



African Waterbird Ringing Scheme

**REPORT ON A WATERBIRD RINGING STUDY
AT LAKE NGAMI, BOTSWANA,
3–18 DECEMBER 2005**

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Introduction

Lake Ngami is situated about 100 km south-west of Maun, in Botswana's Kalahari biome. It lies to the south of the Okavango Delta to which it is joined by the Kunyere River. When full, the lake is approximately 35 km x 8 km in extent. Most of its water comes from river inflow, particularly when the Delta floods, and water overflows, via the Kunyere river, into the lake. During years of good rainfall, water-levels in the lake start rising in June and peak during August after which levels drop slowly until December/January.

The lake has been known to support over 500 000 Red-billed Teal, 7000 Hottentot Teal, 600 African Spoonbill, 10 000 Collared Pratincole and 1000 Whiskered Terns (Tyler and Bishop 1998). For this reason, it has been designated an Important Bird Area in Botswana (c.f. Tyler and Bishop 1998) and in Africa (Fishpool and Evans 2001). In southern Africa, and, when inundated, is considered to be the single most important site within the Okavango Delta for waterbirds (Brewster 2005).

Prior to 2000, the lake reached maximum capacity on seven occasions (Hancock *et al.* 2005), the last time being in 1978/79, while it has been dry for two consecutive years on only five occasions during the same period. Between flooding and drought events the lake usually consists of small pools near the inflow in the north-eastern part. In 2004, following heavy summer rains in the Okavango Delta catchment, the lake reached maximum capacity for the first time in nearly 25 years. As the lake filled, waterbird numbers increased and reached levels of almost 30 000 birds, 20 000 of which were Red-billed Teal (Hancock & Tyler 2005). Fairly good rains fell in 2004/05 which resulted in the lake filling again during 2005 and reached levels similar to those of 2004.

Objectives of study

Based on the large concentrations of waterbirds present at the lake when it becomes inundated, a waterbird ringing study was initiated under the auspices of AFRING. The project had five main objectives:

1. to contribute to the aims and objectives of AFRING, which include building a knowledge base of waterbird movements in Africa to further our understanding of species movement patterns so appropriate conservation actions can be implemented;
2. to investigate movement and dispersal patterns for a range of species, many of which are intra-African migrants or at least nomadic in nature; movement patterns of many waterfowl are still poorly understood;
3. to provide a baseline for future ringing studies against which to monitor and track species' movements; the lake may serve as an important breeding hub for many species, particularly within southern Africa;
4. to use this as an opportunity to train local (Botswana) ringers and build capacity in other regional ringers;
5. to initiate waterbird research projects within Botswana that will contribute to regional and continent-wide wetland conservation initiatives and provide an opportunity for Botswana to consider joining AEWA.

Study period and attendance

The study was carried out from 3-18 December 2005 and coincided with the start of the rainy season in Botswana. Participants camped at designated sites next to the lake (see Fig. 1). Facilities were basic and conditions were demanding, with participants having to make use of portable toilets and for fresh-water to be brought in from a nearby village almost daily.

Participants (ringers and trainee ringers) were drawn from the southern African sub-region after a notice and invitation was circulated via electronic birdnet groups up to two months before the start of the study. Richard Hearn, Waterbird Monitoring Officer from the Wildfowl and Wetlands Trust in Slimbridge, UK, was specifically invited to provide training into catching and ringing ducks and to provide insight into ageing and sexing techniques within this group.

It was intended to focus on anatids due to their known abundance at the lake, and the opportunities afforded to take biometrics and make detailed notes of plumage characteristics. Duck ringing initiatives are poorly developed in much of Africa and part of Richard's tasks within the Duck Specialist Group, of which he is Assistant Coordinator, is to expand duck ringing activities within the continent.

A total of 22 people attended the study, comprising 11 ringers, seven trainees and four VIPs including officials from the Botswana Department of Wildlife and National Parks (DWNP) and BirdLife Botswana. There was a strong emphasis on inviting trainees to take part in the study as there are a limited number of ringers, particularly waterbird ringers, within Botswana and, indeed, in the rest of southern Africa. Staff from the DWNP were targeted specifically in order to expose them to the role that bird ringing can play as a tool in bird conservation and monitoring in Botswana and to target potential individuals as trainee ringers.

Study area and methods

Lake Ngami is a long narrow lake that lies to the south-west of the Okavango Delta and close to the town of Sehithwa (Fig. 1). During this study, the open water area of the lake extended for about six kilometres at its longest point and two kilometres at its widest and was concentrated in the north-eastern section of the lake (see Fig. 1). Water-levels had receded since September 2005, when the water body was reported being a few kilometres longer (PD & CB pers. obs.). Much of the shoreline was covered in short vegetation, consisting mainly of exotic herbs *Xanthium strumarium* and *Datura innoxia* and various grasses. Camel-thorn (*Acacia erioloba*) woodland dominated the woody vegetation surrounding the lake.

Participants were divided into ringing groups with each group selecting a specific area along the northern shoreline at the lake at which to carry out ringing activities (c.f. Fig. 1). Walk-in traps, which were constructed on site, were used to target ducks while mist-nets and wader-nets were used to target waders and other waterbirds. All captured birds were ringed with a SAFRING stainless-steel ring.

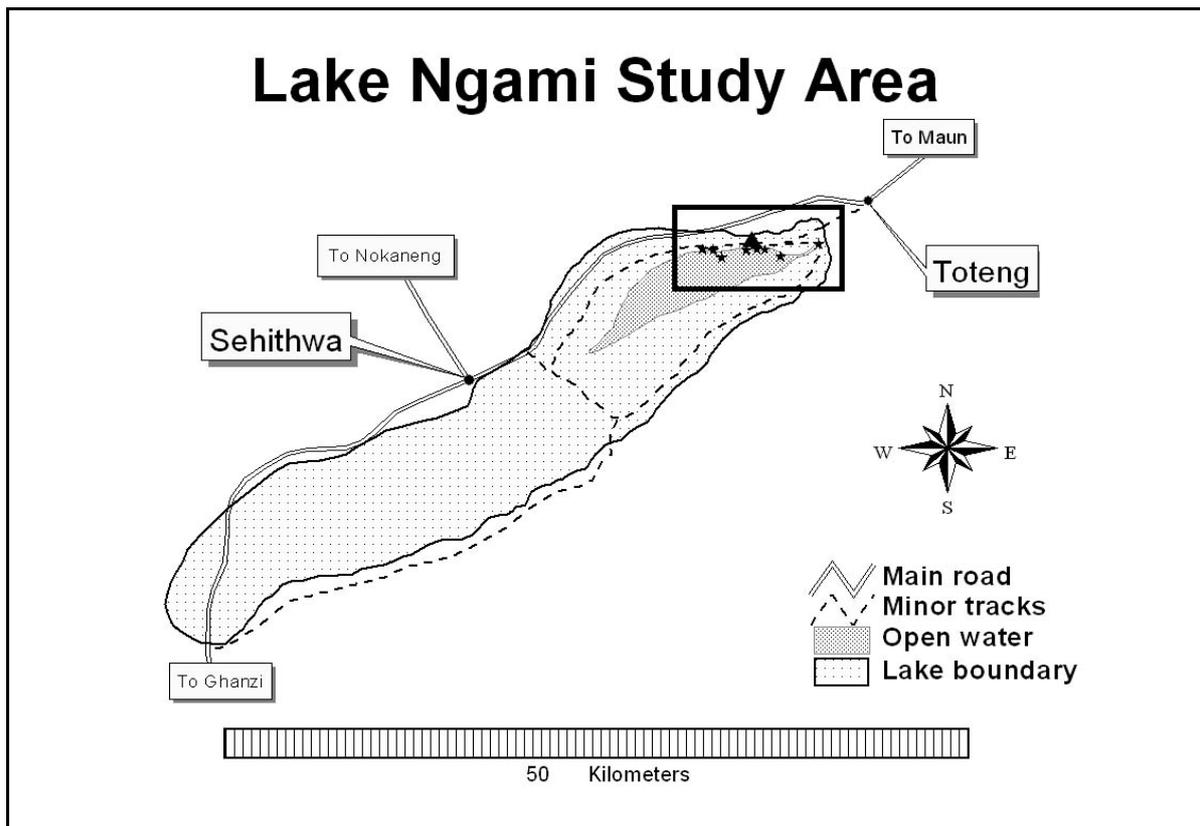


Fig. 1. Map of Lake Ngami showing the study area (□), camping site (▲) and ringing sites (★).

Based on count data during 2004 (Hancock & Tyler 2005) and calls for further studies in Underhill *et al.* (1999), the following species were targeted as priority species: Red-billed Teal *Anas erythroryncha*, Hottentot Teal *Anas hottentota*, White-faced Duck *Dendrocygna viduata*, Comb Duck *Sarkidornis melanotos*, Southern Pochard *Netta erythrophthalma*, Whiskered Tern *Chlidonias hybridus*, Black-winged Stilt *Himantopus himantopus*, Pied Avocet *Recurvirostra avosetta*, Curlew Sandpiper *Calidris ferruginea*, Little Stint *Calidris minuta*, Greenshank *Tringa nebularia* and Ruff *Philomachus pugnax*

Selected targeted species were fitted with plain or engraved colour rings. Plain colour rings were used to mark adult and/or juvenile Kittlitz's Plover, while engraved rings were ear-marked for individuals of White-faced Duck, Comb Duck and Egyptian Goose. The latter species were selected as they have more erect stances than other ducks and geese and when out of the water their tarsi are generally more exposed enabling colour-rings to be more visible than in the dabbling species. The White-faced Duck and Comb Duck are also highly nomadic with known intra-African movements, and being abundant at the lake provides an opportunity to colour-ring them and monitor their movements to and from Lake Ngami.

Although the focus was on catching waterbirds, passerine ringing was also carried out by some teams in the adjoining thornveld bordering the lake.

A waterbird count of the entire lake was carried out by CB between 12-14 December as part of a BirdLife Botswana's census programme at Lake Ngami. PD and RH made detailed counts of birds on 10 December, but only along the northern shore.

Waterbirds are classified according to Wetlands International (2002) and species names follow Hockey *et al.* (2005).

Results

Ringing

Overall, 231 bird species were recorded at the lake during the study period. Of these, 77 species were ringed comprising 1036 individuals. Of the ringed species, 523 (51%) were waterbirds, comprising 27 species, the remaining 513 (49%) being terrestrial birds, comprising 50 species (Tables 1 & 2). As this report focuses on waterbirds, no further reference to or discussion of terrestrial species will be made, suffice to say that Marico Flycatcher (n=84), Scaly-feathered Finch (n=73) and Sedge Warbler (n=68) were the most common terrestrial species caught.

Over 70% of all waterbirds ringed comprised individuals from three species: Blacksmith Lapwing dominated with 262 birds (50%), followed by Collared Pratincole, 61 birds (11%) and Pied Kingfisher, 52 birds (10%) (Table 1).

Three species of ducks were caught and ringed: Hottentot Teal (n=13), Red-billed Teal (n=4) and White-faced Duck (n=2). One White-faced Duck was colour ringed (Fig. 2). One Hottentot Teal was re-trapped during the study; bird PA3434 was ringed on 5 December and re-trapped by another ringing group on the same day.

A total of 86 Palearctic migrant shorebirds were caught comprising nine species (eight scolopacids and one tern, Table 1). Wood Sandpiper (n=37) and Little Stint (n=27) comprised most (74%) of the captured birds.

Four species of resident shorebirds were caught comprising 304 birds (58%) and included: Blacksmith Lapwing (262), Kittlitz's Plover (27), Three-banded Plover (1) and Black-winged Stilt (1). 11 Kittlitz's Plover were colour-banded, and included nine adults and two juveniles (see Fig. 3). Most of the Blacksmith Lapwings were in primary moult with 75% renewing primaries 7-10. No secondary, tail or body moult was noted.

Table 1. List of waterbirds ringed at counted at Lake Ngami between 3-18 December 2005. Complete count by Chris Brewster (CB) took place between 12-14 December, while counts done by Peter D'Arcy (PD) and Richard Hearn (RDH) were made on 10 December from the northern shoreline. NC = Not counted. Species are sorted in descending order of abundance.

Common Name	Scientific name	No. ringed	No. re-traps	Count (CB)	Count (PD, RDH)	Notes
Red-billed Teal	<i>Anas erythrorhyncha</i>	4		6 400		
Ruff	<i>Philomachus pugnax</i>	5		3 900		
Wood Sandpiper	<i>Tringa glareola</i>	36		2 200		
Little Stint	<i>Calidris minuta</i>	19		2 000		
Blacksmith Lapwing	<i>Vanellus armatus</i>	262	3	1 400		
Black-winged Stilt	<i>Himantopus himantopus</i>	1		1 400		
Black-winged Pratincole	<i>Glareola nordmanni</i>	1		1 000		
Great White Pelican	<i>Pelecanus onocrotalus</i>			750		seen daily flying in groups of 20-50 to and from the lake in NE direction
Cattle Egret	<i>Bubulcus ibis</i>	7		670		
Little Egret	<i>Egretta garzetta</i>			420		
Lesser Flamingo	<i>Phoenicopterus minor</i>			400		
Comb Duck	<i>Sarkidiornis melanotos</i>			400		
Glossy Ibis	<i>Plegadis falcinellus</i>			360	440	very common throughout the water body
Collared Pratincole	<i>Glareola pratincola</i>	61		330		
Greater Flamingo	<i>Phoenicopterus ruber</i>			330		
White-winged Tern	<i>Chlidonias leucopterus</i>	1		300		
Fulvous Duck	<i>Dendrocygna bicolor</i>			290	330	mostly in main, deeper central channel
Hottentot Teal	<i>Anas hottentota</i>	13	1	280	315	
White-faced Duck	<i>Dendrocygna viduata</i>	2		250	528	always in small groups in vegetation close to lake edge
African Darter	<i>Anhinga rufa</i>			240		
Whiskered Tern	<i>Chlidonias hybrida</i>	2		180		
Red-knobbed Coot	<i>Fulica cristata</i>			160	175	seen in the deeper channels
Common Greenshank	<i>Tringa nebularia</i>	1		150		
Little Grebe	<i>Tachybaptus ruficollis</i>			120	289	usually seen in the deeper water areas
Marsh Sandpiper	<i>Tringa stagnatilis</i>	3		104	247	
Kittlitz's Plover	<i>Charadrius pecuarius</i>	23		100		
Yellow-billed Stork	<i>Mycteria ibis</i>			100		often seen moving with Great White Pelicans
Black-crowned Night-Heron	<i>Nycticorax nycticorax</i>			80		
African Spoonbill	<i>Platalea alba</i>			80	114	usually with the pelican groups
Southern Pochard	<i>Netta erythrophthalma</i>			80	179	one pair seen with four chicks
Grey Heron	<i>Ardea cinerea</i>			77	188	
Great Egret	<i>Egretta alba</i>			77		

Table 1. contd

Curlew Sandpiper	<i>Calidris ferruginea</i>	3	70	
Pied Avocet	<i>Recurvirostra avosetta</i>		70	
Pied Kingfisher	<i>Ceryle rudis</i>	52	68	
Pink-backed Pelican	<i>Pelecanus rufescens</i>		67	usually seen with Great White Pelicans
Egyptian Goose	<i>Alopochen aegyptiaca</i>		60	156
Caspian Plover	<i>Charadrius asiaticus</i>		60	
Squacco Heron	<i>Ardeola ralloides</i>	3	45	
African Sacred Ibis	<i>Threskiornis aethiopicus</i>		42	
African Jacana	<i>Actophilornis africanus</i>	10	40	
Reed Cormorant	<i>Phalacrocorax africanus</i>		40	seen on the dead sticks around wells
Common Ringed Plover	<i>Charadrius hiaticula</i>		30	
Black Heron	<i>Egretta ardesiaca</i>		28	41 many seen making the familiar 'umbrella' with their wings
Yellow-billed Egret	<i>Egretta intermedia</i>		20	
Spur-winged Goose	<i>Plectropterus gambensis</i>		20	
African Pygmy-Goose	<i>Nettapus auritus</i>		17	25 seen in two separate groups
Yellow-billed Duck	<i>Anas undulata</i>		16	
Common Moorhen	<i>Gallinula chloropus</i>		15	
Black-tailed Godwit	<i>Limosa limosa</i>		12	
Grey-headed Gull	<i>Larus cirrocephalus</i>		12	
Saddle-billed Stork	<i>Ephippiorhynchus senegalensis</i>		8	
Grey Plover	<i>Pluvialis squatarola</i>		5	
Lesser Moorhen	<i>Gallinula angulata</i>	3	3	
Three-banded Plover	<i>Charadrius tricollaris</i>	1	2	
Black-headed Heron	<i>Ardea melanocephala</i>		2	
Goliath Heron	<i>Ardea goliath</i>		2	
Marabou Stork	<i>Leptoptilos crumeniferus</i>		2	
Cape Shoveler	<i>Anas smithii</i>		2	
African Marsh-Harrier	<i>Circus ranivorus</i>		2	
Montagu's Harrier	<i>Circus pygargus</i>		2	male and female seen daily
Common Sandpiper	<i>Actitis hypoleucos</i>	2	1	
African Openbill	<i>Anastomus lamelligerus</i>		1	
White-backed Duck	<i>Thalassornis leuconotus</i>		1	5
Osprey	<i>Pandion haliaetus</i>		1	1 immature seen daily flying up and down lake
African Crane	<i>Crecopsis egregia</i>		1	
Greater Painted-Snipe	<i>Rostratula benghalensis</i>		1	
White-fronted Plover	<i>Charadrius marginatus</i>		1	
Eurasian Curlew	<i>Numenius arquata</i>		1	

Table 1. contd

Common Redshank	<i>Tringa totanus</i>	4	NC		
Green Sandpiper	<i>Tringa ochropus</i>	2	NC		
Green-backed Heron	<i>Butorides striatus</i>	1	NC		
Yellow Wagtail	<i>Motacilla flava</i>	1	NC		
White-breasted Cormorant	<i>Phalacrocorax lucidus</i>		NC		small numbers, seen around wells
Slaty Egret	<i>Egretta vinaceigula</i>		NC	min. 1	three separate sightings recorded during the study period
African Fish Eagle	<i>Haliaeetus vocifer</i>		NC	1	an adult and immature sighted on other occasions
Wattled Crane	<i>Bugeranus carunculatus</i>		NC		at least one group of three observed
Lesser Black-backed Gull	<i>Larus fuscus</i>		NC	2	
Total		515	4	25 397	

Table 2. List of passerines (non-waterbirds) ringed and re-trapped at Lake Ngami between 3-18 December 2005. Species listed in descending order of number of birds caught.

Common Name	Scientific name	No. ringed	No. re-traps
Marico Flycatcher	<i>Bradornis mariquensis</i>	84	2
Scaly-feathered Finch	<i>Sporopipes squamifrons</i>	73	12
Sedge Warbler	<i>Acrocephalus schoenobaenus</i>	68	
Cape Turtle Dove	<i>Streptopelia capicola</i>	33	
Red-backed Shrike	<i>Lanius collurio</i>	33	
Green-winged Pytilia	<i>Pytilia melba</i>	30	
Crimson-breasted Shrike	<i>Laniarius atrococcineus</i>	28	2
Violet-eared Waxbill	<i>Granatina granatina</i>	22	
Chestnut-vented Tit-babbler	<i>Parisoma subcaeruleum</i>	10	2
Red-billed Quelea	<i>Quelea quelea</i>	10	
Rattling Cisticola	<i>Cisticola chiniana</i>	9	
Willow Warbler	<i>Phylloscopus trochilus</i>	9	
Black-chested Prinia	<i>Prinia flavicans</i>	8	
Great Reed-Warbler	<i>Acrocephalus arundinaceus</i>	8	
Grey-backed Camaroptera	<i>Camaroptera brevicaudata</i>	8	
White-browed Sparrow-Weaver	<i>Plocepasser mahali</i>	7	
Blue Waxbill	<i>Uraeginthus angolensis</i>	6	
Southern Grey-headed Sparrow	<i>Passer diffusus</i>	5	
African Pipit	<i>Anthus cinnamomeus</i>	4	
African Reed Warbler	<i>Acrocephalus baeticatus</i>	4	
Lesser Masked-Weaver	<i>Ploceus intermedius</i>	4	
Long-billed Crombec	<i>Sylvietta rufescens</i>	4	
Square-tailed Nightjar	<i>Caprimulgus fossii</i>	4	
Barn Swallow	<i>Hirundo rustica</i>	3	
European Marsh Warbler	<i>Acrocephalus palustris</i>	3	
Great Sparrow	<i>Passer motitensis</i>	3	
Laughing Dove	<i>Streptopelia senegalensis</i>	3	
White-browed Scrub-Robin	<i>Cercotrichas leucophrys</i>	3	
Garden Warbler	<i>Sylvia borin</i>	2	
Kalahari Scrub-Robin	<i>Erythropygia paena</i>	2	
Lesser Honeyguide	<i>Indicator minor</i>	2	
Olive-tree Warbler	<i>Hippolais olivetorum</i>	2	
Southern Pied Babbler	<i>Turdoides bicolor</i>	2	
Acacia Pied Barbet	<i>Tricholaema leucomelas</i>	1	
African Paradise-Flycatcher	<i>Terpsiphone viridis</i>	1	
Black Cuckoo	<i>Cuculus clamosus</i>	1	
Brown-crowned Tchagra	<i>Tchagra tchagra</i>	1	
Brubru	<i>Nilaus afer</i>	1	
Burnt-necked Eremomela	<i>Eremomela usticollis</i>	1	
Cardinal woodpecker	<i>Dendropicus fuscescens</i>	1	
Common Whitethroat	<i>Sylvia communis</i>	1	
Red-necked Falcon	<i>Falco chicquera</i>	1	
Groundscraper Thrush	<i>Turdus litsitsirupa</i>	1	
Icterine Warbler	<i>Hippolais icterina</i>	1	
Little Bee-eater	<i>Merops pusillus</i>	1	
Marico Sunbird	<i>Cinnyris mariquensis</i>	1	
Namaqua Dove	<i>Oena capensis</i>	1	
Red-billed Spurfowl	<i>Pternistis adspersus</i>	1	
Red-faced Mousebird	<i>Urocolius indicus</i>	1	
Tinkling Cisticola	<i>Cisticola rufilatus</i>	1	
Total		513	18



Fig. 2. A White-faced Duck *Dendrocygna viduata* with an engraved colour-ring. Photo by Richard Hearn.



Fig. 3. A colour-ringed adult Kittlitz's Plover *Charadrius pallidus* with a unique colour-combination. Photo by Vincent Ward.

Waterbird counts

CB counted a total of 25 398 waterbirds comprising 69 species (Table 1). Red-billed Teal accounted for 25% (6400 birds) of the total count. Six additional species had counts of 1000 birds or more and included Ruff (3900), Wood Sandpiper (2200), Little Stint (2000), Blacksmith Lapwing (1400), Black-winged Stilt (1400) and Black-winged Pratincole (1000). Five species that were not counted by CB during the survey period were observed and/or counted by PD and RH: White-breasted Cormorant, Slaty Egret, African Fish Eagle, Wattled Crane and Lesser Black-backed Gull.

Discussion and recommendations

Ringing

The fact that the lake was about 25% full provided plenty of shoreline habitat and this undoubtedly had an impact on the species and numbers of waterbirds that were caught. This was evidenced by the dominance of Blacksmith Lapwings in the overall catch, a species that favours exposed shorelines around lake edges. The large numbers of Pied Kingfishers caught and the high number of pelicans counted also suggested that a rich fish community was present at the lake during the study.

The small numbers of ducks caught was disappointing considering the large numbers of birds counted at the lake during the study. Although the walk-in traps were extensively baited, very few birds showed an interest in this food source which suggested that natural food was abundant in the lake. Lake Ngami is known to be a highly productive system when it fills and waterbirds make use of this rich resource as and when it becomes available (Tyler & Bishop 1998). The water-level during the study was relatively high and provided a larger expanse of water in which the birds could forage, perhaps negating their need to come and feed on the baited seed provided. Another possible reason for the low catch-rate of ducks could be due to the use of inadequate traps. The number of walk-in traps used was probably insufficient for the size of the site. The lake, however, does have the potential to catch large numbers of ducks, but should probably be done when water-levels are lower.

Similarly, a small fraction of the Palearctic waders that were present at the lake were caught. Although mist-netting took place during the night, coupled with an incomplete new moon, birds tended to move off to other areas once disturbed and failed to return. As for the ducks, the availability of suitable habitat elsewhere at the lake enabled the birds to move around in a wide area and therefore unable to concentrate the birds for trapping purposes.

The large numbers of Blacksmith Lapwing caught enabled substantial moult, particularly primary moult, data to be collected. Previous ringing trips to the lake by various ringers also resulted in large numbers being caught and vast amounts of moult data being collected (LG Underhill pers. comm.). An analysis and summary of this large dataset would be useful.

The colour-ringing of Kittlitz's Plovers hopes to shed some light on this species' movements in Botswana, particularly when the lake dries, and should be continued when ringing trips are planned to the lake. Regular follow-up surveys or ringing trips, particularly by Maun-based ringers or birders, should be considered to collect as much re-sighting/re-trap information as possible for this species.

An important outcome from this study was that Maun was identified as an ideal ringing-base for waterbird ringing activities at Lake Ngami. Under the umbrella of BirdLife Botswana, traps, rings and other ringing equipment are now stored permanently in Maun and are available for future ringing trips. This will hopefully encourage additional and more frequent ringing studies at the lake. It is also an important first step for remote sites such as Lake Ngami which usually provide access and resource limitations for research activities such as ringing studies.

In terms of ringing, the following recommendations are suggested for future studies at the site:

- Dates to coincide when water-levels are lower (i.e. lake 10-15% full), thus concentrating birds in less available open-water which would potentially increase catching rates.
- Making use of cannon-nets and larger walk-in traps for duck-trapping in order to secure larger number of birds for ringing and processing. This would also aid in gathering more age and sex information and assist in the training component of such studies.

Training and awareness

Although limited number of ducks were caught, those that were trapped and ringed provided an insight to trainees on catching and processing of this species group. It also provided an opportunity to collect important ageing and sexing information, an aspect for which much information is lacking for African anatids. Digital photographs were taken of most ducks that were caught and RDH will report on these on the Duck Specialist Group website (www.wetlands.org/specialistgroups) in the near future.

Guidance and awareness on catching and processing of waders, which often requires specialised techniques and detailed knowledge of primary moult and feather wear, was also achieved.

A key success was the general raising of awareness of the need for this type of research, particularly within Botswana. This was highlighted by the participation and visits from staff of the Botswana DWNP and BirdLife Botswana. Two of the DWNP staff attended for the entire two week period. They gained a considerable understanding of ringing, its methods and objectives and it is hoped that this will lead to greater investment in this activity in the future. In addition, an electronic copy of the AEWA accession guide document was forwarded to the DWNP after the course in the hope that the Botswana government will consider joining as a signatory to the Convention on the Conservation of Migratory Species (CMS) and AEWA.

Local communities were also brought in and introduced to the ringing activities at the lake. This exposure hopes to benefit the long-term conservation of the area, through promoting the area as an important natural resource and, practically, by informing the people of the correct reporting procedures to follow should they find a dead bird with a ring.

Further waterbird ringing studies at the lake will assist in providing ongoing training and awareness to prospective ringers in Botswana and southern Africa. To date, one study has already taken place, in April 2006, with two more planned for August and December 2006.

General

A number of logistical problems were encountered during the study, which included access to the lake and shoreline in wet and muddy conditions (due to heavy rainfall), basic toilet and camping facilities, access to running water and lack of electricity on site. These made ringing conditions difficult, and living conditions often uncomfortable and unpleasant. Although most of these problems are difficult to overcome, particularly at such a remote site, future ringing studies should address some of these issues (e.g. provision of more permanent camping structures with portable toilet facilities) in order to make living conditions and ringing operations a little more comfortable, particularly over long-periods (> 1 week). It is suggested, however, that future ringing studies be confined to one week or less to reduce and/or minimise any logistical difficulties encountered.

Acknowledgements

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Our thanks also go to the Botswana Department of Wildlife and National Parks for granting a research permit for Lake Ngami allowing the ringing study to take place during the allotted time period.

We are also grateful to the Sehithwa community for their cooperation and involvement. The specific site logistics were organised by PD and PH without which the study could not have taken place.

Finally we would like to thank all the ringers and trainees who attended the study without whom the results obtained here would not have been possible.

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