

COMMUNITY MONITORING OF THREATENED BIRDS IN THE LAKEKAMU BASIN - REPORT ON A RECONNAISSANCE TRIP IN DECEMBER 2008



R.J. Pierce

February 2009

Eco Oceania Pty Ltd Report for Conservation International and the Lakekamu
Basin Communities

Contents

1.	Background	2
2.	Reconnaissance timetable	3
3.	Key fauna observations	3
4.	Capacity and constraints for local monitoring	5
5.	Which species to monitor and what methods to trial	5
6.	Protocols to trial in May 2009	8
7.	Interpreting the data	10
8.	Conclusions and recommendations	11
	Acknowledgments	12
	References	12

1.0 Background

The Lakekamu Basin is a large (250,000 ha) area of lowland forest that supports exceptionally high biodiversity values, including many threatened bird species (CI 1998, CI undated). This project aims to develop, test and apply simple bird monitoring methodology that the Lakekamu Basin community, CI and others can use to determine medium and long-term trends in populations of key species in the Basin and potentially elsewhere in PNG and Melanesia. The target species for monitoring in the Basin are important indicator species of the lowland rainforest ecosystem and other intact forests of PNG. They are also iconic fauna of the region. These species are as follows (with IUCN 2008 threat rankings in parentheses):

- Muruk or southern cassowary – *Casuarius casuarius* (Vu)
- New Guinea harpy eagle – *Harpyopsis novaeguineae* (Vu)
- Southern crowned pigeon – *Goura scheepmakeri* (Vu)
- Vulturine parrot – *Psittichas fulgidus* (Vu)

Some other threatened and near threatened species may also be able to be addressed systematically or opportunistically as priority 2 species for monitoring, including:

- Salvadori's teal (*Salvadorina waigiensis*) (Vu)
- Guerne's eagle (*Aquila guernei*)
- palm cockatoo (*Probosciger aterrimus*) (LC)
- kus or Papuan hornbill (*Rhyticeros plicatus*)

The monitoring is intended to be as statistically robust and representative of these species in the Basin as possible, but which local community, CI staff and in some cases interested visitors can apply in a user-friendly way. Potential approaches could include CPUE studies (e.g. hunting data of key species) and bird fly-overs (sightings/hearing of birds from vantage points or transects), and possibly also transects of sign (e.g. location and frequency of muruk pekpek (cassowary droppings) per unit length of transect, length of footprint/age of bird), all with simple data sheets

that relate to statistical and graphical analysis. They will provide a spatial (geographical) pattern of abundance from which future application will establish trends over time.

2.0 Reconnaissance Timetable

Ray Pierce and Kepslok Kumilgo visited the Lakekamu Basin in the period 12-18 December 2008 and met with Village Engagement Team members at Urulau, Nukeva, Tekadu and Karoko and made a preliminary assessment of the feasibility of different monitoring options. The itinerary was as follows:

- 12 Dec – truck from POM to Lakekamu River am; motorized dingy to Urulau pm.
- 13 Dec – dingy to Nukeva am; with Joseph and others in village and hunting area pm.
- 14 Dec – walk Nukeva to Tekadu, all day
- 15 Dec – Tekadu area with Brendon all day
- 16 Dec – walk from Tekadu via Bulldog Road and Kakoro Track to Kakoro, all day
- 17 Dec – Kakoro area in morning with Rauhenny; dingy down Biaru River to Urulau pm
- 18 Dec – continue down river am, and truck to POM pm.

3.0 Key fauna observations

Muruk – southern cassowary

A single wild adult was seen on the bank of the Biaru River on 17 December. No pekpek (droppings) were observed along the trails between Nukeva and Tekadu on 14 December and between Tekadu and Kakoro on 16 December, a total of c.30 km, despite continuous searching. Muruk are hunted by people from all four villages. At Urulau, muruk reportedly approach the outskirts of the village where they are often captured or shot (Albert pers. comm.). The feeling of the VETs at each village is that captures are approximately the same over the years (but there is no measure of effort). Captive muruk intended for sale or food were seen at Urulau and Nukeva.

New Guinea harpy eagle

We observed what appeared to be harpy eagles in forest across the river from Tekadu. Currently, harpy eagles are thought to be more considerably more common at Tekadu than in past years (Brendon pers. comm.). They are sometimes killed if they attack chickens or children.

Gurney's eagle

One observed over Kakoro late afternoon of 16th December.

Little eagle (*Hieraaetus morphnoides*)

One observed over each of Nukeva and Kakoro.

White-bellied sea-eagle (*Haliaeetus leucogaster*)

Two seen perched beside the Lakekamu River near Urulau on 18 December.

Spotted whistling duck (*Dendrocygna guttata*)

A group of c.10 of these small spotted ducks was seen on the lower Lakekamu River on 18 December.

Salvadori's teal

Not observed during the visit, but this species is reportedly seen on swiftly flowing rivers of the Tekadu area (Brendon pers. comm.), including down to 70 m asl on the Avi Avi River (B. Beehler pers. comm.).

Gouria – southern crowned pigeon

None were observed during a brief search in a hunting area at Nukeva on 13 December. One was flushed by our party from near the Kakoro Track on 16 December. They are hunted by people from the four villages.

Vulturine (Pesquet's) parrot

This species was observed in small numbers throughout the Basin. They were seen on most of the one-hour observation periods while boating along the Lakekamu and Biaru Rivers, and during one-hour observation periods from vantage points at Nukeva, Tekadu and Kakoro (Table 1). It was not clear if this species was actively hunted by villagers.

Palm cockatoo

As for vulturine parrot.

Kus - Papuan hornbill

Hornbills were conspicuous throughout the Basin during this trip and were recorded during all one-hour observations (Table 1). They are hunted for food by at least some villagers.

Table 1 – Threatened and near-threatened birds observed in Lakekamu Basin during one hour observations at vantage points and during river travel in December 2008

Location	Lower Lakekamu River	Middle Lakekamu River	Nukeva	Lower Tekadu	Lower Tekadu	Kakoro	Biaru River	Biaru River
Date: Dec 2008	12	13	13	15	16	16	17	17
Time start	1600	1820	1730	0630	0630	1700	1500	1600
Observers	RP, KK	RP, KK	RP	RP	RP	RP	RP	RP
Weather	Fine	Fine	Misty	Fine	Fine	Fine	Showers	Showers
Guernsey's eagle	0	0	0	0	0	1	0	0
Papuan hornbill	8	6	3	7	5	4	11	7
Vulturine parrot	0	2	3	5	2	2	0	2
Palm cockatoo	2	3	3	2	4	3	4	5
Other notables:								
S cassowary	One on bank of lower Biaru River							
NG harpy	Observed near Tekadu							

Note: observers were Ray Pierce and Kepslok Kumilgo.

4.0 CAPACITY AND CONSTRAINTS FOR LOCAL MONITORING

The Village Engagement Team members are very knowledgeable people with a good understanding of conservation and sustainability issues. During this visit the VETs indicated a clear interest in undertaking the monitoring of threatened species. They believe that they already have a good feeling for the trends in populations of locally threatened species like muruk and gouria, because of the amount of time they spend in their forests, but they also understand the need to back this up with more quantified monitoring.

Whilst the VETs have excellent skills in species identification, they cannot be expected to implement and carry out all of this monitoring by themselves. There is a need for some specialist equipment and support, including ongoing analyses and report-backs, as well as periodic visits by technical people to ensure the programme is sustainable. There are a number of other factors that will influence the final selection of monitoring protocols.

Some key factors are as follows:

- The VETs and other villagers appear to be skilled in species identification (sight and sound) and interpreting bird sign
- The VETs will have no problem completing data sheets provided they are clearly presented, ideally in pidgeon so that others in the community can use them
- Minor equipment needs include watches, data sheets, clipboards, pencils, string, etc, and replaced as needed, potentially annually
- Monitoring should avoid complex and costly equipment that can also malfunction (e.g. cameras and GPS units), all of which would also need to be provided in multiples of 4-6 into the future
- Monitoring needs to be safe, e.g. not involve additional exposure to threats such as mosquito bites, death adders and river crossings, possibly the three greatest local hazards. In other words monitoring transects should not involve anything additional to routine hunting, track walking or river work that is currently undertaken by the community, or if it does, appropriate steps are taken to avoid or minimize the hazards
- Monitoring needs to be relatively passive, but fun and interactive, in order to recruit new monitoring members and thus ensure that the programme is sustained
- The VETs currently lack basic resource material, e.g. field guides and/or photocopies of plates from e.g. Beehler et al (1986).

5.0 WHICH SPECIES TO MONITOR AND WHAT METHODS TO TRIAL?

5.1 Muruk (southern cassowary)

The best options for muruk monitoring are firstly CPUE (catch per unit effort) carried out by selected hunters, and secondly transects to measure density of pekpek.

CPUE

Currently hunters provide voluntary information to CI via a questionnaire on the muruk and other animals that they capture or kill. However, this questionnaire contains no measure of effort. Ideally, reliable hunters would be nominated and encouraged to keep records of all of their hunting days during each year, recording details of:

- hunting area
- number of muruk seen and/or heard
- number captured/killed
- details of days (long or short days)
- skulls collected by VETS and kept for age analyses.

It would enable inter-year assessment of the effort required to capture/kill muruk in specific hunting areas. It could also include supplementary information, e.g. relative amount of sign seen per day's hunting. A potential data sheet for muruk and gouria (*Goura*) is provided in Section 6. The method would not be useful in pledged conservation areas, but data could be recorded on sightings/sign etc.

Transects for pekpek

This distance sampling method is being trialed by CSIRO in Far North Queensland. Transects of 250 m length and up to 5 m wide are currently being tested (D Westcott pers. comm.). A slightly refined method would be needed for Lakekamu, e.g. using 100 m transects in which two or more observers pull out a 100 m long rope out and walk back to the start counting pekpek on either side out to c.2.5 m, finally pulling in the rope. The method could be used in both hunting and pledged conservation areas.

However there are a number of problems associated with this method for Lakekamu, including:

- scale – it would take a huge effort to gather data that are representative of the c.250,000 ha of the Basin and differentiate between future conservation and hunting areas, c.f. the wider area currently sampled when hunting
- muruk density – the lack of pekpek seen during c.30 km of trails walked during this reconnaissance (c.f. average of 1.5 per km in Speewah-Kuranda area in Queensland in November-December 2008, R Pierce pers. obs.), suggests that muruk may be at much lower densities in some parts of the Basin
- data variability – the transect method seems to produce highly variable data (RP pers. obs., R Sinclair pers. comm.).
- death adder bites cause many deaths in the Lakekamu and it is unacceptable to ask VETs to undertake this type of risky monitoring. If however, if any VETs express interest in transects, they would need to wear appropriate safety equipment.

5.2 Gouria

Options for monitoring Gouria (*Goura*) include firstly the CPUE method described above for muruk, and secondly a transect method, e.g. counting gouria that are detected along trails. The methods have similar benefits and problems to those for muruk and need to be further evaluated with the VETS in May 2008. It could be that both methods are acceptable for trusted people going about routine hunting walking along trails, etc.

5.3 New Guinea harpy eagle

Options for monitoring harpy eagles are limited to the foothills area, with Tekadu being conveniently located. Observations in December 2008 and comments from VET Brendon pers. comm., suggest that scanning nearby ridges as well as keeping details of birds killed could be simple and effective monitoring methods. In addition or alternatively, Bruce Beehler pers. comm. recommends listening counts after dark.

Observations

This would simply involve observing from vantage points, of which there are several in and around Tekadu (and perhaps in the hills above Kakoro). In May 2009 we will trial the usefulness of observations as follows: confined to an hour at prescribed times of the day and year, with a total of 10 counts per season being trialed. Observers would record each harpy eagle seen (a pass) during the one hour, and also record the most number of birds seen together. The data set will be tested for variability and this will determine whether 10 is a satisfactory sample size.

Number killed

This would involve the VETs keeping annual records of harpy eagles killed in and around the village.

Calling

We will trial listening for eagles after dark at Tekadu, with pairs of birds often counter-calling (B. Beehler, pers. comm.). We will select areas away from river noise, e.g. track at Brendon's, the air strip, and upper Tekadu.

5.4 Papuan hornbill

This is a large and conspicuous bird in the Basin. Fly-over counts from vantage points would be the simplest monitoring method, and include total counts as well as maximum number seen together. These could be supplemented with transect counts along the Lakekamu and Biaru Rivers. All would be based on birds detected per hour.

5.5 Palm cockatoo

As for Papuan hornbill above.

5.6 Vulturine parrot

Options for vulturine parrot monitoring include firstly the fly-over counts described for Papuan hornbill (see above) and secondly, counting birds at roost trees.

Roost trees

This species uses regular night-roost trees, which are typically emergent fig trees at which birds arrive after sunset and leave before sunrise (Gretchen Druliner pers. comm.).

Gretchen's work suggests that roost trees are typically 5-11 km apart. It may be possible to monitor the number of birds using these trees in Lakekamu. One problem with this method lies in interpreting change in numbers of birds, e.g. does it reflect local changes in numbers or simply a change in roost site? If this method is used, it should not be used in isolation of fly-over counts and transects at different parts of the Basin.

5.7 Salvadori's teal

Ducks of mountain torrents, like the blue duck in New Zealand, are most effectively surveyed and monitored by using observers and trained bird dogs (the latter to find nesting or roosting birds), clearly not an option here. Even carrying out visual searches along a river's length could result in birds being overlooked, and in any case this task is dangerous for observers. In May 2008 we will discuss other options with the VETS at Tekadu, e.g. mapping locations where the ducks are seen each year.

6.0 PROTOCOLS TO TRIAL IN 2009

6.1 Hunting data

This would require an individual hunter or his recorder to document data on the location, level of hunting effort (days) and birds killed or captured. Use a separate data sheet for different hunting areas and new hunters (Table 1).

Table 1 - Hunting effort and results

Location: Nukeva west bank of river (give name of hunting area)			Year: 2009	Hunter/observer: Give name	Recorder: Joseph
Date or month	1/2/09	Mar09	etc		
Weather	F	I			
No. hours	5	8			
No. muruk seen	3	1			
No muruk killed	1	1			
No muruk caught	0	0			
Level of muruk sign – 0, L, M, H	M	L			
Skull no.	1	2			
No. Gouria seen	7	7			
No. gouria killed	1	0			
No gouria caught	0	1			
Comments: general and specific observations e.g. on 7/3/09 few muruk seen and little sign = unusual for this area. Also note any opportunistic kills etc.					
Notes: weather F = fine, R = rain, I = intermittent rain Level of muruk sign – 0 = none, L = low, M = medium, H = high amount of sign					

6.2 Fly-over counts for eagles, parrots and hornbills

Sites

Suitable sites for fly-over monitoring include the following:

- Urulau - aid post
- Urulau - Lakekamu river edge,
- lower Nukeva (beside river at Joseph's),
- Nukeva (playing field),
- lower Tekadu (Brendon's),
- Tekadu (river edge looking onto western ridge across river)
- Tekadu airstrip
- upper Tekadu (Francis's),
- Kakoro (Rauhenny's),
- Other more isolated sites if they are visited frequently enough, e.g. Ivamka (research station), river confluence resting site (but note that timing of observations may need to be less rigid than for other sites – see below)
- Sites that are within areas that may become future pledged conservation areas.

Draft protocol

1. Decide on who will be main observers (coordinators) at each monitoring site, e.g. VET members and other reliable observers/recorders
2. Each coordinator selects a monitoring site that provides a wide field of view – can be in village and/or at distant sites if the latter are often visited
3. Complete 10 x 1 hour observations in May-June each year at the site
4. This comprises 5 morning counts starting at 0700 h and 5 evening counts starting at 1730 h (this might change if we find one is better than the other in May 2009)
5. It's OK for more than one observer, but try to keep to the same coordinator for consistency at least while others are learning the method
6. Enter all data on the sheet by writing down the number of birds seen/heard at any one time – e.g. if you see 3 birds flying E, then later one flying back W, enter this as 3E,1W (see data sheet, Table 2).
7. For harpy eagle the early morning and evening observations will probably be unsatisfactory, with additional monitoring at a later time e.g. 0900-1000 h possibly being required.

6.3 Data and reporting

Recommended process is as follows:

- VET members give data to CI staff during visits to Basin - photocopy and keep copy of data at POM
- CI send original data to Ray Pierce who analyses data and provides annual report to CI – report includes summary of findings, graphs, recommendations and appended data
- CI copies the annual report for VETs at each village

- Possibly requires visit to Basin by RP or other CI specialist periodically for discussion, refinement, motivation, etc.

Table 2 – Lakekamu Basin Fly-over counts of threatened birds – example of datasheet

Lakekamu Basin - One hour bird fly-over										
Location: Tekadu – Airstrip										
Count no.	1	2	3	4	5	6	7	8	9	10
Date	10/5/09	10/5/09	Etc							
Time start	0700	1730								
Observers	BT etc	BT etc								
Weather	Fine	Occ showers								
Harpy eagle	0	0								
Vulturine parrot	3E	1W, 2E								
Palm cockatoo	2E,1N, 2E	5W, 1 W								
Papuan hornbill	1E,3E, 2N	6W, 2 W, 3E								
Others; SC cockatoo	3W	1W								

6.4 Equipment needed by VETs

The VETs need the following equipment for carrying out this work:

- Data sheets, clipboard and pencils
- Labels for skulls
- Watch
- Copies of plates of PNG birds to enable VETs to record local names
- For those who wish to trial transects for pekpek, a 100 m length of string each and a small tape measure.

7.0 INTERPRETING THE DATA

Determining abundance of birds can be problematic in PNG forests because of varying survey methods and patchy distributions (Beehler et al 1995, Beehler and Mack 1999). Although many of the target species to be monitored are quite widespread and/or mobile in the Basin, it is likely that some of the monitoring could produce widely varying counts depending on additional factors such as time of day, season, spatial location of food trees, and individual behaviour of birds or groups of birds. Some of this variation can be reduced by confining counts to prescribed times of day, e.g. when vulturine parrots and others are moving between roosts and food trees and vice versa (G Druliner pers. comm.) and when the onset of morning winds provide uplift for hunting harpy eagles. Spatial

bias will be addressed to some degree by the selection of sites with very wide viewing areas and complementing this with counts along transect lines (walking trails). Aberrant behaviour of birds can be interpreted by examining observations of maximum numbers seen together. These and other aspects will be addressed in May 2009 during and following the collection of some data sets.

If data variability can be minimised, the monitoring will be useful for examining inter-year trends in population indices within sites. Like most monitoring of this nature, sudden change in measures at specific sites from year to year will not necessarily mean a significant change in population size. It is more important to examine trends in results within sites over several years and for all the Basin sites collectively. This is the approach that has been taken for many threatened species, e.g. North Island kiwi (*Apteryx mantelli*) in Northland, New Zealand, where inter-year monitoring of call counts (an index of abundance) was refined in 1995. This monitoring has grown from 23 stations in four population clusters in 1995 to c.200 stations in 15 clusters in 2008, with clear population trends becoming apparent (see e.g. Pierce and Westbrooke 2003). If Lakekamu monitoring can be kept equally simple and fun for participants, there are good prospects for sustaining the programme and expanding local interest in monitoring and conservation generally as has happened with the kiwi programme.

8.0 CONCLUSIONS AND RECOMMENDATIONS

Given the excellent identification skills of the Lakekamu VETs and the individual characteristics of the target species for monitoring, it is planned to trial specific monitoring approaches during a longer trip in May 2009. This will involve providing equipment (refer Section 6.4) and other support (e.g. bird pictures/plates) for the VETs and implement or trial the following:

- CPUE data on muruk and gouria
- Fly-over counts of the more mobile species – kul, palm cockatoo and vulturine parrots – mainly from in or near villages and residences, but some sites distantly removed from villages will also be considered
- More specialist observations and/or listening for harpy eagles and Salvadori's teal.

In addition some complementary approaches will be further evaluated and if appropriate, implemented during that trip. These include:

- Transect counts along rivers for flying birds = transect version of fly-over per hour
- Transect counts along walking trails = birds seen/heard per hour of walking
- Roosting trees of vulturine parrots
- Transects for muruk pekpek
- Seasonal patterns – determine whether it is possible to replicate the fly-over monitoring in different seasons at 2 or more stations to determine the most effective times of year for monitoring.
- Any other suggestions from VETs and specialists that appear to be feasible.

Depending on advances in designation of pledged areas, it may be possible to establish monitoring in support of some of those areas in May 2009. It is proposed to provide basic resource material for the VETs identified in Section 6.3 for the May 2009 work

ACKNOWLEDGMENTS

Thanks to CI for funding this project and for CI staff who assisted in different ways, especially Chris Margules, Modi Pontio, Roger James, Viola Digwaleu, Angela Kirkman and Kepslok Kumilgo, the last of whom also accompanied me in the December Lakekamu reconnaissance trip. Thanks to the people of Lakekamu Basin who were particularly hospitable during the December trip, including Albert, Brendon, Joseph, Rauheny and their families and friends. Vincent and his helpers provided portage services at Nukeva-Tekadu-Kakoro. Many useful comments on potential monitoring methods were provided by Bruce Beehler, Gretchen Druliner, Miriam Supuma and Ross Sinclair (WCS).

REFERENCES

- Beehler B.M., Pratt T.K., Zimmerman D.A. 1986 *Birds of New Guinea*. New Jersey, Princeton University Press.
- Beehler B. et al 1995. Documenting the lowland rainforest avifauna in Papua New Guinea: the effects of patchy distributions, survey effort and methodology. *Emu* 95:149-161.
- Beehler B.M., Mack A.L. 1999. Constraints to characterizing spatial heterogeneity in a lowland forest avifauna in New Guinea. In: Adams N.J. and Slotow R.H. (Eds) *Proc 22nd Int. Ornithol. Congr., Durban*. Pp 2569-79.
- Bosip P. and Mekado F. undated. *Lakekamu Integrated Conservation and Development Plan*. CI.
- CI undated. *Lakekamu Basin, Papua New Guinea Factsheet*. CI, Papua New Guinea.
- CI 1998. *A biological assessment of the Lakekamu Basin, Papua New Guinea*. Rapid assessment program 9. CI, Washington.
- Pierce R.J., Westbrooke I.M..2003. Call count responses of North Island brown kiwi to different levels of predator control in Northland, New Zealand. *Biological Conservation* 109: 175-180.