear which seems to be confirmed by my observations.

The megapode population was estimated at 20–25 adult birds, while an estimated 10 immatures and at least 5 juveniles were seen. Some megapodes were very territorial as they were always seen in more or less the same area. They also seemed to be monogamous and showed territorial behaviour. In most cases a nesting mound was situated within such an area. Especially in the beginning of the project, in June, the birds were very vocal. During this period the megapodes were encountered chasing each other and fighting on the forest floor which always involved two to five birds, nervously calling and jumping like chickens, fighting the opponent with their legs and wings.

Vocalizations

At least three different calls were made by the birds in different situations. The German TV which documented the rat eradication project managed to record two of these on tape. Callings were always performed during the day with a peak in morning and early afternoon. In contrast to the literature, no calls were ever heard at night. Calls were always performed from the forest floor, except when two fighting birds attacked each other while jumping in the air.

TYPE I call was a rising moaning-mewing-like call "Niiiiauuuuu", lasting for five seconds, which descends in pitch toward the end. It was performed mainly when birds reacted to others over some distance. It continues for several minutes and is sometimes performed as a duet by a pair. Jones et al. (1995: 172-173) suggest that *M. cumingii* might not perform duets.

TYPE II was a pheasant- or crow-like "Graaak Graaak", which was often heard when birds were disturbed and fled. It was sometimes heard when birds chased each other.

TYPE III is similar to Type I but significantly shorter and more harsh. It is a very high whistling-screaming "Tsieeee" call, which rises continuously until it suddenly stops. This sound, which lasts about one or two seconds, was performed as a sort of alarm call, mainly during fighting and chasing or with increasing aggression. It was heard once when a bird fled after being attacked by a Monitor Lizard *Varanus salvator*.

During the six weeks of my presence, the birds were more often seen in pairs. On one occasion a pair was caught by surprise and after it fled in two different directions, separated by a trail, it started calling to each other (TYPE I call described above). Observations of solitary birds nearly always involved juveniles or immatures. Roosting occurred on medium-size branches in the lower parts of bigger trees and mostly over open areas or above trails. It seemed the same branches were used regularly.

Breeding

Breeding took place all over the island but with a higher density in the less-developed western and central part of the island (the resort is situated on the eastern side of the island). Eleven active mounds were found as well as at least half a dozen of overgrown, non-used mounds. In addition to this I recorded another three sites where excessive digging had occurred. Three more nesting holes were dug between roots of rotten trees. Digging and mound attendance seemed to take place nearly exclusively during the morning hours. The biggest mound measured 1.5 m in height an 3–4 m in diameter. Burrows were found in sand along sandy beaches and between decaying roots of rotten trees. As there are no geothermal sites on Sangalaki or on the nearby islands, volcanic nesting does not occur here.

Monitor lizards regularly dug in or near the mounds probably looking for eggs or even chicks, although the successrate seemed low. The introduced rats, however, seemed to cause a bigger threat. The eradication project showed that high concentrations of rats lived near the mounds and sometimes probably even inside mounds. At one occasion an injured chick was seen with bite marks on its head and neck which might have been caused by rats. Before the chick could be captured and photographed it managed to get away though.

Conservation

No hunting or egg collection by humans occurs on Sangalaki, thanks mainly to the conservation efforts of the Turtle Foundation. However, no control takes place on the surrounding islands where the megapode occurs and eggs are said to be taken there. Sangalaki might therefore become the only island in the area that will

support the species in the future. This might also be of influence on the Sangalaki population as immigration, either naturally of through human involvement, will become impossible. Now that some 600 rats have been eradicated from the island, the megapode population will hopefully increase. No non-target species, such as megapodes, were reported as victim of the eradication process. This was a critical point as poison was used all over the island and for a longer period of time to exterminate the rats.

On Sangalaki, the rat eradication project was carried out with success and although designed for the well being of marine turtles, it also seems to benefit the megapodes on the island. To further clarify the subspecific status of the megapodes as well as their conservation needs it would be desirable to initiate a project on the island. The Turtle Foundation (http://www.turtle-foundation.org) has the necessary infrastructure on the island and valuable contacts in the region to support such work. Everybody interested is free to contact me or the Turtle Foundation for further questions.

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Problems regarding the systematic position of *Macrocephalon*

Sander Pieterse

c/o National Museum of Natural History, P.O. Box 9517, 2300 RA Leiden, The Netherlands

During a three-month student training course at the National Museum of Natural History/Naturalis, I studied megapode phylogeny under the supervision of René Dekker. I compared and combined molecular and morphological phylogenies published by Brom & Dekker (1992), Mey (1999), Birks & Edwards (2002) and Dyke et al. (2003). One of the reasons to do this was because the position of *Macrocephalon* in Brom & Dekker (1992) differs significantly from Mey (1999), Birks & Edwards (2002), and Dyke et al. (2003). Brom & Dekker (1992) link *Macrocephalon* to *Megapodius* (and *Eulipoa*), whereas the others link it to the clade of *Leipoa*, *Talegalla*, *Alectura* and *Aepypodius*. In the phylogeny of Birks & Edwards (2002), based on a combined data set of ND2 and RDP1 DNA sequences, the branch of *Macrocephalon* carries a bootstrap value (1000 replicates) of 56. This doesn't seem very satisfying, but the RDP1 phylogeny on the other hand shows a high bootstrap value of 82. One of the aims was to shed new light on the systematic position of *Macrocephalon* within the family.

A morphological data set has been built, using traditional morphological characters from Brom & Dekker (1992) and Dyke et al. (2003) and parasite data from Mey (1999). The following traditional morphological characters were selected on the basis of their utility: 1) wing taxis, 2) presence of wattles, 3) presence of a tuft of feathers on the uropygial gland, 4) the presence of red powder on the egg shell, 5) the amount of yolk, 6) the shape of the tail, and 7) the feathering of the head. In the analysis, these characters were given equal weight as the parasite characters. These characters were scored over the seven genera instead of the species, due to insufficient power of the characters to distinguish species within one genus (especially within *Megapodius*). Maximum parsimony was used as a criterion.

Only mitochondrial ND2 sequences were analysed, because there were some alignment problems with the RDP1 sequences that could not be overcome in the short amount of time. The omission of the RDP1 data should be born in mind taking the conclusions into account. The ND2 sequences were aligned and weighted according to the relative amount of changes on the three codon positions and the relative amount of transitions and transversions. The criterion used was maximum parsimony to keep the results comparable to those of the morphological analysis.

Both morphological and molecular phylogenies have been built using the outgroups of Birks & Edwards (2002) and *Ortalis vetula* (Plain Chachalaca; family Cracidae), the latter being my preferred outgroup because it is closely related to the megapodes.

The results showed that *Macrocephalon* was placed with *Megapodius* and *Eulipoa* in the morphological phylogeny (with all outgroups as well as with only *Ortalis vetula* as outgroup). In the molecular phylogenies, *Macrocephalon*'s place was variable depending on the use of a weighting scheme and the selected outgroup(s). A weighted analysis with all outgroups shows a basal polytomy with the two major clades within the megapodes. Both a weighted analysis with *Ortalis vetula* as well as an unweighted analysis with all outgroups, place *Macrocephalon* as a sistergroup of *Leipoa*, *Talegalla*, *Alectura* and *Aepypodius* (with bootstrap values of 53 and 55 respectively). An unweighted analysis with *Ortalis vetula*, on the other hand,

places *Macrocephalon* as the sistergroup of *Eulipoa* and *Megapodius* with a bootstrap value of 68. None of these bootstrap values are high enough to consider the position of *Macrocephalon* solved. Even if one or more values would be high enough to consider it solved, there is still the problem of the differences occurring with different outgroups and the use of a weighting scheme.

I have also combined the osteological data of Dyke et al. (2003) with the selected morphological data set of seven characters (see above) and the parasite data by Mey (1999) into a sort of "total evidence" data set. All three types of data were given equal weight. These data were available for three genera within the Megapodiidae (*Macrocephalon*, *Megapodius* and *Alectura*) and *Ortalis* (which was used as the outgroup). These three genera are suitable for this analysis, because the question which I wanted to answer is whether *Macrocephalon* should be placed in the clade of *Megapodius* (and the closely related *Eulipoa*) or the clade of *Leipoa*, *Talegalla*, *Alectura* and *Aepypodius*.

After performing a maximum parsimony analysis on this data set, *Macrocephalon* is placed next to *Alectura* (with a bootstrap value of 66). If you decide to exclude the parasite data, *Macrocephalon* is again linked with *Megapodius* (with a bootstrap value of 56). A possible problem here is the effect of taxon sampling (only three genera were analysed instead of seven). Therefore these results only give a preliminary indication.

Besides the position of *Macrocephalon*, the sequence in which *Leipoa* and *Talegalla* are placed differs or is at least weakly supported in the morphological and molecular phylogenies.

The main conclusion is that the systematic position of *Macrocephalon* is not clear on the basis of the analysed data sets. Evidence points both ways and none of it seems very convincing. So far, the only data set which provides convincing evidence for the position of *Macrocephalon* is the one of RDP1 analysed in Birks & Edwards (2002). In order to find more strong evidence for the position of *Macrocephalon* (and the sequence of *Leipoa*/*Talegalla*), a new approach is necessary, preferably using independent data for extra support. A total evidence approach, incorporating morphological and molecular (and perhaps even ecological) data into one data set, could be an option. Future analyses should be based on as many characters as possible, should have good taxonomic sampling within the family, and should carefully present the strengths and weaknesses of the analyses and data sets.

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Reply to Pieterse

Sharon Birks

The relationship of *Macrocephalon* to the rest of the megapodes has long been of interest – the Maleo represents one of the earliest splits within the megapodes, and its affinities within the family are less strongly supported than some others. Its relationship within the family may prove difficult to tease out definitively because of historic events, but it is a worthy effort to try to bring as much evidence to bear on the question as possible. Pieterse proposes to do this is by including both morphological and molecular traits in new phylogenetic analyses. Such analyses often prove challenging in practice: taxonomic sampling may be different among datasets, and combining different datasets often makes analyses of particular sets of characters more difficult. While Pieterse's goals are good, I do not believe that the new analyses seriously challenge earlier conclusions from molecular data, as I explain below.

First, the RDP1 dataset (a slowly evolving gene) is arguably the most reliably interpreted of all currently known sets of characters in terms of phylogenetic reconstruction, especially for the deeper relationships. It provides a relatively large number of variable characters (270 of the 972 sites are parsimony informative), and mostly lacks potentially confounding problems in the lice and morphological datasets such as unambiguous assignation of ancestral states, and/or homoplasy due to convergent evolution or direct transmission. The fact that this dataset provided high bootstrap support for the *Macrocephalon* + brush-turkey clade cannot be lightly dismissed, and I would argue that any re-analysis and discussion that omits this dataset cannot be really fruitful.

Second, the original analyses of the ND2 dataset were more robust for several reasons. Two methods for reconstructing phylogenetic relationships were employed (parsimony and maximum likelihood analysis), and both converged on the same result. Maximum likelihood is widely viewed as a preferable method for molecular data than parsimony, because of its ability to incorporate more accurate models of molecular evolution. Pieterse also sometimes chose to use only a single outgroup (*Ortalis*). While its close relationship to the megapodes would make it the preferred outgroup if only a single taxon had to be chosen, multiple outgroups are necessary to unambiguously assign polarity to characters (Smith 1994), especially given the depth of the branch leading to *Macrocephalon* within the megapodes. Given these problems and the potential problems with taxonomic sampling in the morphological data from Dyke et al. (Graybeal 1998; Hillis 1998), I think there are good reasons for favoring conclusions from the original molecular analyses.

Finally, Pieterse argues that variation in bootstrap values from different datasets and with different weighting schemes is a serious problem, and here I disagree. The fact that two large, completely independent datasets, analyzed with different models, and with different weighting schemes, converged on the same topology, and with bootstrap values $\geq$ 50%, seems to me compelling evidence that the relatively close relationship between *Macrocephalon* and the brush-turkey clade is real and unaffected by variables introduced by the analyses. Historical events (e.g., a rapid evolution of several lineages) can make high bootstrap values impossible to recover no matter how large the datasets (e.g., Poe and Chubb 2004), so bootstrap values must be weighed with other evidence, and looking for a particular number before one is "satisfied" will always be a judgment call.

Although I think there is enough evidence from molecular characters to argue that *Macrocephalon* clearly shows an alliance with the megapode clade containing the brush-turkeys and malleefowl, further efforts to resolve this relationship and particularly that of *Leipoa*/*Talegalla* within this clade are certainly worthwhile. However, to add real value to the discussion, I agree with Pieterse that these analyses (whether based on morphological characters, further molecular characters, or both) must be carefully constructed to be convincing: they must have good taxonomic sampling within the family, they must be based on as many characters as possible, and the strengths and weaknesses of specific analyses and datasets must be weighted and presented very carefully.

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WPA Galliform Genetics Group

During the International Galliformes Symposium in India it was decided that all the people around the world doing Galliform genetics should be given a forum by which they can share ideas and empower each other. The result is that Brant Faircloth, from the University of Georgia, Athens (brant@uga.edu) and I (gbaker@uwc.ac.za) will be coordinating a Galliformes Genetic Group. The objective of this group is to:

- To provide a platform for the discussion of Galliform Genetics.
- To provide open-source access to tried and tested methods.
- To facilitate communication between Galliform geneticists worldwide.

We have launched a website at the following address http://gallus.forestry.uga.edu/genetics/ and will send out a newsletter to all those on the mailing list on a regular basis. If you have comments or additions you would like to make to the website you can do so on-line. Enquiries and those wanting to be added to the mailing list can email gbaker@uwc.ac.za.

Dr Gillian C Baker, (co-chair IUCN SSC Megapode Specialist Group), Dept. Biodiversity and Conservation Biology, University of Western Cape, Private Bag X17, Modderdam Road, Bellville 7535, Cape Town, South Africa. Tel: ++ 27 (0)21 959 3544.

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BirdLife/WPA/SSC Megapode Specialist Group
Megapode Newsletter, Vol. 19, nr. 1
December 2005

Megapode Newsletter Vol. 19, nr. 1

December 2005

Dr. René W. R. J. Dekker, National Museum of Natural History, P.O. Box 9517, 2300 RA Leiden, The Netherlands. Tel. 31 71 5687623; Fax 31 71 5687666; e-mail: Dekker@naturalis.nl
Dr. Darryl N. Jones, Australian School of Environmental Studies, Griffith University, Nathan, Australia. e-mail: d.jones@griffith.edu.au
Dr. Gillian C. Baker, Ground Floor Flat, 39 Westbourne Street, Hove, BN3 5PE, East Sussex, U.K. e-mail: gcbuk@hotmail.com

Dear megapoders

The frequency of the Megapode Newsletter is not what it is supposed to be, for which we apologize. The last issue was distributed more than a year ago, while it is our intention to have two issues per year. There are various reasons for this: the small number of field projects, a declining number of megapode researchers in general, other projects coming to and end and new jobs for some who have been actively involved during the past decade(s). But a new generation of megapoders is hatching, one of whom is Jessica van der Waag. An introduction into her studies on Malleefowl *Leipoa ocellata* is included in the issue. Another young researcher who has spend much time under the most difficult conditions is Iwein Mauro. His search for Bruijn's Brush-turkey *Aepypodius bruijnii* has been mentioned in previous Megapode Newletters. Reference to a recent publication by Iwein in *Emu* is given under "Recent Publications". We hope you will enjoy the information presented in this newsletter, but would also like to ask you to provide us with contributions to be able to bring the frequency of this newsletter back to two issues per year.

The editors.

BirdLife/WPA/SSC Megapode Specialist Group
Megapode Newsletter, Vol. 19, nr. 1
December 2005

Behavioural observations in two young Malleefowl

Jessica van der Waag

University of Western Australia, Albany, WA 6332, Australia
e-mail: vanderwaag@westnet.com.au

Malleefowl *Leipoa ocellata* were once widespread over the southern half of Australia. Today, their distribution is restricted due to ongoing habitat fragmentation. In Western Australia the native mallee vegetation has been heavily cleared for agriculture, resulting in many small remnants under private ownership (Saunders & Ingram, 1995; Benshemesh, 2000). As a large, charismatic species, Malleefowl are a figurehead species for the active conservation of small privately owned mallee remnants, which in turn benefits other species of fauna and flora within the habitat.

There has been a substantial decrease in the density of breeding pairs in some small remnant populations, and local extinctions of others (Priddel & Wheeler, 1994; Saunders & Ingram, 1995). In the absence of targeted management it is reasonable to expect continued local extinction of Malleefowl populations on small habitat remnants, leading to elevated extinction risk for the species throughout the entirety of its range (Priddel & Wheeler, 1994).

Despite a number of studies of young Malleefowl (Priddel & Wheeler, 1990; 1994; 1997; Benshemesh, 1992), still very little is known on their behaviour, dispersal and habitat requirements between two weeks of age and recruitment into the adult population. Malleefowl are thought to achieve maturity at three to four years of age (based on captive birds) (Benshemesh, 2000). We also know very little about recruitment, pair formation or the commencement of breeding. With a cost of high time input required, and difficulties with recapture to renew transmitters, young Malleefowl have not previously been intensively radio-tracked for long periods.

This study, in a mallee remnant near the townsite of Ongerup, Western Australia, involves intensive radio-tracking of chicks and young Malleefowl. The research is part of a PhD at the University of Western Australia Albany, examining how to support the long-term persistence of Malleefowl populations in small isolated habitat remnants in Western Australia. Radio-tracking of young Malleefowl allows us to gather information on aspects of their life history including dispersal, behaviour, survival and habitat requirements.

In the 2004/05 breeding season, eggs were collected from mounds in a small 138ha mallee remnant, incubated and ten day old chicks and ten young birds (one to two months of age) were released into the source site. Predators included native raptors, currawongs *Strepera versicolor*, goanna *Varanus* sp. (Fig. 1), and introduced species, cat and fox.

Figure 1. A goanna with a two-day old Malleefowl chick.

Two of the young birds continue to survive and have just reached 12 months of age, 10½ months of which have been spent in the field. During the first two months following the release, the birds were located twice daily, and were occasionally given a small amount of seed. With this regular contact and treatment, the birds have become used to the researchers presence, allowing close observation of their behaviour. The ability to provide a treat has also made recapture possible. As the birds are growing, recapture is essential in order to change the transmitter for ongoing tracking (the birds roost up to five meters high from three months of age making nocturnal recapture impractical). By intensive, long-term radio-tracking it has been possible to observe aspects of behaviour not previously recorded for young Malleefowl.

Social behaviour among young birds

The young birds were raised solitarily and released at different points in the study site. During the first month following release, as the birds became used to the researcher, close observation became possible. The birds used vocalisations from this early age, particularly in response to aerial predators (and once for a kangaroo), and a visual display (observed in response to the noise of a camera or fast movements by volunteers).

After one month living solitarily, the two birds bonded, foraging and resting within meters of each other. Initially, the birds used the same visual display extensively. The display is identical to the fear/aggression display used by adult birds; erecting the body and wing feathers, and crests (the young Malleefowl develop these at approximately one month of age), and with the head held erect (Fig. 2). The adults use a mild form of the display to greet the other member of the pair on the mound when they come in each morning to work (Fig. 3). The adult males use a high intensity form of the display when confronted with an intruder on the mound (Frith, 1962; van der Waag, 2003).

Figure 2. High intensity fear/threat display in a one-month old Malleefowl.

The displays were observed when the researcher provided seed, generally initiated by the younger male. The older female (by two weeks) was dominant and a reply display would generally cause the male to withdraw. On two occasions during the first two weeks of bonding by the birds, they were observed fighting. Following the exchange of intense displays, the birds would jump forward, striking out with their feet. Fights did not last more than a few seconds, with the dominant female returning to feed and the young male remaining one to two meters away.

Over the following months, the birds alternated between living together for a few weeks (Fig. 4), and then apart. As the two birds grew, the male became dominant and visual displays were observed less frequently. The two birds used a ‘location’ vocalisation extensively when moving through the bush. On two occasions during August, a third, slightly larger bird was also observed with the two. The birds appear to have separated in late September, early October, and have not since been observed by the researcher together.

Figure 3. Low intensity fear/threat display used by a female bird to greet her mate on the mound.

Figure 4. The two birds together in late August.

Mound tending at one year

Perhaps the most exciting observation of these birds came in November 2005. In late September the remains of an adult bird were found 30 meters from one of the active mounds. The mound had been filled with litter and closed to allow the organic material to begin fermentation to generate the first stage of heat for incubation. As daily work had not yet commenced, it was not possible to observe the birds to determine if the carcass was one of the pair.

In mid November, the radio-tracked male was observed resting in scrub near the mound. As the mound was opened by the researcher in order to mark the eggs, the young bird came onto the mound and began filling it back in (Fig. 5). There was one egg in the mound (the mound of an established pair nearby had two eggs). The bird has since been observed closing the mound, working it in a method matching the established adult birds (van der Waag, 2003). His partner has not yet been observed, though, as a wild bird, is expected to be cautious in the presence of the researcher.

Figure 5. The young male working the mound

In order to answer many questions surrounding the ability of year old Malleefowl to breed, it is planned to use collected DNA material from the chicks. This may allow us to determine the paternity of the chicks from the mound this season, to determine if the bird killed near the mound is the same male that used the mound last season, and to determine if it is the same female laying in the mound as in the previous season.

The young, radio-tracked female bird appears likewise to have settled in an area of the remnant. At this stage, it is not known if she has paired and begun breeding. During the breeding season, the male birds appear to spend most of the day near the mound, whereas the females spend the morning at the mound to assist with mound tending and for egg laying, and again in the late afternoon to assist with the final neatening of the mound. To date no mound has been located in the area. In the coming season, the female will be radio-tracked more intensively in order to determine if she is also breeding and further chicks and young birds will be released and radio-tracked at two small bush remnants near the agricultural town of Ongerup in Western Australia.

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BirdLife/WPA/SSC Megapode Specialist Group
Megapode Newsletter, Vol. 19, nr. 1
December 2005

Successful re-introduction of the Moluccan Megapode *Eulipoa wallacei* at the Haruku Village nesting grounds, Haruku Island, Moluccas, Indonesia

C.J. Heij

Natuurhistorisch Museum Rotterdam, P.O. Box 23452,
3001 KL Rotterdam, the Netherlands. e-mail: c.j.heij@hetnet.nl

Introduction

The Tanjung Maleo nesting grounds near Kailolo village on the Moluccan island of Haruku (Fig. 1) is one of the last strongholds of the Moluccan Megapode *Eulipoa wallacei*. By the end of the 20th century, about 4200 females used Tanjung Maleo for egg-laying, and - especially during full moon periods in the dry season - more than 200 eggs per day were collected (and sold) by local people. Probably already since historical times, egg-harvesting and maintenance of the nesting ground is governed by strict local rules, called 'sasi' (Heij *et al*., 1997; Heij & Rompas, 1999; Heij, 2001). Elsewhere on the island, about 10 km south of Kailolo, near Haruku Village there is another *Eulipoa* nesting ground (Fig. 2), but predation by dogs and pigs (Fig. 3), lack of maintenance and uncontrolled collecting of eggs and adults had diminished the number of egg-laying birds (Heij *et al.*, 1997). In January 1997, in cooperation with Pattimura University of Ambon, Mr Eli Kisya (an official of Haruku Village) and Mr Pede Tuanaya (of Kailolo village), I started a project to re-introduce the Moluccan Megapode at the nesting ground near Haruku Village.

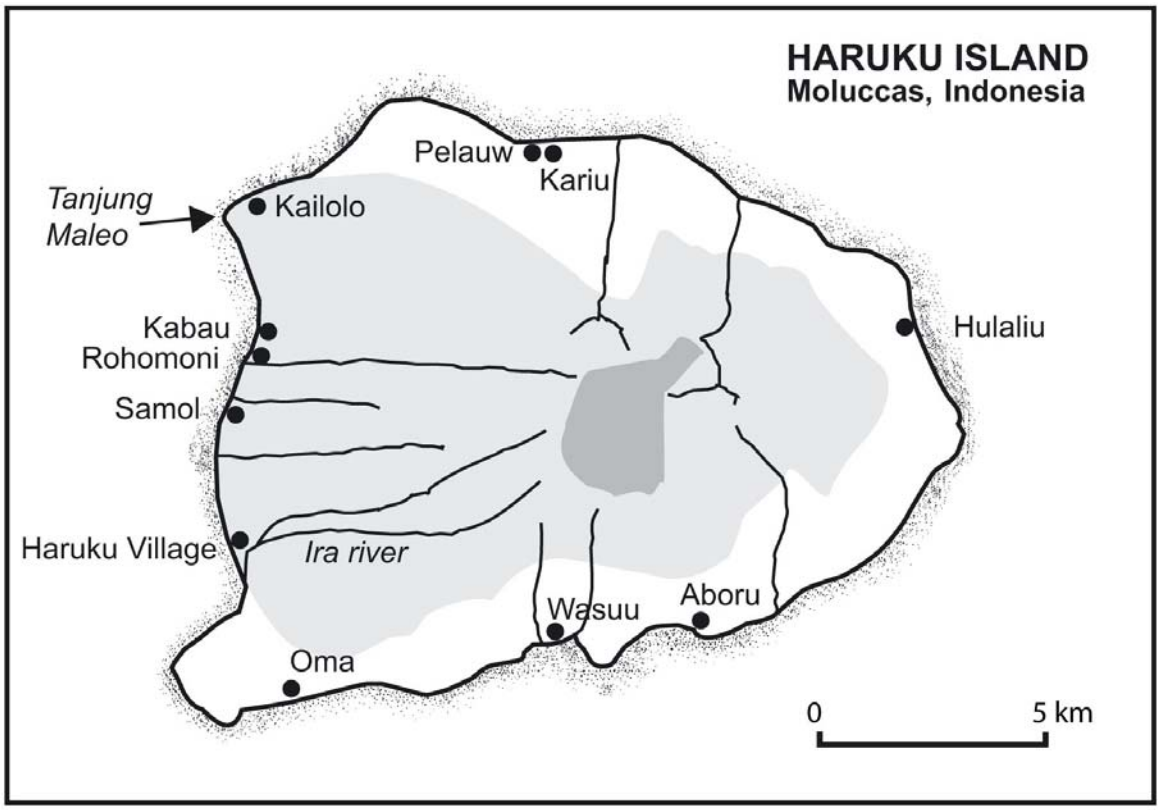

Figure 1. Haruku Island, with the locations of the Tanjung Maleo nesting ground (3° 32' 26.6''S; 128° 24' 56.6''E) near Kailolo, and the Haruku Village nesting ground near the mouth of the Ira river. (Map: Jaap van Leeuwen, Natuurhistorisch Museum Rotterdam).

Figure 2. The *Eulipoa* nesting ground near Haruku Village. Left the river Wai Ira, right the seashore. (Photo: C.J. Heij, 15 May 2005).

Study area, material and method

The nesting ground is located just south of Haruku village and is a beach area, partly grown with ivy *Ipomoea pes-caprae*. It is about 50 m wide and 400 m long, bordered in the west by the sea, in the east by the river Ira that runs parallel to the beach, and in the south by the mouth of the river (Fig. 2).

Figure 3. Domestic pig, a common predator of *Eulipoa* eggs, scavenges the Haruku Village nesting ground. (Photo: C.J. Heij, 15 May 2005).

On 21 Apri1 1997, we translocated 24 freshly laid Moluccan Megapode eggs from the Tanjung Maleo nesting ground to the Haruku Village nesting ground. The translocated eggs were buried in two rows at a depth of 50 cm. The exact locations were marked with a plastic label. At the same nesting ground and at that time, we found 3-5 freshly dug burrows and one fledgling (a chick that had just reached the surface), meaning that the nesting ground was not completely abandoned. A fence was erected around the area and thus some security was provided (Fig. 4). During my absence similar egg transfers were repeated a least twice by Pede Tuanaya: 21 May 1997 20 eggs and 21 September 1997 20 eggs. Hatching was carefully monitored (by Eli Kisya and the author) in July and August 1997 (Table 1). After September 1997, more eggs were translocated by P.Tuanaya , but no notes were kept.

Figure 4. Eli Kissya (right) and the author burying translocated *Eulipoa* eggs at the Haruku Village nesting ground. (Photo: A. Sol, 21 April 1997).

Table 1 Hatching dates and hatching success of translocated eggs of *Eulipoa wallacei* at the Haruku Village nesting ground.

translocation date	hatching dates					total hatched	incubation period
21 April 1997 24 eggs	4 July 3 eggs	6 July 1 egg	7 July 5 eggs	8 July 7 eggs	9 July 4 eggs	20 eggs (83.3%)	average 78.5 days
21 May 1997 20 eggs	10 Aug 4 eggs	11 Aug 12 eggs	12 Aug 3 eggs			19 eggs (95.0%)	average 82 days
21 September 1997 20 eggs	not monitored						

Results and Discussion

The translocated eggs hatched wonderfully well (Table 1), but due to local circumstances (jealousy, fear of competition and corruption) the transfer of more of eggs did not proceed as scheduled. My last visit to Haruku Village was in November 1998. When in January 1999 political/religious riots started in the Moluccas and both villages (Kailolo = Muslim; Haruku = Christian) were in a state of war, the project stopped altogether, and no further data was gathered.

Seven years later, on 15 May 2005, I was very surprised to hear and see that there was a stable egg-laying population of Moluccan Megapodes at the Haruku Village nesting grounds. Based on local information and my own observations, I rate the present status of the nesting ground as 3A according to the scale used by Heij *et al*. (1997: 95): 'stable minor nesting ground, regular nesting by small numbers (< 20 eggs during the peak season)'

According to local information, from 1998 onwards the number of egg-laying birds has grown and the numbers increased even more during the violent periods of religious and political unrest (in 1999-2004) During that time, the inhabitants of desa Haruku did not dare to leave the village to collect eggs and the nesting ground was quiet and safe for the birds/eggs. Some local inhabitants moved from the village to the sago-woods surrounding the village and bordering the nesting ground. These dwellings were the target of attacks of Jihad-warriors and were burnt down on several occasions. During these times of unrest, the birds redirected their egg-laying activities to various bare patches around Haruku village, i.e. the cemetery to the east, the beaches further south of the village and various other places where they were never seen before. (A similar situation occurred on Ambon Island when the village of Waai was totally destructed by fire: when all the inhabitants had left, *Eulipoa* eggs were found on the deserted beaches [local information, Waai, May 2005].)

At present, the Moluccan Megapode has left the alternative nesting sites and is back at the Haruku Village nesting ground near the Wai Ira river again. The fence, which in 1997 gave the nesting ground some protection, had disappeared. Together with the increase of the egg-laying population and the pacification of

the social-political situation in the Moluccas, uncontrolled egg collecting has started again. On 15 May, 2005, I encountered a clever boy (Fig. 5) that during the three preceding days had collected a bucketful of eggs (circa 25) that his father had sold in Ambon.

Figure 5 The most common predator of *Eulipoa* eggs at the Haruku Village nesting ground: a boy digs up an egg for human consumption. (Photo: C.J. Heij, 15 May 2005).

Although there is no proof, I strongly believe that the translocation of eggs in 1997 has revived the once rapidly declining egg-laying *Eulipoa* population of the Haruku Village nesting ground. The severe religious and political unrest that occurred on Haruku and other Moluccan islands in the years directly after the translocation project, undoubtedly enhanced this process of recovery, because the nesting ground was devoid of any human activity and the eggs could hatch undisturbed.

Further action

At a seminar about the conservation of the Moluccan megapode, I suggested to Eli Kisya (the head of the Adat of Haruku Village) that during one year no eggs should be touched or collected. After that period a responsible program of collection will have to be discussed with the villagers (Heij, 2005). First of all, a fence running from the seashore to the Wai Ira river should be put in place again. Everyone involved seemed enthusiastic and awaits further action scheduled for May 2006.

Acknowledgements

I thank drs. J.J. Wenno, Pattymura University of Ambon, for his help in setting up the re-introduction project in 1997 and Manuel Kaya for the organisation of the seminar in 2005. Many thanks to Monsignor A.P.S. Sol Msc who, by his presence in Kailolo and Haruku added just a little more ‘status’ to the project. Pak Pede Tuanaya of Kailolo Village risked life and limb to collect the eggs and transport them ten hard kilometers further south to desa Haruku. Furthermore I wish to thank the head of desa Kailolo, Iman Munir Tuanaya and the head of the Adat of desa Haruku, Eli Kisya for their help. As always, the computer skills of R.J. Vink were of great help. The paper benefited from the comments of C.W. Moeliker. Financial support was provided by the Heij-Hoesen Fund (1997) and the Wilcon Fund (2005).

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BirdLife/WPA/SSC Megapode Specialist Group
Megapode Newsletter, Vol. 20, nr. 1
July 2007

Megapode Newsletter Vol. 20, nr. 1

July 2007

Dr. Gillian C. Baker, Ground Floor Flat, 39 Westbourne Street, Hove, BN3 5PE, East Sussex, U.K.
e-mail: gcbuk@hotmail.com
Dr. René W. R. J. Dekker, National Museum of Natural History, P.O. Box 9517, 2300 RA Leiden, The Netherlands. Tel. 31 71 5687623; Fax 31 71 5687666; e-mail: Dekker@naturalis.nl
Dr. Darryl N. Jones, Australian School of Environmental Studies, Griffith University, Nathan, Australia.
e-mail: d.jones@griffith.edu.au

Dear megapoders

Again may we apologise for the paucity of Megapode Newsletters over the past two years. The editorial team have taken on many new challenges in the past few years and our busy schedules coupled with a lull in news from the field has resulted in fewer issues published than we would have liked. Since our last publication however a number of new projects have been initiated and we have received exciting news from Waigeo where the first photographs of Bruijn's Brush-turkey have been taken in the wild and more sobering news from the Nicobar islands with an update on the impact of the Tsunami on Nicobar Megapode populations. I am also very pleased to see not one, but three reports on Maleo conservation in Sulawesi. Members of the Wildife Conservation Society (WCS) and the Nederland-Batam Foundation provide details of new conservation projects in North Sulawesi where much of the early work on Maleo was conducted, whilst Marcy Summers reports on a Maleo conservation project in the Eastern Peninsula of Central Sulawesi. I am particularly happy to hear about this project in Libuun, as during my 1998 survey of nesting grounds I had considered this one of the most pristine in Central Sulawesi. With the help of this project, run by AlTo, Maleo seem set to prosper there. In North Sulawesi the nesting grounds at Tangkoko and Bogani Nani Wartabone have suffered considerably over the past two decades, due to a combination of forest fires and general human pressure. The hatchery project run by WCS at Bogani Nani Wartabone has had tremendous success, and in Tangkoko, Maleos have started returning to the area after the conservation work carried out by KONTAK and the Nederland-Batam Foundation began.

In Australia, research and conservation projects on the Malleefowl continue and a Megapode Symposium is planned for September as part of the National Malleefowl Forum. We hope to provide abstracts of this meeting in the next newsletter.

Gillian Baker, editor.

In brief

News from WCS

The four Maleos that were on St. Catherines are now in the Bronx Zoo. They've successfully hatched one chick so far and WCS is trying to get a better handle on incubation parameters.

Endangered Bruijn's Brush-turkey photographed for the first time

In early April 2007 MSG member Iwein Mauro led an exploratory bird tour to Mount Danai on the Indonesian island of Waigeo. The group had the opportunity to watch an adult male Bruijn's Brush-turkey persistently displaying from atop its nest mound just four meters away from their hide in ridgetop cloud-forest. Some amazing images were taken, which constitute the first photographs of the species in the wild. A press release including photos was released by Papua Expeditions on 2nd July 2007.
http://www.PapuaExpeditions.com/aepypodiusbruijnii.html

MSG on the Internet

We have been invited by the IUCN to produce a profile of the MSG for the SSC website. This will help to raise awareness about megapodes and allow people to get in contact with key members of the group. We have compiled profiles for René Dekker, Darryl Jones, Marc Argeloo, Ross Sinclair and myself, but would like to include other members, especially those working at the grass roots in the field. I would be happy to hear from anyone who feels that they could act as a representative for the MSG in their particular field.

We have also been given the go-ahead by Phil McGowan, Director, World Pheasant Association, to expand the MSG area of the WPA website. I would very much like to put up summaries of all projects involving megapodes, so that we may network more effectively. I would be grateful if anybody involved in megapode research/conservation could provide me with a 300 word summary of their project, with appropriate web links and/or contact details.

Gill Baker

Up-coming meetings

KATANNING 2007: National Malleefowl Forum and First Western Australian Megapode Symposium

The Forum will be held at the Katanning Leisure Centre from **September 7-9** and at Yongergnow Australian Malleefowl Research Centre, Ongerup, on **September 11.**

The programme will include:

- The analysis of monitoring data (Joe Benshemesh)
- Review of implications for mound monitoring; detailed discussion of NHT project (Ann Stokie)
- State by State Round-up; achievements since Mildura
- The rediscovery of Bruijn's Brush Turkey (Iwein Mauro)
- Megapodes in Queensland (Darryl Jones).
- Megapodes in New Guinea (David Beaumont).
- Sighting data (Blair Parsons)
- Aspects of Malleefowl biology (Jessica van der Waag)
- Release of captive malleefowl (Chris Coombes).
- Researching Malleefowl monitoring sites – A VMRG perspective (Peter Stokie)
- Release of captive bred malleefowl in South Australia (Robert Wheeler)
- Malleefowl at Mt Gibson Minesite (Martine Scheltema)

For Information and Registration contact:

Stephen Davies,
P.O Box 9,
Mount Helena 6082
Western Australia
Phone (08) 9572 1074
e-mail S.Davies@exchange.curtin.edu.au

New Projects and People

We are very pleased to welcome the following people to the Megapode Specialist Group and to be able to introduce new projects reported on here by Blair Parsons, Marcy Summers, Jaco van As and John Tasirin.

Name	Based in	Particular Interest/Study species
Nathan Johnson	Mariana Islands/USA	Micronesian Megapodes as part of wildlife surveying in the Marianas
Mellie Sampson	WCS– Papua New Guinea	Melanesian Megapode
Blair Parsons	Western Australia	Malleefowl
Marcy Summers	Central Sulawesi/USA	Maleo
John Tasirin	WCS – Indonesia	Maleo
Nick Brickle		
Jaco van As	Netherlands/Sulawesi	Maleo

Malleefowl in the fragmented Western Australian Wheatbelt: spatial and temporal analysis of a threatened species.

Blair Parsons

CSIRO Sustainable Ecosystem, Private Bag 5, PO Wembley WA 6913
Email: Blair.Parsons@csiro.au

The key objective of this project is to develop and implement management of reserves, farmland and private bush that protects and enhances the existence of Malleefowl at local and regional scales. These management guidelines and actions will be based on a thorough understanding of the relationships between Malleefowl and various landscape influences such as climate, clearing and fire history, habitat management, and agricultural production.

The project will make use of geographical information systems with spatial modelling techniques being employed to provide insight into Malleefowl distribution and patterns of decline. These models make use of a wealth of knowledge including a community-based sightings database, field data and from existing studies conducted in eastern Australia.

This research aims to provide landholders and land management agencies with the knowledge and tools needed to make decisions regarding the management of land for nature conservation. By providing them with insights into the ecology of Malleefowl and the impact current and past actions may have on them, managers will have the opportunity to modify their practices in an effort to benefit this species.

It is the intent of this project to provide communities with the skills and knowledge to design effective conservation projects at a variety of scales (farm, catchment, region) using a variety of different management options (e.g. habitat restoration, predator control). This project will build on a large body of threatened species and landscape design research undertaken in the WA wheatbelt and will provide outcomes of direct significance to the National Recovery Plan for Malleefowl (Benshemesh 2000).

BirdLife/WPA/SSC Megapode Specialist Group
Megapode Newsletter, Vol. 20, nr. 1
July 2007

Report of Conservation Activities at Maleo Nesting Ground Libuun, Taima, Tompotika, Central Sulawesi, Indonesia August 2006 – June 2007

Marcy Summers
The Alliance for Tompotika Conservation (AlTo)
21416 - 86th Ave SW, Vashon Island, WA, USA 98070 ~ (206) 463-7720
tompotika@centurytel.net ~ www.tompotika.org

Background
The Alliance for Tompotika Conservation /Aliansi Konservasi Tompotika, or "AlTo" is a partnership effort of a U.S.-based 501(c)3 non-profit organization working closely with Yayasan Pemerhati Lingkungan (YPL), a small environmental NGO based in Luwuk, Central Sulawesi, Iguana Tompotika, a Luwuk-based Pencinta Alam ("nature-lovers") group of college students; and the 64-member egg-diggers' organization of Desa Taima, Central Sulawesi. Through a close consultation process from late-2005 through July 2006, the parties agreed to a complete moratorium on the harvesting of Maleo eggs at the sandy beachside nesting ground at Taima, to be facilitated by AlTo.

How the Moratorium Works
The moratorium was launched on 1 August, 2006 with a ceremony and celebration held near the nesting ground at Libuun, Taima. The ceremony was attended by numerous dignitaries and government officials from nearby desas (villages), kecamatans (districts), and Kabupaten Banggai (province), as well as local villagers and 7 AlTo-sponsored visitors from the US. Cessation of the egg harvesting began on 1 August. Prior to establishment of the moratorium, the Taima egg-diggers' organization assigned egg-digging rights on a rotating basis between their 64 members, with virtually all eggs laid at the nesting ground ultimately taken (with no provision for leaving any eggs).

Since August 1, the maleo nesting ground has been guarded 24-hrs a day by a team of guards. The team consists of two AlTo Conservation Officers (drawn from a staff of 8 Iguana Tompotika members), who serve a 24-hr, 5-day shift at the nesting ground; joined between 9 am and 5 pm by one former egg-digger from the Taima egg-diggers' organization. The Conservation Officers also collect data on Maleo activities each hour between 5 am and 7 pm and overnight. The data recorded each hour include: weather; number of birds present at the nesting ground; number of pairs present; occurrence of egg-laying; disturbances or unusual occurrences (such as presence of monitor lizards, goats, or other); and number of chicks hatched. Between 7 pm and 5 am, overnight data is recorded on weather, chicks hatched, and any unusual occurrences, and the nesting ground is patrolled on the hour each hour. At the start of the moratorium, the beginnings of a wire fence were constructed in order to keep out humans and other predators, but the effort was discontinued when it was found that the fence was unnecessary from the standpoint of human intruders and it was feared that it might impede Maleo's access to the nesting area.

Eggs and Chicks
The moratorium began just as numbers of Maleos occurring each day at the nesting ground was increasing for the high season. In August 2006, 125 eggs were laid and protected, increasing to 157 in Sept and continuing to increase to a high of 191 eggs in both December and January. February saw a decrease to 151 eggs, with a continued gradual decrease to 44 in April. May and June saw very few Maleos laying, with only 10 eggs in May and 8 in June. This pattern of peak laying in Dec-Jan corresponds roughly with the dry season in Tompotika, which begins around July-Aug and usually ends around Nov-Dec (this year's was said to be unusually long). Total eggs laid and protected Aug '06 – June '07 was 1275.

The first chick at the nesting ground was seen on October 22. Chicks nearly always hatch after dark (6 pm), with first the head emerging from the sand, then the rest of the body. Typically, soon after emergence a chick flies to the bushes around the nesting ground, where it rests for some minutes before flying off into the forest. In the last part of October, (22-31), 10 chicks were seen, increasing to a high of 40 chicks seen in the month of December, then decreasing again to 7 in April and none in the months of May and June. The total number of chicks observed in the Oct 22-June period is 151—only a dismal 12.3% of eggs laid during the corresponding period (Aug-April). The highest rate of chick emergences detected was 29%: eggs laid in the period Sept 11-Oct 10 resulted in 40 chicks observed in the month of December.

The reasons for such low rates of chick detection are unclear. Possibilities include: loss of eggs to predators, poachers, or destruction during incubation; non-viability of eggs or failure to hatch; chick mortality before or after emergence; and failure to detect hatched chicks before they fly. Significance of the first three factors is thought to be low: although biawaks (monitor lizards) are occasionally seen crossing the nesting ground, they are watched carefully when present, and although they do make very brief attempts at digging, they have never been seen to find eggs. Adult birds ignore them. No other potential egg predators have been observed. There has been no evidence of poaching or collusion by humans taking eggs. Very occasionally, broken eggs have been observed, apparently broken while adult Maleos were digging nest pits in the same area. Broken, "rotten" eggs have also been observed occasionally. Small numbers of dead chicks have been observed, apparently prey to hermit crabs after hatching, but these numbers have decreased since regular clearing of ground debris and vegetation has made the nesting ground less hospitable for the crabs.

What is thought to be significant, however, is the number of chicks which hatch and fly without being detected and recorded by AlTo staff. Because the chicks hatch almost exclusively at night, they are difficult to see in the dark, and it has not so far proved feasible to perform a continuous all-night watch; rather the nesting ground is patrolled once each hour. Frequently during this patrol a chick is seen only when it flies from its resting perch on a shrub at the edge of the nesting area. Options for better detection of hatching chicks are being explored, including use of infra-red motion-detecting cameras, but preliminary tests indicate that these cameras are not likely to be a good solution.

Stakeholder Support for Moratorium

The Maleo moratorium has proved to be very popular with all stakeholders. Former egg-diggers now receive greater and more reliable pay for their occasional work as nesting ground guards than they did as egg-diggers. They continue to divide guard duty amongst themselves. Iguana Tompotika members are thrilled to have jobs as Conservation Officers, and are being trained in conservation science skills at the same time. A small per-egg contribution is also made each month to a community benefits fund, and Taima villagers have opted to use these funds to purchase cement for the new village mosque that is under construction. The project is so popular that after the initial 6-month and 1-year trial periods, the Taima community has opted to extend the moratorium for another 3 years. In addition, the Kabupaten Banggai government has proved very supportive of the project, making donations of building materials and a large sign publicizing the area protected, and has signed an MOU granting the AlTo team 5-year management authority at the site. AlTo has also been requested to consult with Kab. Banggai on the possibility of a similar maleo protection project at Bangkiriang, southwest of Luwuk. Finally, AlTo supporters outside of Indonesia are pleased to be supporting a maleo conservation activity that preserves nesting in its natural state and has resulted in a cessation of egg-digging and the hatching of new chicks.

Forest and Habitat Protection

At the launch of the moratorium, the desa and kabupaten governments agreed to declare 40 ha of coastal scrub forest immediately surrounding the nesting ground as protected from any kind of logging or conversion by humans, with the immediate environs of the nesting ground forbidden for entry. A larger area of 72 ha has actually been delineated, and it is hoped that the original protection will be expanded to include all this area, which preserves not only the immediate environs of the nesting ground, but also the main corridor by which Maleos travel to the nesting ground from the nearby forested hills. AlTo is also at work promoting protection of forests in other areas of Tompotika, and the upcoming Awareness Campaign will also focus heavily on the importance of protecting Sulawesi's native forests wherever they remain.

Future Directions

AlTo's current plan is to continue the moratorium indefinitely. Options for better detection of chicks are being actively explored, and there are plans to develop a visitor fee system in the latter part of 2007 (currently access to the nesting ground is controlled but free of charge). A substantial Conservation Awareness Campaign that will cover Maleo and many other conservation issues is being launched to serve the entire Tompotika area starting in August, 2007. AlTo is also seeking funds to expand its protection efforts to sea turtles, which nest on the same beach as the maleos, as well as other beaches nearby. As the project grows, AlTo would also like to explore various research questions, such as: frequency of Maleo egg-laying outside of main communal nesting area; finding a workable banding technique; comparison of *in situ* vs. hatchery hatching rates; adult Maleo home range and movement patterns, etc.

BirdLife/WPA/SSC Megapode Specialist Group
Megapode Newsletter, Vol. 20, nr. 1
July 2007

Maleo nesting ground project in Tangkoko, North-Sulawesi, Indonesia

Jaco van As
The Nederland-Batam Foundation, Hugo de Vriespark 12, 6741CM, Lunteren, NL.
neba@neba.nl www.neba.nl

The maleo nesting ground project in the Tangkoko-DuaSaudara nature reserve is a project of the Tangkoko Ecotourism Guides Club (KONTAK), supported by the Netherlands via the Nederland-Batam Foundation. KONTAK is an organization of local nature guides from the village Batuputih that is active in and around the nature reserve. KONTAK views it as its mission to conserve the nature reserve for future generations to enjoy. To be able to realize their vision KONTAK has created three types of projects; nature conservation, ecotourism and social development. The three types of projects are interconnected and all aimed at preserving Tangkoko.

The main nature conservation project of KONTAK is the Maleo nesting ground project. At the start of last century the Maleo population at Tangkoko numbered thousands of birds. Due to poaching the population numbers declined dramatically and presently very few birds remain in the area. Although in the past, Maleo at Tangkoko nested at beaches as well as inland, the remaining birds only nest inland. The few remaining birds did not have access to their nesting grounds after major forest fires destroyed the forest cover at Rumesung and Tiwo (two areas inside the preserve). In 2000 around 180ha of forest cover was destroyed, in 2004 the same area was hit by fires again, damaging 130ha. Following the fires the forest cover in the area was replaced by a secondary growth of grasses and shrubs. These grasses and shrubs grew so dense that the Maleo were unable to access their nesting grounds.

At the end of 2003, KONTAK together with the Nederland-Batam foundation created the Maleo nesting ground project to attempt to save the Maleo in Tangkoko. The project consisted of several steps:

1. Clearing the secondary growth of grasses and shrubs,
2. Replanting trees to re-establish forest cover,
3. Possibly reintroducing a viable population of Maleo,
4. Monitoring the development of the population.

In 2004 the project started by building a 13m observation tower. The tower is to be used as an observation point (for step 4), but also as a sortie base for patrols and fire fighting in the area and as a focal point for all the activities in the area. Since 2004 KONTAK has been working on clearing the secondary growth of grasses and shrubs. The work continued in 2005 and in 2006 a start was also made with replanting trees. Clearing secondary growth and replanting trees in the entire area (180ha) was not opted for because this is not in line with the minimal intervention policy for nature reserve areas in Indonesia and because this would be a too big a task (amount of work and funds needed) for a local organization. Instead it was opted to clear patches and corridors of grasses and shrubs and to re-plant saplings and young trees in these areas, with the hope that this will jump-start the natural re-growth of forest cover. The clearing of the secondary growth (and the lack of forest fires in the area) resulted in sightings of Maleo in the area, meaning that the nesting ground was again accessible for Maleo. To further aid the Maleo, old nests were dug out to loosen-up the compacted soil. This made it easier for Maleo to dig their nests. As a result of all the activities, the nesting ground has become active again. Several nests containing eggs were found in 2006; around 20 – 30 eggs were found and a hatchling was spotted while it was digging itself out of its nest.

To monitor and maintain the nesting ground KONTAK enlisted a former Maleo egg poacher from the village. Instead of poaching for eggs he is now very active in protecting Maleo and preserving them for future generations to enjoy.

The fact that the nesting ground has become active again is a success, but still more needs to be done.

- Re-establishing forest cover is problematic. The nesting ground area is a remote area only accessible via the sea. This means replanting can only be done during the dry season (not the best time for re-planting), because high waves and wind prevent access to the area during the rainy season.

- Many active nests are predated by monitor lizards. To prevent predation by monitor lizards a small hatchery has been created at the nesting ground, where the hatchlings will be held for about two weeks after hatching.
- The Maleo population is very small. The number of eggs found seems to be in line with the estimate of the rangers and KONTAK members that fewer than 10 pairs of Maleo are present in Tangkoko.
- Forest fires still threaten the area. The dry grass and shrubs make the area prone to forest fires. As long as the grasses and shrubs are not replaced by forest cover the risk of fires will remain high. And any fire in the area has the potential of canceling the previous successes.

In spite of the complications KONTAK and the Nederland-Batam foundation are optimistic that they will be able to preserve the maleo for Tangkoko.

- Among the local population the awareness of the beauty of nature and the need to preserve it is growing and support for the activities of KONTAK is high.
- Local people are involved in the project. Hereby, ownership of the project is shared with the local communities. It is their project and it is their unique environment that they themselves attempt to preserve.
- Former poachers are now involved in conservation. Not only is a former poacher of Maleo eggs now involved in preserving Maleo, almost all members of KONTAK are former poachers, or children of poachers themselves.
- KONTAK has the support of the local government of Batuputih and the Bitung region, the BKSDA (the managing organization of the Tangkoko-DuaSaudara nature preserve) and the Indonesian forestry department. KONTAK has won several national, provincial and regional awards for their activities.

All in all, KONTAK and the Nederland-Batam foundation are pleased with the results of their Maleo nesting ground project so far and are optimistic that they will be able to make this project a success in the future. The Tangkoko Ecotourism Guides Club and the Nederland-Batam foundation would like to invite all who are interested to come to Tangkoko to visit their project.
The maleo nesting ground project has been supported via the Nederland-Batam foundation by the Prince Bernhard Fund for Nature and the Netherlands branch of the WWF.

The release of 4000th maleo chick in Sulawesi

John Tasirin,
Sulawesi Program Coordinator WCS Indonesia Program, Jl. Sam Ratulangi 41, Manado 95111. Ph. (431) 8880441. Fax. (431) 8880441. Email: jtasirin@wcs.org

There are less than 100 active Maleo nesting grounds left in the world, all exist in Sulawesi. The Wildlife Conservation Society (WCS) and Bogani Nani Wartabone National Park (BNWNP) intensely manage three of them. The program has successfully protected the eggs from natural predators and more importantly ceased the collection of eggs by locals, which in many other areas has led to abandonment of nesting grounds and thus a reduction in their population.

WCS has trained local guardians to look after the nesting grounds and have built semi-natural hatcheries to incubate the eggs. Eggs from the nesting ground were carefully transferred to the hatcheries where they were incubated in a naturally heated soil and totally protected during the 60 day incubation period. When the maleo chicks emerged from the earth, the local guardians would take them out from the hatchery and let them fly into nearby protected forest. The protection program has been a huge success. Over the past last three years 4000 maleo chicks have been released.

This was celebrated on May 28th, 2007 by WCS, TNBNW and the local community. District governments, students, teachers, villagers, park rangers, police officers visited the nesting ground and witnessed all hard work by the guardians and park rangers to save the endangered bird. A commitment was later made by the local people and their leaders to help the maleo survive. They want their children to see the wonder that nature had provided,

the amazing maleo bird. Eight maleo chicks were released simultaneously that morning. Among them was the 4000th chick. They freely flew to the forest with a hope that they will come back to safer and healthier nesting grounds.

Updates

Nicobar Megapode status, ecology and conservation: aftermath tsunami

K. Sivakumar
Wildlife Institute of India, Dehra Dun

Executive Summary

1. The Wildlife Institute of India conducted a status survey of the Nicobar Megapode along with other coastal endangered species in the Nicobar group of islands in an effort to document the adverse impacts on their populations due to tsunami that occurred on 26th December 2004. The endemic Nicobar Megapode population showed a dramatic decline (nearly 70%) in the number when compared to previous survey carried out in 1993-94. In 2006, there were approximately 800 breeding pairs in the coastal zones of these island group.

2. There was no evidence of Nicobar Megapodes in Megapode Island WLS and Trax Island during this survey where megapodes were reported before the tsunami.

3. Crucial megapode habitat such as littoral forest of the island group were adversely affected. The populations of indicator species of the littoral forest *Barringtonia asiatica* and *Terminalia bialata* were severely affected. However, regeneration of these species was found in the coastal region.

4. The island ecosystem is known for its resilience due to their ability for repopulating habitats and promoting regeneration. However, the restoration of the original biodiversity is possible only if the natural process such as recolonization is facilitated. The aftermath of the tsunami has left a trail of homeless families who need rehabilitation. Finding proper homes and alternate livelihood for them should not undermine ecosystem resilience. Raising plantation crops to generate revenue in the littoral forests should take into account the long term effects of habitat alteration.

5. Significant levels of wildlife habitats have been occupied by the tribals under the leadership of the tribal chiefs (known as Village Captain). Any conservation awareness programme with the help of these Village Captains would be useful for implementing recovery plans of declining species.

6. The Nicobar Division of the State Forest Department needs to be strengthened to facilitate wildlife protection and to take up appropriate wildlife management actions.

7. A total of 37 permanent monitoring plots have been identified and marked for long term monitoring of megapodes and its habitat. With some basic training, forest staff can collect data from these plots and within a weeks time all islands can be surveyed and collected data analyzed for developing appropriate conservation and management measures.

A full 49 page report is available in pdf from K. Sivakumar (ksivakumar@wii.gov.in).

Recent publications

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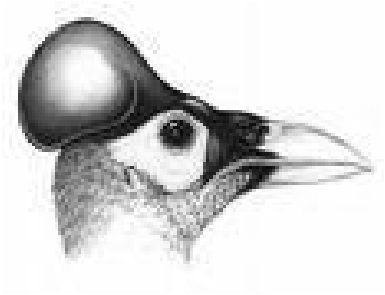
BirdLife/WPA/SSC Megapode Specialist Group
Megapode Newsletter, Vol. 21, nr. 1
February 2008



Megapode Newsletter Vol. 21, nr. 1

February 2008

Dr. Gillian C. Baker, Ground Floor Flat, 39 Westbourne Street, Hove, BN3 5PE, East Sussex, U.K.
e-mail: gcbuk@hotmail.com
Dr. René W. R. J. Dekker, National Museum of Natural History, P.O. Box 9517, 2300 RA Leiden, The Netherlands. Tel. 31 71 5687623; Fax 31 71 5687666; e-mail: Dekker@naturalis.nl
Dr. Darryl N. Jones, Australian School of Environmental Studies, Griffith University, Nathan, Australia.
e-mail: d.jones@griffith.edu.au

Dear megapoders

The Species Survival Committee of IUCN has just held an international conference on the future of specialist groups within IUCN and their role in data gathering and red listing. From 11-14 February, over 100 specialist group chairs and relevant personnel of IUCN gathered at a conference venue in Al Ain, United Arab Emirates, to share thoughts on the subject. The conference, including international flights and hotel reservations, was sponsored by the Environment Agency of Abu Dhabi. René Dekker attended this meeting as chairman of the Megapode Specialist Group.

The proposal for a new structure of specialist groups and red list authorities as put forward by IUCN was not approved by the delegates, although it was generally agreed that the process of assessment of data and evaluation of threat categories has to change. The assessor (by some compared with "the author of a scientific publication") and evaluator (the "peer reviewer") should, for instance, not be one and the same person as is often now the case. A new proposal will be drafted. To include the wishes and guarantee the voluntairy basis of the specialist groups, five specialist group chairs have been appointed representing all specialist groups to discuss this further with SSC/IUCN. A final structure has to be agreed upon well before the 4th World Conservation Congress in Barcelona in October 2008 where it will be placed on the agenda. We will keep you informed.

This meeting also gave the chairmen of 4 of the 5 galliform specialist groups present (Peter Garson and Rahul Kaul – Pheasants, Ilse Storch – Grouse, John Carrol and Richard Fuller - Partridge, Quails & Francolins and René Dekker - Megapodes) the opportunity to discuss the future of their specialist groups with Phil McGowan - World Pheasant Association and Holly Dublin - Chair, IUCN Species Survival Commission. The minutes of these meetings are currently being drafted and will soon be distributed among the members of the galliform specialist groups.

This issue of the Megapode Newsletter largely reports on the National Malleefowl Forum and First Western Australian Megapode Symposium which was held in Katanning, Australia, in September 2007. Thanks go to Ross Sinclair for collating the symposium abstracts for this newsletter. I wish you lots of inspiration with what was presented there and all the best with your own megapode studies and conservation work.

René Dekker

In brief

Red List Update

Two species were considered this year for changes to their Red List status. Bruijn's brush-turkey will be upgraded from VU to EN because of new knowledge. Nicobar megapode will stay at VU for the time being until further information is available regarding the recovery of the population post-tsunami.

Ecosystem Partnership Fund

The Critical Ecosystem Partnership Fund (CEPF) will soon be calling for proposals for the Micronesia/Polynesia 'hotspot'. WPA have had money from this fund for Sichuan and Palawan and would be delighted to work with any megapoders to apply for funds for projects within its area. If anybody has any proposals please contact Phil McGowan at WPA

MSG on the Internet - update

The lastest edition of Species (the newsletter of the Species Surival Commission) includes a spotlight on the Megapode Specialist Group (No 48, July – December 2007 pp 6-10). http://www.iucn.org/themes/ssc/news/species/species.htm. This profile will soon be available on the SSC website. The MSG area of the WPA website will also be growing in the coming months. Watch this space for further information.

Recent meetings

KATANNING 2007: National Malleefowl Forum and First Western Australian Megapode Symposium

The Malleefowl Forum 2007

Stephen Davies
Chair, The Malleefowl Forum 2007 Organising Committee
Muresk Institute, Curtin University of Technology, GPO Box U1987, Perth, WA 6845, Australia.
School of Environmental Science, Murdoch University, South Street, Murdoch, Western Australia 6150, Australia. S.Davies@exchange.curtin.edu.au

The second Malleefowl Forum was held in Katanning, Western Australia, from 7-11th September 2007. The forum involved 78 participants with 23 oral presentations and 20 posters over the first three days, with a field trip to the Yongergnow Australian Malleefowl Centre on the last day. The forum is part of a series on malleefowl, planned to be held every three years. The first was in Mildura (Victoria) in 2004. It is hosted by the National Malleefowl Recovery Team. The next forum will be held in one of the eastern states of Australia at a time and venue yet to be decided. The following are abstracts from the forum. It is expected that full proceedings of the forum will be publish in early 2008.

An outsider's view of the Malleefowl Forum 2007

J Ross Sinclair
Wildlife Conservation Society Papua New Guinea Programme & Leibniz Institute for Zoo & Wildlife Research Berlin, Postfach 601103, D-10252 Berlin, GERMANY. rsinclair@wcs.org

As someone not involved in malleefowl research, I attended this meeting to give an overview of conservation and management of megapodes in other countries. I was impressed by the broad participation in this forum,

including volunteer groups from all states where malleefowl occur, landowners with malleefowl on their properties, university academics, scientists and students studying malleefowl, non-governmental organisations, zoos, industry, and state and federal agencies charged with research, management and policy concerning malleefowl. No other megapode species - and very few endangered species at all - can boast such a broad-based, dedicated and talented group of people working for its conservation. What I found particularly impressive was the launch of a national system of standardised monitoring of malleefowl that is both scientifically robust and achievable. The monitoring programme was developed following the first forum in 2004 and is undertaken by well-trained although ostensibly non-technical volunteers. Such collaboration between the groups mentioned above is an inspiration to those of us working on other threatened megapodes, and shows the way forward if we are to conserve the megapode family.

ORAL PRESENTATON ABSTRACTS

Progress toward a national system of monitoring and adaptive management.

Joe Benshemesh
La Trobe University, School of Biological Sciences, Bundoora, 29 Shiers St, Alphington, Victoria 3078, Australia. jbenshemesh@bigpond.com

One of the main aspirations voiced at the last Malleefowl forum in Mildura was to standardise and consolidate the monitoring and move toward a more dynamic phase in which monitoring is used to assess management and benefit Malleefowl. Three years on, there is much to report and we are well on our way to reaching this goal. In particular, a multi-regional project was developed to standardise and improve the monitoring and to analyse the data collected so far. These data are impressive, totalling nearly 600 site-years at over 60 sites across Australia, and were analysed by Professor Richard Barker and Ryan Macfarlane (University of Otago, NZ) in regard to environmental factors such as rainfall, landscape, and management practices such as fox baiting. The results confirm that Malleefowl are declining nationally even in reserves set aside for their protection, and challenge long held views about what constitutes effective management. The analysis has demonstrated that we do not know as much as we thought about how best to manage Malleefowl populations, and highlights the need for better ways of identifying management practices that are beneficial and effective. Improving, standardising and analysing the monitoring data over the past few years has provided a firm foundation on which to build such an 'adaptive management' (AM) system. The system being designed will be underpinned by the monitoring conducted by community groups and, by linking management and research, will provide a core action for Malleefowl recovery for many years to come. Current studies are providing a framework for this AM system and developing the necessary databases. These developments represent a shared vision among community groups, managers and scientists, and have been fuelled by enthusiasm and a sense of purpose as much as funds. Further development will require even greater opportunities for community involvement in Malleefowl conservation and a high degree of collaboration between state governments and numerous NMR organisations.

A review of the implications of mound monitoring: Detailed discussions of the Natural Heritage Trust Multi-regional Malleefowl project

Ann Stokie
Natural Heritage Trust Malleefowl Project Convenor, Secretary - Victorian Malleefowl Recovery Group, 25 Belfast Street, Newtown, Victoria 3220, Australia. annos@iprimus.com.au

The last two years have seen an extraordinary movement towards developing a National approach to address the conservation needs for Malleefowl, an agreed National System for the monitoring of Malleefowl and agreement on National standards. What has been particularly striking is the involvement of such a large number of people both land managers and volunteers. The activities have included: collection of historical data, entering of data onto the database, data analysis, use of the data analysis to refine monitoring, national meetings in Melbourne and Adelaide, National Monitoring Manual. An enormous spirit of co-operation has prevailed and now we have a National Malleefowl Monitoring Handbook. We have demonstrated how much we can achieve when we work together. The challenge for this forum is to decide where we go to from here.

New South Wales Malleefowl Roundup 2007

Peter Ewin
Department of Environment and Climate Change NSW. Peter.Ewin@environment.nsw.gov.au

One of the key challenges facing Malleefowl conservation in NSW is the ability to increase the volunteer effort in the monitoring and management of the species. Compared with the other Malleefowl states, NSW has relatively little volunteer involvement, apart from some assistance from the Victorian Sunraysia Malleefowl Preservation Society and the Goonoo Bigfoot Malleefowl Project. Landholders in the Lower Murray Darling Catchment Management Authority (CMA) area are playing an active role in Malleefowl conservation, but more participation is needed across the range of the species, which spans seven CMAs. Although the Malleefowl's distribution spans from the southwestern corner to as far east as the Goulburn River National Park, the core populations occur in the southwestern corner of NSW (on both National Parks managed and private land) and the central NSW mallee around Yathong, Nombinnie and Round Hill Nature Reserves and adjoining leasehold lands. The main recovery actions on DECC estates have been aerial and ground-based fox-baiting and monitoring via aerial survey and some ground based monitoring. Control of feral goats is another important activity that will assist in the protection of Malleefowl habitat. Some preliminary results of the aerial surveys are presented here, with mound to mound surveys indicating an increase in breeding activity following fox-baiting. Opportunistic monitoring of the one of the eastern most populations in the Goonoo SCA (formerly Goonoo SF) near Dubbo has been undertaken by members of the Goonoo Bigfoot Malleefowl Project, but unfortunately about 25000 hectares (of the 63000 hectare reserve) including much of the core habitat was burnt in a wildfire in 2007. A successful captive breeding program has been operating at the Western Plains Zoo at Dubbo since 1990. In that time, over 500 juvenile birds have been released at Yathong and Nombinnie NRs to supplement the wild population. It is hoped that with the recent creation of CMAs in NSW that more extensive off-park work may be undertaken in NSW, particularly in the south-west corner, and this may increase the amount of volunteer work that is undertaken.
Malleefowl Roundup 2007

Victorian State Report for Malleefowl 2004-2007

Peter Stokie
Victorian Malleefowl Recovery Group, 25 Belfast Street, Newtown, Victoria 3220, Australia.
pstokie@iprimus.com.au

There are five distinct bodies working on malleefowl initiatives in Victoria: The Victorian Malleefowl Recovery Group, Parks Victoria Department of Sustainability and Environment, Catchment Management Authorities for the Mallee, Wimmera and North Central Victoria, Non Government Organisations. The Victorian Malleefowl Recovery Group (VMRG) since the last National Forum, has conducted all monitoring activities in all 34 sites throughout Victoria using trained volunteer monitors, coordinated and initiated site re-searches of 18 sites since 2004, and actively supported a MCMA Greencorps re-searching team in 2005, managed the NHT Multi Regional Malleefowl Project, conducted Australia wide monitoring training programs in three states, developed a detailed Track and Scat manual and a website dedicated to malleefowl activities across Victoria. The outcomes of the monitoring trends from 2004 to 2007 will be presented in the detailed report. Trends indicate a slight decline in Malleefowl numbers across these three years in very difficult drought period. Re-searching existing sites and establishing new sites has been highly successful through strategic use of grants funds by involving a number of community groups to carry out the re-searching tasks and in return the VMRG have met all out of pocket expenses incurred by these community groups. The VMRG has taken on the role as a political lobby group in opposing government and industrial initiatives that have had the potential to impact upon Malleefowl in a significant negative way. Parks Victoria (PV), the responsible land managers for the most significant areas of Malleefowl habitat, have been involved in initiatives to analyse fox scats collected from Malleefowl sites. PV has supported the VMRG by funding the VMRG annually through Volunteer Community Grants. There is an important partnership between the Parks Victoria Rangers and the VMRG to enable monitoring to be completed safely. PV staff are also volunteers with the VMRG. Where Malleefowl exist on private land the Department of Sustainability and Environmen (DSE) is the responsible authority in Victoria, and as there are very few malleefowl outside of public lands their involvement with Malleefowl is not significant.

The DSE support the Wedderburn Conservation Management Network, and have designated Biodiversity and Threatened Species Officers in each Region. The DSE is responsible for District Fire Protection Plans. The Catchment Management Authorities for the Mallee, Wimmera and North Central Victoria (CMA) support some activities to help the protection of Malleefowl. These activities are largely centred in the Mallee CMA's area of jurisdiction, where Greencorps initiatives, some fencing of remnant reserves and publications have been funded. The MCMA has been the Contract Manager for the NHT Malleefowl Project. Non Government Organisations like WWF and The Wilderness Society have funded Malleefowl activities in the past three years. The Bush Heritage Trust is a member of the Wedderburn Conservation Management Network, and Trust for Nature has supported the purchase of private land for the conservation of malleefowl. Two aspects of the initiatives of supporting Malleefowl stand out in Victoria. The first is the cooperative arrangement for conducting malleefowl monitoring. Victoria is fortunate to have a situation where scientists, volunteer and land managers (i.e. Park Victoria Rangers), and NGO's such as WWF, TWS and the Victorian National Parks Association operate together on public lands in mutual support. The second is the representative nature of the Victorian participation on the National Malleefowl Recovery Team. The four people representing Victoria cover land managers (PV), Catchment Management Authorities (MCMA), NGO's (WWF) and volunteers (VMRG).

Malleefowl Conservation in South Australia - Achievements from 2004 to 2007

Sharon Gillam
Biodiversity Planning Project Officer, Northern and Yorke District, Regional Conservation Directorate, Department for Environment and Heritage - South Australian Government, GPO Box 1047, Adelaide, South Australia 5001. Australia. gillam.sharon@saugov.sa.gov.au

In South Australia, Malleefowl continue to persist in isolated areas of remnant mallee, in both public reserves and on private land, however, the long-term conservation requirements for Malleefowl have been unclear. In 1989, a Malleefowl survey and monitoring program commenced whereby monitoring the activity of Malleefowl mounds located within permanently marked grids provided the most accurate indication of persistence and changes in breeding activity over time. Mound monitoring may also provide an effective tool for measuring current and future management actions. During the period 2004 – 2007, considerable progress has been made in Malleefowl conservation efforts in SA. Significant changes, beginning in 2004, were made to the monitoring system. This included the adoption of an electronic monitoring method developed by Benshemesh (1997), and collecting, validating and converting all historic Malleefowl data to electronic format. Other initiatives include the funding of contract project officer positions in the Murraylands, South East and Adelaide with specific aims to aid the Malleefowl recovery effort; on-ground actions involving the fencing of priority Malleefowl habitat; monitoring workshops for volunteers; and a research project into Malleefowl genetics involving the SA Museum. In addition, community groups, individuals and agency staff have become actively involved and shown great enthusiasm in furthering conservation efforts for Malleefowl.

Conservation Genetics of Malleefowl

Raoul Mulder, Peter Dunn & Steve Donnellan
Department of Zoology, The University of Melbourne, Victoria 3010, Australia.
R.Mulder@unimelb.edu.au

Defining appropriate genetic units for the management of Malleefowl is one of the key objectives of the Malleefowl Recovery Plan. We recently obtained funding from the Australian Research Council's Linkage Grants Scheme to examine genetic variation in populations of Malleefowl throughout their range, estimate genetic diversity and isolation, define biologically relevant management units, and assess the risk of extinction. The information will enable us to develop management approaches that incorporate genetic considerations when considering strategies for minimised extinction risk. The project is a collaboration between the Universities of Melbourne and Wisconsin (USA), the South Australian Museum, the SA Nature Foundation, the Victorian Department of Sustainability and Environment and the Malleefowl Preservation Group, and will run from 2007 to 2011. We are keen to encourage collaboration and participation in this project from additional participants, in order to maximise the quantity and diversity of genetic material that will be available for analysis.

Nganamara in South Australia's Aboriginal Lands

Thalie Partridge[1] and Matthew Ward[2]
[1]Threatened Species Officer, Anangu Pitjantjatjara Yankunytjatjara Land, PMB 227 Umuwa via Alice Springs, NT 0872. thalielmapy@bigpond.com
[2]Regional Ecologist for the Alinytjara Wilurara region, Department of Environment and Heritage, SA. Ward.Matthew@saugov.sa.gov.au

In the Maralinga Tjarutja Lands there have been numerous historic records of Nganamara (Malleefowl) and Nganamara signs; however no monitoring of Nganamara activity/mounds has occurred. A recent sandplot survey of animal tracks across the Maralinga Tjarutja lands, found six locations with fresh Nganamara tjina (tracks) confirming the continued occurrence of Nganamara in the region. The habitat of these signs varied from dense mallee to open mulga woodland. A survey taking place in August 2007, involving ecologists and Oak Valley Land Management will target Nganamara mounds in order to establish a monitoring program.
In contrast, Nganamara mounds in the APY Lands have been monitored since the early 1990's by Anangu, Anangu Pitjantjatjara Yankunytjatjara Land Management (APYLM) and visiting ecologists, primarily within the Walalkara and Watarru regions. 26 mounds are recorded in the APY LM database. No new active mounds have been recorded since 2005, some mounds have become inactive during the period of monitoring. Reasons for this remain unclear. Some concern has been expressed by traditional owners about the effect of predators; however more systematic monitoring of Nganamara and their predators will be undertaken before predator control is considered. Foot surveys led by Anangu from Watarru have recorded Nganamara tjina (tracks) in habitat to the east of recorded mounds and surveys will continue in this area and other areas with suitable habitat.

Western Plains Zoo Malleefowl Breeding Program 1998 – 2007

Judith Gillespie
Western Plains Zoo, PO Box 831, Obley Rd, Dubbo NSW 2830, Australia.
jgillespie@zoo.nsw.gov.au

Western Plains Zoo commenced participation in the captive breeding and reintroduction of Malleefowl in NSW almost 20 years ago. The program first started in 1988 with a proposal for the Zoological Parks Board of NSW to assist the NSW NPWS Recovery Program for Malleefowl, involving incubating wild collected eggs, rearing them for release in Nature Reserves in the central west of NSW and simultaneously setting up a breeding pairs to produce offspring for ongoing releases. Since the program's inception a total of 555 Malleefowl have been released in 3 reserves. Over the many years husbandry management has developed and an updated document of husbandry techniques has recently been compiled. The captive program has provided a valuable process for developing husbandry skills for this species and highlights the valuable role zoos and similar institutions can provide for release to the wild programs and in providing sites for insurance populations in case of catastrophic declines in the wild.

The conservation and management of megapodes in the Indo-Pacific

J Ross Sinclair
Wildlife Conservation Society Papua New Guinea Programme & Leibniz Institute for Zoo & Wildlife Research Berlin, Postfach 601103, D-10252 Berlin, GERMANY. rsinclair@wcs.org

Most of the megapode species that humans encountered when they colonized the Indo-Pacific region are now extinct. Of those species remaining, most are classified as at risk of extinction. This puts megapodes among the most degraded and at risk families of birds in the world. The factors that likely led to the extinction of 30 or more species of megapode are still at play today: unsustainable use by humans, habitat change and introduced species. One thing that has changed is that we now have the information and tools to arrest the decline. Unlike our ancestors, we know in broad terms which species are declining and have hypotheses as to why this is occurring. Furthermore, in a few cases we have gathered enough information to design and implement management plans that are protecting some megapode populations and show the way to reduce the risks of further extinctions. For example, colonial-nesting megapodes over-harvesting of eggs is widespread.

The experimental use of hatcheries and closed seasons has revealed ways that substantial numbers of chicks can escape these harvests. The habitat characteristic for incubation sites of several species are known and therefore can be protected in areas that face habitat change. Although these are successes, much remains unknown about megapodes, particularly for species occurring outside Australia. Simply put, we need to learn more, and do more, to prevent further extinctions in the unique family of birds.

Bruijn's Brush-turkey *Aepypodius bruijnii*: field discovery, monitoring and conservation of an enigma

Iwein Mauro
PO Box 289, 98401 Sorong, Indonesia. iweinmauro@gmail.com

The endemic brush-turkey of Waigeo Island in eastern Indonesia, *Aepypodius bruijnii*, managed to remain entirely unknown in the living world during the more than 120 years that elapsed in between its formal description from trade skins in 1880 and its field discovery by the speaker in May 2002. Since then, Bruijn's Brush-turkey has been shown to nest only on the island's previously ornithologically unexplored highest summits, along an ecological gradient above 620 m elevation, where a structurally distinctive, wind-sheared and possibly locally edaphically controlled, stunted cloud-forest grows on infertile substrates. This breeding habitat comprises just 60 km2 or 1.9 % of the island's area and is contained within six locations sensu IUCN (2001), three of which are now confirmed to support breeding populations. The species' global population has been estimated at 349 mound-owning males or 977 mature individuals, with 98 % of the population restricted to just three locations in the eastern part of the island (Mauro 2004; 2006). Threats that impinge on the species are discussed, and it is concluded that its current precautionary treatment as Vulnerable warrants upgrading to Endangered in accordance with the revised IUCN Red List categories and criteria. Habitat destruction as a consequence of wild fires and a recent logging epidemic had previously been identified as the major factor threatening this unique brush-turkey's long-term survival (Mauro 2004; 2006). In addition, the species' second and third largest breeding populations could now rapidly come under extreme pressure if proposed mineral extraction projects in Waigeo's northern ultramafic belt materialise.

Megapodes in Northern Australia

Darryl Jones
Centre for Innovative Conservation Strategies, Griffith University Queensland, Australia.
d.jones@griffith.edu.au

Malleefowl are unquestionably the aberrant megapode: all of the other 21 species live in subtropical and tropical regions, mainly in dense rainforests where the construction of incubation mounds is relatively straightforward. Malleefowl are of particular interest because they have somehow managed to adapt what would have been a life in the jungle to millennia of relentless drying. Coping with extreme climate change is possible but requires sophisticated adaptations. Comparisons with the two more northern megapodes that occur in Australia – the Australian brush-turkey and the orange-footed scrubfowl - provides an assessment of the extent of this adaptation in malleefowl as well as an opportunity to learn how the other species are faring. Although many megapodes remain seriously threatened, these two Australian species have learned how to live successfully among people, in some locations such as Brisbane, Darwin and Cairns, becoming nuisances in urban areas. Despite its abundance, however, the scrubfowl remains poorly studied. On the other hand, continuing work on the brush-turkey has greatly enhanced our understanding of the species and of many aspects that are common to the family as a whole. Of particular importance is the recent discovery of a specialised form of temperature sex determination in brush-turkeys in which different levels of mound heat result in highly skewed sex ratios. This presentation will review some of these recent findings, highlighting issues of particular relevance to malleefowl conservation and ecology.

Malleefowl in the Western Australian wheatbelt: An ecological study informed by community knowledge

Blair Parsons
CSIRO Sustainable Ecosystems/ University of Western Australia, Private Bag 5 PO, Wembley, Western Australia 6913, Australia. blair.parsons@csiro.au

The Malleefowl (*Leipoa ocellata*) is listed as vulnerable across Australia and the National Recovery Plan suggests that its range has contracted by 45% in Western Australia. Estimates of decline are based on detailed studies of single populations or continent wide assessments based on presence only data. We investigated whether presence-only data could reliably assess the status of Malleefowl by comparing presence with presence-absence data from Western Australia. We also quantified changes in the range of Malleefowl in Western Australia and determined the relative influence that various threatening processes (e.g. land clearing, agricultural development), may have had on its range. Presence-only data were vulnerable to false absence and bias in observer effort, but we demonstrated a method that overcomes these weaknesses by verifying areas of apparent absence, resulting in the production of a presence/absence dataset. Malleefowl have suffered a range contraction within Western Australia but this contraction is less substantial than previously claimed. The contraction in range within the agricultural landscapes of south-west Western Australia is associated with extent of land clearing, the number of years since commencement of agricultural activity, and the number of sheep within a landscape. To conserve Malleefowl, we believe landscapes developed for agriculture in recent decades must be protected to ensure they do not develop attributes found in landscapes that have been heavily cleared and occupied since the early 1900s. In addition to the work detailed above, we will also present preliminary findings from work aimed at understanding the role that fire plays in the ecology of Malleefowl in the Western Australia wheatbelt. This research utilises remote sensing to quantify the frequency and extent of wildfires in the WA wheatbelt and vegetation survey to document how Malleefowl habitat recovers from such fire events.

Biology of young Malleefowl

Jessica van der Waag
University of Western Australia, Australia. vanderwaag@westnet.com.au

After emerging asynchronously from the nest mound, the chicks of the Malleefowl *Leipoa ocellata* (Megapodidae) disperse independently. Malleefowl chicks are thought to lead solitary lives until reaching maturity at three to four years of age. Very little is known of the dispersal, behaviour and habitat requirements of young Malleefowl during this period, particularly in a landscape of small habitat remnants. By radio tracking chicks and captive-raised young birds, it was possible to gather new information on young Malleefowl which may be used to inform management of small remnants, and have implications for large reserves. Findings that will be presented include social interactions among young birds, dispersal and movements within the habitat, causes of mortality and recruitment events.

Post-release survival of captive-bred malleefowl in western New South Wales

Andrea Wilson, Chris Coombes, Remy Dehaan, and A. L. Wilson
School of Environmental Sciences, Charles Sturt University, Locked Bag 588, Wagga Wagga, NSW 2678, Australia. ccoombes@csu.edu.au rdehaan@csu.edu.au

Malleefowl populations have undergone serious declines as a result of habitat loss and predation by introduced predators. Since 1990 a successful captive breeding program has been supplying chicks for release into Nature Reserves in western NSW. However, early studies indicated that post-release survival of the captive-bred chicks was low, mainly as a result of predation by foxes. In addition movement patterns of sub-adults following release is poorly known, making selection of optimal release sites difficult. This study investigated the survivorship of captive-bred malleefowl following the introduction of aerial fox baiting. After behavioural and radio-transmitter attachments trials on captive birds, data on mortality and movement patterns of 14 sub-adult birds were collected using radio telemetry after release from November 2005 to April 2006. Survivorship in the first four months following release was relatively high with only one mortality confirmed. The majority of birds dispersed from the release site. However, variation in movement patterns

between individuals was high, with some individuals moving large distances each day and others remaining in the vicinity of the release site. The results of this study suggest that fox baiting has been successful in improving survivorship of released malleefowl.

Malleefowl searches at Yeelirrie station in arid WA: a valuable collaboration between industry and volunteers

Joe Benshemesh[1], Susanne Dennings[2] and Carl Danzi[3]
[1]La Trobe University, School of Biological Sciences, Bundoora, 29 Shiers St, Alphington, Victoria 3078, Australia. jbenshemesh@bigpond.com
[2]Malleefowl Preservation Group, Ongerup, WA, Australia. sdennings@westnet.com.au
[3]WA Malleefowl Network Facilitator, WWF - Australia, PO Box 4010, Wembley Western Australia 6913, Australia. cdanzi@wwf.org.au

Between 2000 and 2006 the MPG undertook systematic surveys for Malleefowl at Yeelirrie Station, a 2750 km^2 pastoral property managed by BHP Billiton Nickel West and located 400 km north-north-west of Kalgoorlie, WA. The primary objective of this study was to describe the distribution of Malleefowl at Yeelirrie and to provide information on population trends. Volunteers walked over 800 km of systematic transects in search of Malleefowl footprints and other signs, and located at least 24 mounds. Six widely separated areas were found to be inhabited by Malleefowl and breeding was confirmed in four of these areas. Malleefowl are highly localised at Yeelirrie, but we found no evidence of declines: footprints of Malleefowl were found in all five areas in which old mounds were found during our surveys, suggesting that Malleefowl range had not contracted over the past few decades, and in 2006 the birds still occupied areas in which their footprints were detected in 2000 and 2003. Recent management of Yeelirrie thus appears to have been beneficial for Malleefowl, although the frequency and extent of wildfire during the past five years (in particular) is a concern and may have removed some favourable habitat. We estimate that there are probably 10-20 breeding pairs on the property and conclude that the most important contribution that managers can make toward the conservation of Malleefowl at Yeelirrie is to continue to manage the property in an ecologically sensitive way, and to continue to monitor this important Malleefowl population in order to assess the success or otherwise of management actions.

Researching Malleefowl monitoring sites – A The Victorian Malleefowl Recovery Group perspective

Peter Stokie
Committee Member - Victorian Malleefowl Recovery Group, 25 Belfast Street, Newtown, Victoria 3220, Australia. pstokie@iprimus.com.au

The importance or searching monitoring sites periodically is essential for the continuation of scientifically valid data on malleefowl breeding density. However it is probably the hardest thing to maintain due to the significant restraints of the time involved in conducting a systematic search and the difficulty of having sufficient personnel to conduct the search. This paper explores some of the methods the Victorian Malleefowl Recovery Group (VMRG) have employed in their searches, and an analysis of the relative successes and difficulties involved. The value of being well prepared, having well trained, motivated and supervised searchers, and using modern technologies to assist with searches increases the viability to conduct successful searches. The history of past searches and the strategies used for more recent much improved searches will be presented as a model for other groups to consider.

Does the integrity or structure of mallee habitat influence the degree of fox predation on Malleefowl (*Leipoa ocellata*)?

David Priddel[1], Robert Wheeler[1] and Peter Copley[2]
[1]Department of Environment and Conservation (NSW), PO Box 1967, Hurstville, New South Wales 2220, Australia. Robert.Wheeler@environment.nsw.gov.au
[2]Department for Environment and Heritage (SA), GPO Box 1047, Adelaide, South Australia 5001, Australia.

Malleefowl (*Leipoa ocellata*) are in decline across their range. Previous studies have found that the survival rate of young Malleefowl is low, the single greatest cause of mortality being predation by the introduced Red Fox (*Vulpes vulpes*). Many of these studies, particularly those in New South Wales (NSW), were conducted in habitats that were heavily modified by fire, exotic herbivores or plant harvesting. In this paper, we examine the survival of Malleefowl in relatively undisturbed mallee habitats within two conservation reserves in South Australia (SA). Both reserves were long unburnt and free of large exotic herbivores, but differed greatly in understorey structure. Fifteen young captive-reared Malleefowl were released into each reserve. In all, 70% of these individuals were dead within 40 days. Fox predation was the prime cause of mortality, accounting for at least 35%, and perhaps as much as 96%, of all deaths. The rate and causes of mortality were similar in the two reserves. The overall rate of Malleefowl survival was (1) better than that recorded in more-disturbed habitat in NSW in the absence of any fox control, but (2) substantially less than that in NSW after widespread fox control was implemented. This study indicates that Malleefowl in SA are subject to significant levels of fox predation, even in relatively undisturbed habitats. Available data indicates that during the past two decades Malleefowl populations in SA have declined at about the same rate as those in NSW. Current densities in SA are typically about one quarter of what they were 15 years ago. For the two mallee habitats examined, evidence suggests that understorey structure had no influence on the degree of predation. We conclude that habitat integrity and structure have very little effect on Malleefowl demography, and suggest that Malleefowl populations across Australia are threatened by foxes, placing the species at substantial risk of extinction.

POSTERS

The Friends of North Eastern Malleefowl

Mick Davis

WWF – Australia , PO Box 181 , N ortham WA 6401, Australia. mjdavis@wwf. or g.au

The Friends of North Eastern Malleefowl (FONEM), is a non-incorporated group of interested individuals, shires and others from WA's northeastern Wheatbelt, that are working together to protect and promote Malleefowl and their conservation in WA, between Wyalkatchem and Westonia, and from Trayning to Tampu. In 2003, with the support of the 'Better Bencubbin' Progress Association, the Shire of Mt Marshall and the Threatened Species Network (TSN), members erected 12 Malleefowl Crossing signs along main roads that cut though known Malleefowl habitat across the shire of Mt Marshall. Since then FONEM have also supported a number of local projects aimed at fencing Acacia shrublands where Malleefowl are known to occur. As a small group, FONEM has so far focused on awareness raising, collecting sighting data and supporting local projects that benefit Malleefowl. In the future, we hope to establish our own grid in the northeast Wheatbelt, and train locals to monitor a large (over 300ha) patch of malleefowl habitat to National standards. Working with the Western Australian Malleefowl Network, our group hopes to provide useful data on Malleefowl activities from this little studied area. Malleefowl conservation on private conservation reserves in the Lower Murray Darling Region - Gary Doyle, Patty Byrnes Claire Wilkinson, and Noel Hayward. The Lower Murray Darling Region covers approximately 6.3m hectares in the far south west corner of NSW.

Much of this is uncleared with over 94% of the region still being covered in native vegetation of varying condition. Of this approximately 1.5 m hectares is made up of mallee communities which can be considered Malleefowl habitat. Whilst this represents in excess of 92% of the original extent of mallee communities, analysis using a computer based biodiversity forecasting tool indicates that the loss in habitat value is much greater with regional occupancy being only 30% of the original extent.

This is the result of grazing over the majority of the area, plus some fragmentation in the more developed areas. With only 91,100 hectares or 6.0% of the habitat protected in National Parks and Reserves, the responsibility for survival of the Malleefowl in the region rests largely with the landholders. Over the past decade, 122,000 hectares of conservation reserves suitable for Malleefowl have been created by Landholders in the region, either through land use agreements or financial incentives. A series of management actions for these reserves are agreed with the landholder and would typically include: exclusion of stock and feral herbivores (goats); control of native herbivores (kangaroos); management of pest animals (in particularly carnivorous pests such as cats and foxes); and actions to improve the condition of the native vegetation. Anecdotal evidence from the Landholders involved would suggest an increase in the population and distribution of Malleefowl since the reserve system has been established. More systematic monitoring of these

reserves and non managed areas is now required to determine trends in Malleefowl populations and to determine the effectiveness of the management actions in place. Additional management of areas outside of the reserves, including corridors & surrounding mallee communities, and the connectedness of the existing reserve system are key requirements for ensuring Malleefowl populations survive into the future.

Western Plains Zoo Malleefowl Breeding Program 1998–2007

Judith Gillespie
Western Plains Zoo, PO Box 831, Obley Rd, Dubbo NSW 2830, Australia.
jgillespie@zoo.nsw.gov.au

Western Plains Zoo commenced participation in the captive breeding and reintroduction of Malleefowl in NSW almost 20 years ago. The program first started in 1988 with a proposal for the Zoological Parks Board of NSW to assist the NSW NPWS Recovery Program for Malleefowl, involving incubating wild collected eggs, rearing them for release in Nature Reserves in the central west of NSW and simultaneously setting up a breeding pairs to produce offspring for ongoing releases. Since the program's inception a total of 555 Malleefowl have been released in 3 reserves. Over the many years husbandry management has developed and an updated document of husbandry techniques has recently been compiled. The captive program has provided a valuable process for developing husbandry skills for this species and highlights the valuable role zoos and similar institutions can provide for release to the wild programs and in providing sites for insurance populations in case of catastrophic declines in the wild.

PRESENTATIONS WITHOUT ABSTRACTS

Malleefowl work in Western Australia

Carl Danzi
WA Malleefowl Network Facilitator, WWF - Australia, PO Box 4010, Wembley Western Australia 6913, Australia. cdanzi@wwf.org.au

Malleefowl at Mt Gibson Minesite

Martine Scheltema
ATA Environmental, 2 Bulwer Street. Perth WA 6000, Australia
martine.scheltema@ataenvironmental.com.au

Malleefowl in the Little Desert

Raymond C. Reichelt (Whimpey) OAM
Little Desert Nature Lodge, PO Box 202, Nhill Vic 3418, Australia. info@littledesertlodge.com.au

ACKNOWLEDGEMENT

The organising committee was chaired by Stephen Davies (Curtin and Murdoch Universities & Birds Australia) and involved Sally Cail (North Central Malleefowl Preservation Group), Carl Danzi (WWF-Australia, Malleefowl Facilitator), Ann Stokie (VMRG), Jessica Van Der Waag (PhD student UWA/MPG), Natalie Holland (WWF – TSN Vic), Judy O'Neill (MPG/Yongergnow Inc), Blair Parsons (PhD student UWA), and Liz McLellan (WWF - TSN WA). The committee would like to thank all those who presented at the forum, including invited speakers Darryl Jones, Iwein Mauro and Ross Sinclair, who talked about wider megapode science and conservation. The forum was held at Katanning Leisure Centre, which provided an excellent service and generous discount for which the committee is very grateful.

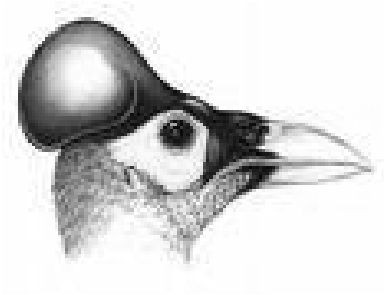
New Projects

In addition to the three exciting Maleo projects reported in the last edition of the MSG newsletter (July 2007), we have been notified of another Maleo project based in Tangkoko, North Sulawesi which is run by the M & P Wilcon Ecoguide Fund. For further information contact: wilconfund@planet.nl and info@papuabirdclub.com.

Recent publications

Dekker, R.W.R.J., 2007. Distribution and Speciation of Megapodes (Megapodiidae) and Subsequent Development of their Breeding Behaviour. In: W. Renema (ed.), Biogeography, Time, and Place: Distributions, Barriers, and Islands: 93–102. Springer. [a pdf can be obtained upon request: dekker@naturalis.nl].

BirdLife/WPA/SSC Megapode Specialist Group
Megapode Newsletter, Vol. 21, nr. 2
July 2008



Megapode Newsletter Vol. 21, nr. 2

July 2008

Dr. Gillian C. Baker, Peninsula Medical School, Barrack Road, Exeter, EX2 5DW, UK.
e-mail: baker_gillian@yahoo.co.uk
Dr. René W. R. J. Dekker, National Museum of Natural History, P.O. Box 9517, 2300 RA Leiden, The Netherlands. Tel. 31 71 5687623; Fax 31 71 5687666; e-mail: Dekker@naturalis.nl
Dr. Darryl N. Jones, Australian School of Environmental Studies, Griffith University, Nathan, Australia.
e-mail: d.jones@griffith.edu.au

Dear megapoders

In May, Gillian Baker emailed you, asking your ideas about merging the Megapode Specialist Group with the Grouse, Pheasant, and Partridge, Quail & Francolin Specialist Groups into a single large Galliform Specialist Group. The reasons behind the idea, which came from the chairs of the four SG's who met with other SG chairs in February in the United Arab Emirates, were mainly practical. Looking backwards over the past few years and looking forward to the challenges which lay ahead of us, we were convinced that we needed each other. Because you, as member of the Megapode Specialist Group, as well as the members of the other three WPA specialist groups, might have different views we wanted to know your thoughts about this. In the meantime, many have responded and in this issue of the Megapode Newsletter you will find a summary of the responses that the World Pheasant Association has received from the four SG's. Comments and votes from the feedback have been compiled as independently as possible. We will discuss the results between the four SG's and WPA and communicate the outcome with you as soon as possible.

Furthermore, you will find in this newsletter information about the conservation of a Maleo site in North Sulawesi, a new study into mating in the Australian Brush-turkey and the announcement of a new book on Australian megapodes, written by two of our colleagues, Darryl Jones and Ann Göth.

René Dekker

Future of the Galliformes Specialist Groups

In early May the Galliformes Specialist Group Chairs and Co-chairs sent out a letter to members of each of the four Groups to ask for opinions on the way ahead. This letter was based on the feeling, shared by all six Chairs and Co-chairs that the SGs were becoming less effective than in the past. They felt that they were struggling to deliver and did not see things improving under the status quo. The result of their discussions was that they felt pooling all available resources and experience into one single Galliformes Specialist Group was certainly one way to improve things.

The letter requested that comments be sent to Philip McGowan at WPA by the end of May. Altogether, thirty-four comments were received. Some expressed a clear view on the suggestion of a single group, whilst others chose to make their own observations on either the current position or offered ideas on particular aspects.

In trying to structure the diverse opinions, we have assessed the feedback at two levels. First, we have identified where there are clear views on the structure that might be employed. Second, we have sought to 'capture' every single comment that has been made so that no thoughts or suggestions are lost. Therefore, these should be read in the context of the overall views on the structure.

1. Structure

Keeping the current structure: 2 SG members suggested this
Comments associated with these responses were:

- The 'burden' would be too great for one Galli SG;
- Members of one big group would feel isolated (ie small fish in a big pond); and
- There are too many species for one single group to be responsible for.

A Galliformes SG as an umbrella for taxonomic focal points/subcommittees: 18 members suggested this
Comments associated with these responses were:

- Would be able to seek common conservation solutions across species, landscapes, regions and other SGs;
- The current separate SGs place too much work on too few people;
- Would allow the employment of an officer to work for the Galli SG;
- Would allow officers to be nominated for each taxonomic group/subcommittee, or other similar divisions such as Old World and New World;
- Project work may eventually suffer if the separate SGs are kept as they are;
- Information and expertise will be easier to share across SGs;
- One Galli SG could increase awareness and impact of the SGs in USA;
- Having a subcommittee within the one SG will make sure the identity and research foundations of the individual groups is not diluted, and will allow the work to be more spread throughout the subcommittee;
- Will allow time and resources to be pooled;
- Concerns over what exact support WPA could provide to one super SG; and
- Concerns that certain groups (e.g. megapodes) will be swamped by others.

One super Galliform SG: 6 members agreed with the proposal with no further comment (as above).

Not obvious/no opinion: 8 members felt that they knew too little of the workings of the SGs to offer an opinion or were happy for others to make the decision.

2. All comments received

These are not 'weighted' according to the number of people making each comment. Therefore, some comments were made by a single person, whilst others were made by several or many.

Pros of one super SG	Cons
Overlapping species with common conservation problems addressed, address issues regionally/by ecosystem, synthesize effects across species	Too much work for one committee – multiply demands/pressures of one group by 5
Cracids will be covered	Lose invaluable specialist expertise and knowledge
Too much work for too few people as it currently stands	Too big a task for WPA to take on – need nominated officers – funding?
Current set-up doesn't work	Conservation work still being done, more so recently, just need some 'paperwork/communications' help

Same effort would benefit more species	Will large SG be able to resolve current challenges
Delegate duties around – relieve chairs and also encourage new energy/faces	Members with very focused interests may feel 'swamped'
Emphasise importance of Galli conservation/SSC/SGs in USA – funding prospects?	Larger organisation may be more difficult to approach – less involved members may get/feel lost, lose commitment
Many members of one SG have expertise/interest in another SG	Reduction in profile/special status/high regard
Designated officers/coordinators to carry out information flow/processing	Lose diversity of achievements
Unusual for such a taxonomic break-up among other SGs	Chairs of subcommittee will still face same pressures as now – so why change?
Bring grousers back to origin of WPA	May become biased towards certain species, experts or regions
Single SG could more effectively work with other SGs and NGOs	May dilute the identity and research foundations of the separate SGs?
Save time & money with one newsletter to produce and one website to maintain, one action plan (?)	One super-group may provide a lot of 'useless' info for members
Stronger affiliation with WPA could be a very valuable step forward	It would be a 'step-back' to form a super-group, as the separate SGs were established to provide specific support, advice etc
Possibility of increasing funds raised, particularly by support office	Need a reorganisation of the separate SGs, rather than an umbrella over these umbrellas
Compare with Crocodile SG: full-time Executive Director, Vice-Chairmen for taxonomic groups/regions and topics eg genetics, research, trade etc	Who will make the large/important decisions? Will they be biased?

Summary of comments

A simple assessment of these comments does suggest that there is support for the 'big picture' idea of pooling resources to have a bigger impact at a larger scale. However, there is a concern at the level of individual SG member as to how this will affect their relationship with a large SG.

In brief

Recently, AlTo (Alliance for Tompotika Conservation) staff were contacted by a local man who had captured what appears to be a juvenile maleo in a snare. The bird, of indeterminate sex, appears equivalent in size to a small adult maleo (measurements not taken), with black-and white plumage much as an adult bird. The casque, however, is small and only partially developed, and is covered with fine down rather than being smooth and leathery as in adult birds. The area around the eye and base of bill is marked with yellow, but the colouring is lighter (less orange) and covers less area than in adult birds.

The maleo was photographed by AlTo staff near where it was captured in Kec. Lamala, near Mt. Tompotika, Central Sulawesi and has been copied to MSG for general interest. (photo copyright AlTo 2008).

World Conservation Congress

This four-yearly event is taking place this year in Barcelona this October. The last opportunity for online registration is 25th September. For more information about this important congress follow the weblink below:
http://cms.iucn.org/news_events/events/congress/about/index.cfm

Bruijn's Brush Turkey re-classified

In this years publication of the Red Data List Briijn's Brush Turkey has been uplisted from vulnerable to Endangered. This decision is based on new information on the species provided by Iwein Mauro.

Binerean: A Promising Maleo Conservation Site

Johny S. Tasirin
WCS - Indonesia Program, jtasirin@wcs.org

Binerean Beach is on the Binerean Cape in Pinolosian, North Sulawesi. It is located about 300 km south of the provincial capital, Manado and 100 km from the WCS managed maleo nesting ground in Tambun in the Bogani Nani Wartabone National Park (BNWNP). The geographical coordinates are 0°24'6.32"N; 124°16'32.53"E. The nesting ground comprises 2.7 km white sandy beach, in area ideal for tourism and water sports.

There is small plantation of coconuts and other crops on the beach. The plantation is bordered with a protected forest (*Hutan Lindung*). The forested area is only about 100 ha but it is an important corridor for the maleos to reach the larger forests further inland in the BNWNP. It is not known whether or not this beach population and the inland populations are discrete or inter-mixing. An understanding of the biogeography of these populations would be invaluable in establishing effective management strategies for these populations.

Rapid assessment from local knowledge suggests that the Binerean Cape and the surrounding areas are also home to many of Sulawesi's charismatic mammals, sea turtles (three species), and crocodiles. It is also rich in sea, wetland, and forest bird species and is an ideal location for conservation action.

The Wildlife Conservation Society (WCS) Indonesia Program is building a simple research station in the plantation near the maleo nesting ground. The land is relatively isolated. To walk to the cape from the nearest village requires crossing creeks and a large river.

The most active maleo nesting ground is located at the end of Binerean Cape. It is the furthest point from the village. The maleos, however, may nests along the 2.7 km beach and even further. There are about a dozen active nesting pits in Tanjung Lagamuru, 2 km further east from Binerean Cape. With a proper management, the cape may become an important sanctuary for maleo and conservation education centre. A pleasant beach and maleo sighting is a very attractive combination.

Neighbouring to the Binerean landscape there is a plantation company called Kahuripan Kawanua Pantera (KKP) that manages about 3000 ha plantation of cloves and vanilla. After attending a number of village meeting run by WCS, KKP has shown a strong interest to take on board a number of strategies to promote wildlife conservation in their managed sites.

At the moment, WCS has set a monitoring program in Binerean. HOBO digital data loggers were set to monitor the year-round air and soil temperature and humidity in one hour interval. A grid system was adopted to monitor the maleo. Local guardians have been trained to protect the area and to monitor adult maleo visits, laid eggs, and hatchlings in a daily basis. The guardianship started on November 2008. Within two months, we rescued 43 eggs which would otherwise end up in frying pans of the locals or visitors. As many as 90 pairs of maleos have been sighted.

Binerean is a potential site to conserve beach nesting maleo populations. It is also potential place to develop a conservation awareness program using the maleos as a flagship species.

New Projects

"Research into the mating system of the Australian brush-turkey (Alectura lathami)

David Wells, PhD Candidate,
Biology Dept, Macquarie University, E8A 322 , 0402 265920 dwells@bio.mq.edu.au

I am currently working on a PhD project co-supervised by Dr Darryl Jones. My thesis will follow three lines of enquiry:

(a) video observations of behaviour at mounds
(primary question: do females choose mounds, males or 'mound ownerships'?)
(b) paternity analysis using microsatellites
(primary question: where copulations are associated with egg-laying, are they less likely to achieve fertilization?)
(c) comparative study of urban and non-urban populations
(primary question: are mounds more likely to be re-used continuously in urban environments, and what are the consequences for the mating system?)

In relation to (b), I would appreciate any advice from other readers on ideal microsatellite primers for paternity analysis in megapodes.

STAY TUNED..... for a new book on megapodes.

Ann Göth

"*The Mound-builders*" by Darryl Jones and Ann Göth, will be published in late 2008 (CSIRO Publishing, as part of the long-running Australian Natural History Series). This book will focus on the three Australian species – Malleefowl, Orange-footed Scrubfowl and Australian Brush-turkey, all members of the mound-building group of megapodes.

Chapters 1 to 3 will focus on taxonomy, distribution, habitat, appearance, vocalisations, feeding ecology, general ecology, the historic discovery of megapodes, and the extinct megapodes of Australia. Chapters 4 and 5 will cover these birds' unusual breeding biology, including breeding seasons as well as everything about mounds and eggs. Chapter 6 will be dedicated to the biology of the chicks, including appearance, growth, habitat, survival, as well as behaviour in and outside the mound. Chapter 7 will summarise the social and reproductive behaviour, in particular the various factors affecting these birds' mating systems. And last but not least, Chapter 8 will focus on the conservation and management of the three species, with particular emphasis on the plight of the endangered Malleefowl and the unusual problems associated with suburban moundbuilders.

The book will provide the most up-to-date and comprehensive summary of what we know of these birds today, some of which is the result of the authors' own work over many years. It will be aimed at both bird-specialists as well as a wider, non-scientific audience. Interspersed with many colour photos, figures, tables and drawings, and written for a wide audience, it will be easy to read. Footnotes refer to references for the most important topics and will enable the interested reader to find additional literature.

While focusing on the three Australian species, this book will also provide important background information for all other megapode species, all of which have been much less studied than their Australian relatives. Information on topics such as the breeding biology, ecology and survival of chicks, social behaviour and conservation will – at least to some extent –also be applicable to these other megapodes.

So stay tuned, and regularly check the webpage of CSIRO publishing to find out when this book will be released (http://www.publish.csiro.au/). Alternatively, send an email to ann.goeth@bio.mq.edu.au, and she will let you know when the book is up for sale.

Recent publications

Göth, A., Eising, E.M., Herberstein, M.E. & Groothuis, T.G.G., 2008. Consistent variation in yolk androgens in the Australian Brush-turkey, a species without sibling competition or parental care.-- *General and Comparative Endocrinology* **155**: 742-748.

Göth, A., 2007. Incubation temperatures and sex ratios in Australian brush-turkey (*Alectura lathami*) mounds.-- *Austral Ecology* **32**: 378-385.

Göth, A. 2007. Mound and mate choice in a polyandrous megapode: females lay more and larger eggs in nesting mounds with the best incubation temperature.-- *The Auk* **124**: 253-263.