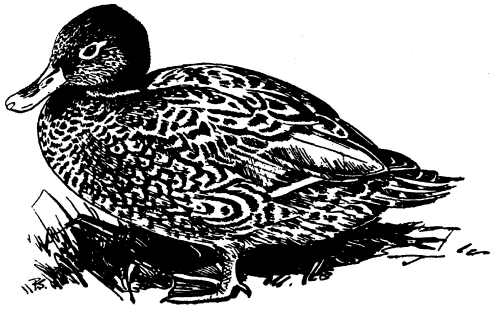
TWSG NEWS

The bulletin
of the

THREATENED WATERFOWL SPECIALIST GROUP



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ABOUT THE GROUP

The Threatened Waterfowl Specialist Group (formerly Threatened Waterfowl Research Group) was established in October 1990 and is coordinated from the Wildfowl & Wetlands Trust (WWT) at Slimbridge, UK, as part of the IUCN-SSC/Wetlands International Waterbird Network. The TWSG and its bulletin aim to identify Anatidae taxa that are threatened with extinction, to gather and exchange information on these taxa, and to promote their conservation. Membership is worldwide and includes 923 organisations, groups and individuals who are active or interested in threatened waterfowl research and conservation. Addresses of TWSG members, further information about the TWSG, this bulletin, and/or membership can be obtained from Baz Hughes at the address below.

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TWSG-Forum: list-server of the Threatened Waterfowl Specialist Group
The TWSG-Forum list-server, maintained by the Wildfowl & Wetlands Trust from Slimbridge, UK, provides a vehicle for the on-line exchange of information about globally threatened or near threatened Anseriformes (ducks, geese, swans and screamers). To subscribe, e-mail *majordomo@wwt.org.uk* with "subscribe twsg-forum" (without quotes) in the body of your e-mail message. To unsubscribe, simply replace the word "subscribe" with "unsubscribe". To circulate a message to the Forum, send it to: *twsg-forum@wwt.org.uk*. When submitting information please note that we may include such items in future issues of TWSG News.

TWSG web site: *http://www.wwt.org.uk/threatsp/twsg/*
Opinions expressed in articles in this bulletin are those of the authors, and do not necessarily represent those of the TWSG, WWT, Wetlands International or IUCN-SSC.

This issue of TWSG News was edited by Baz Hughes, Glyn Young, Colette Hall and Peter Cranswick. Design and layout by Colette Hall. Illustrations are by Joe Blossom, Mark Hulme, Paul Johnsgard, Libby Millington and Peter Scott.

EDITORIAL

Over the last ten years, there has been great progress in conserving threatened waterfowl worldwide: there are now Recovery Plans for most threatened waterfowl in North America, Europe, and Australasia, and there have been notable successes, such as on Hawaii where Nene numbers have increased from 885 in 1998 to over 1,200 birds in 2003. However, action is still focused in the affluent western world where conservation funding is relatively easy to come by, whilst threatened species in Eastern Europe, Asia and South America, where help is most needed, continue to dwindle. Species breeding in Russia and wintering in China have been particularly badly affected, probably by habitat loss and degradation, disturbance and over-hunting on the staging and wintering grounds. Even previously common species, such as Falcated Duck, are now red-listed. So what can the TWSG do to help save the world's threatened waterfowl?

Involve local people. The involvement of local communities, and their appreciation of the economic, functional and aesthetic value of wetlands and their dependent species, is crucial to any long-term wetland conservation project. Despite this, community involvement initiatives are often only paid lip-service in species conservation. We therefore need to build community involvement initiatives into our threatened species programmes.

Target resources. The threatened waterfowl and wetlands most in need of our help are found in Eastern Europe, Asia, Africa and South America. We will therefore target our resources in these areas and convince others in the developed world to do the same.

Help build expertise. Most of our members working on threatened species programmes have small teams of highly committed staff. We need to help them develop their skills, expertise and capacity through capacity-building initiatives to pass on expertise in waterbird conservation (particularly in research, monitoring, catching and ringing, and disease surveillance).

Find threatened species champions. Many of the most successful species conservation programmes are organised, and to a large extent funded, by non-government organisations who have the commitment, motivation and resources to produce and implement species action plans. The TWSG is working with the secretariat of the African-Eurasian Waterbird Agreement to establish working groups to implement action plans which we have produced for the Ferruginous Duck and White-headed Duck. Our next challenge is to ensure champions are in place for all threatened waterfowl.

Focus on action on the ground. Obviously writing action plans is just the first step in the conservation process – the key to success is ensuring follow-up action on the ground. A dedicated project officer for each species is a must – and can be especially successful if they become so committed that they embark on a personal crusade to save a species.

Ensure long-term funding and support. Unless large-scale funding can be secured, it is often best to focus on implementing a small number of the most important conservation projects for a species, but ensuring they continue in the long term. Only too often, a three-year grant comes to and end and a conservation programme folds. The TWSG needs to commit itself to ensuring long-term fund-raising and support for threatened waterfowl.

Baz Hughes

THREATENED WATERFOWL SPECIES AND SUB-SPECIES

In the following list of globally threatened and near threatened Anseriformes species and sub-species, species categorisations follow the 2006 IUCN Red List of Threatened Species (IUCN 2006) whilst sub-species were categorised during the compilation of the IUCN-SSC Anseriformes Action Plan (TWSG in prep.). The TWSG would welcome comment on this list of threatened Anseriformes, especially notification of new data which may lead to re-categorisation of any taxa.

SPECIES

COMMON NAME	SCIENTIFIC NAME
EXTINCT SINCE A.D. 1600	
New Zealand Swan	*Cygnus sumnerensis*
Mauritian Shelduck	*Alopochen mauritania*
Réunion Shelduck	*Mascarenachen kervazoi*
Chatham Island Shelduck	*Pachyanas chathamica*
Mauritian Duck	*Anas theodori*
Amsterdam Island Duck	*Anas marecula*
Labrador Duck	*Camptorhynchus labradorius*
Auckland Islands Merganser	*Mergus australis*
CRITICALLY ENDANGERED	
Crested Shelduck	*Tadorna cristata*
Campbell Island Teal	*Anas nesiotis*
Laysan Duck	*Anas laysanensis*
Pink-headed Duck	*Rhodonessa caryophyllacea*
Madagascar Pochard	*Aythya innotata*
Brazilian Merganser	*Mergus octosetaceus*
ENDANGERED	
White-headed Duck	*Oxyura leucocephala*
Swan Goose	*Anser cygnoides*
White-winged Duck	*Cairina scutulata*
Blue Duck	*Hymenolaimus malacorhynchos*
Hawaiian Duck	*Anas wyvilliana*
Meller's Duck	*Anas melleri*
Madagascar Teal	*Anas bernieri*
Brown Teal	*Anas chlorotis*
Scaly-sided Merganser	*Mergus squamatus*

SPECIES

COMMON NAME	SCIENTIFIC NAME
VULNERABLE	
West Indian Whistling-duck	*Dendrocygna arborea*
Lesser White-fronted Goose	*Anser erythropus*
Hawaiian Goose	*Branta sandvicensis*
Red-breasted Goose	*Branta ruficollis*
Salvadori's Teal	*Salvadorina waigiuensis*
Eaton's Pintail	*Anas eatoni*
Philippine Duck	*Anas luzonica*
Auckland Island Teal	*Anas aucklandica*
Baikal Teal	*Anas formosa*
Marbled Teal	*Marmaronetta angustirostris*
Baer's Pochard	*Aythya baeri*
Steller's Eider	*Polysticta stelleri*
LOW RISK (NEAR THREATENED)	
Northern Screamer	*Chauna chavaria*
Emperor Goose	*Anser canagica*
Blue-winged Goose	*Cyanochen cyanopterus*
Orinoco Goose	*Neochen jubata*
Chubut Steamer-duck	*Tachyeres leucocephalus*
Falcated Duck	*Anas falcata*
Spectacled Duck	*Anas specularis*
Ferruginous Duck	*Aythya nyroca*
Blue-billed Duck	*Oxyura australis*

SUB-SPECIES

EXTINCT SINCE A.D. 1600	
Coue's Gadwall	*Anas strepera couesi*
Mariana Mallard	*Anas platyrhynchos oustaleti*
Rennell Island Grey Teal	*Anas gibberifrons remissa*
Chatham Island Teal	*Anas chlorotis ssp. nov.*
Niceforo's Pintail	*Anas georgica niceforoi*
CRITICALLY ENDANGERED	
Borrero's Cinnamon Teal	*Anas cyanoptera borreroi*

SUB-SPECIES

COMMON NAME	SCIENTIFIC NAME
ENDANGERED	
Madagascar White-backed Duck	*Thalassornis leuconotus insularis*
New Zealand Grey Duck	*Anas superciliosa superciliosa*
Tropical Cinnamon Teal	*Anas cyanoptera tropica*
Andaman Teal	*Anas gibberifrons albogularis*
Galapagos Pintail	*Anas bahamensis galapagensis*
Crozet Islands Pintail	*Anas eatoni drygalskii*
Colombian Ruddy Duck	*Oxyura jamaicensis andina*
VULNERABLE	
Recherche Cape Barren Goose	*Cereopsis novaehollandiae grisea*
Middendorf's Bean Goose	*Anser fabalis middendorffi*
Thick-billed Bean Goose	*Anser fabalis serrirostris*
Tule Greater White-fronted Goose	*Anser albifrons gambeli*
Dusky Canada Goose	*Branta canadensis occidentalis*
Peruvian Torrent Duck	*Merganetta armata leucogenis*
Colombian Torrent Duck	*Merganetta armata colombiana*
Australian Cotton Pygmy Goose	*Nettapus coromandelianus albipennis*
Merida Teal	*Anas andium altipetens*
Kerguelen Pintail	*Anas eatoni eatoni*
LOW RISK (NEAR THREATENED)	
American Comb Duck	*Sarkidiornis melanotus sylvatica*
Florida Duck	*Anas fulvigula fulvigula*
Australian Black Duck	*Anas superciliosa rogersi*
Lesser Grey Duck	*Anas superciliosa pelewensis*
Andean Teal	*Anas andium andium*
South Georgia Pintail	*Anas georgica georgica*
South American Pochard	*Netta erythropthalma erythropthalma*

REFERENCES

IUCN. 2006. 2006 IUCN Red List of Threatened Species. Downloaded from *www.iucnredlist.org*.

TWSG. in prep. Global Action Plan for the Conservation of Anseriformes (Ducks, Geese, Swans and Screamers). IUCN, Gland, Switzerland.

IUCN RED LIST CATEGORIES AND CRITERIA

CRITERION A. REDUCTION IN POPULATION SIZE			
Main Criteria	**Sub-criteria**	**Qualifiers**	
Reduction ≥90% in 10 years or 3 generations (**CR**) Reduction ≥70% in 10 years or 3 generations (**EN**) Reduction ≥50% in 10 years or 3 generations (**VU**)	**1**. Reduction in the past (observed, estimated, inferred or suspected), where the causes are clearly reversible AND understood AND ceased, *based on a-e opposite*	**a**. Direct observation	**A1a**
		b. Index of abundance	**A1b**
		c. Decline in area of occupancy, extent of occurrence, and/or quality of habitat	**A1c**
		d. Actual or potential levels of exploitation	**A1d**
		e. Effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites	**A1e**
Reduction ≥80% in 10 years or 3 generations (**CR**) Reduction ≥50% in 10 years or 3 generations (**EN**) Reduction ≥30% in 10 years or 3 generations (**VU**)	**2**. Reduction in the past (observed, estimated, inferred or suspected), where the reduction or its causes may not be reversible OR understood OR have ceased, *based on a-e opposite*	**a**. As a above	**A2a**
		b. As b above	**A2b**
		c. As c above	**A2c**
		d. As d above	**A2d**
		e. As e above	**A2e**
Reduction ≥80% in 10 years or 3 generations (**CR**) *to 100 years max* Reduction ≥50% in 10 years or 3 generations (**EN**) *to 100 years max* Reduction ≥30% in 10 years or 3 generations (**VU**) *to 100 years max*	**3**. Reduction in the future (projected or suspected), *based on b-e opposite*	**b**. As b above	**A3b**
		c. As c above	**A3c**
		d. As d above	**A3d**
		e. As e above	**A3e**
Reduction ≥80% in 10 years or 3 generations (**CR**) *to 100 years max* Reduction ≥50% in 10 years or 3 generations (**EN**) *to 100 years max* Reduction ≥30% in 10 years or 3 generations (**VU**) *to 100 years max*	**4**. Reduction includes the past and the future (observed, estimated, inferred, projected or suspected) where the reduction or its causes may not be reversible OR understood OR have ceased, *based on a-e opposite*	**a**. As a above	**A4a**
		b. As b above	**A4b**
		c. As c above	**A4c**
		d. As d above	**A4d**
		e. As e above	**A4e**

CRITERION B. SMALL RANGE fragmented, declining or fluctuating			
Main Criteria	**Sub-criteria**	**Qualifiers**	
1. Extent of occurrence estimated <100km^2 (**CR**) *with at least two of a,b or c* Extent of occurrence estimated <5,000km^2 (**EN**) *with at least two of a, b or c* Extent of occurrence estimated <20,000km^2 (**VU**) *with at least two of a, b or c*	**a**. Severely fragmented *or* At 1 location (**CR**) At ≤5 locations (**EN**) At ≤10 locations (**VU**)	None	**B1a**
	b. Continuing decline (observed, inferred or projected) *in any of i-v opposite*	**i**. Extent of occurrence	**B1bi**
		ii. Area of occupancy	**B1bii**
		iii. Area, extent and/or quality of habitat	**B1biii**
		iv. Number of locations or subpopulations	**B1biv**
		v. Number of mature individuals	**B1bv**
	c. Extreme fluctuations *in any of i-iv opposite*	**i**. Extent of occurrence	**B1ci**
		ii. Area of occupancy	**B1cii**
		iii. Number of locations or subpopulations	**B1ciii**
		iv. Number of mature individuals	**B1civ**
2. Area of occupancy estimated <10km^2 (**CR**) *with at least two of a, b or c* Area of occupancy estimated <500km^2 (**EN**) *with at least two of a, b or c* Area of occupancy estimated <2000km^2 (**VU**) *with at least two of a, b or c*	**a**. As a above	None	**B2a**
	b. As b above *in any of i-v opposite*	**i**. Extent of occurrence	**B2bi**
		ii. Area of occupancy	**B2bii**
		iii. Area, extent and/or quality of habitat	**B2biii**
		iv. Number of locations or subpopulations	**B2biv**
		v. Number of mature individuals	**B2bv**
	c. As c above *in any of i to iv opposite*	**i**. Extent of occurrence	**B2ci**
		ii. Area of occupancy	**B2cii**
		iii. Number of locations or subpopulations	**B2ciii**
		iv. Number of mature individuals	**B2civ**

CRITERION C. SMALL POPULATION declining or fluctuating			
Main Criteria	**Sub-criteria**	**Qualifiers**	
Population <250 mature individuals (**CR**) *and either 1 or 2* Population <2,500 mature individuals (**EN**) *and either 1 or 2* Population <10,000 mature individuals (**VU**) *and either 1 or 2*	**1**. Continuing decline ≥25% in 3 years or 1 generation (**CR**) *to 100 years max* Continuing decline ≥20% in 5 years or 2 generations (**EN**) *to 100 years max* Continuing decline ≥10% in 10 years or 3 generations (**VU**) *to 100 years max*	None	**C1**
	2. Continuing decline (observed, projected or inferred) and *a and/or b opposite*	**ai**. all sub-pops ≤50 (**CR**) all sub-pops ≤250 (**EN**) all sub-pops ≤1,000 (**VU**)	**C2ai**
		aii. ≥90% mature individuals in 1 sub-pop (**CR**) ≥95% mature individuals in 1 sub-pop (**EN**) all mature individuals in 1 sub-pop (**VU**)	**C2aii**
		b. Extreme fluctuations in number of mature individuals	**C2b**
CRITERION D1. VERY SMALL POPULATION			
Population <50 mature individuals (**CR**) Population <250 mature individuals (**EN**) Population <1,000 mature individuals (**VU**)	None	None	**D1**
CRITERION D2. VERY SMALL RANGE			
Area of occupancy typically <20km^2 or typically <6 locations (**VU** only - capable of becoming CR or EX in v. short time)	None	None	**D2**
CRITERION E. QUANTITATIVE ANALYSIS			
Probability of extinction in wild >20% in 20 years or 5 gens (**EN**) *to 100 years max* Probability of extinction in wild is 10% in 100 years (**VU**)			**E**

NEWS ROUNDUP

MADAGASCAR POCHARD RE-DISCOVERED

Biologists for The Peregrine Fund recently discovered 13 Madagascar Pochard *Aythya innotata* while conducting avian surveys in a remote part of northern Madagascar. Whilst searching for the Madagascar Harrier *Circus macrosceles*, National Director for the Peregrine Fund's Madagascar Project Lily-Arison Rene de Roland and field biologist Thé Seing Sam observed nine adult birds with four young thought to be nearly two weeks old.

The Madagascar Pochard, currently listed as Critically Endangered on the IUCN Red List, was last seen in 1991 at Lake Alaotra on the Central Plateau of Madagascar. The single male was captured and kept in Antananarivo Zoological and Botanical Gardens until its death one year later. The last record of multiple birds (approximately 20) on Lake Alaotra is from June 1960.

Secretive and often solitary in nature, the Pochard is found only in Madagascar, preferring shallow and marshy habitat – little is known, however, about its behaviour and life cycle. The decline of the species is likely to have started in the 1940s and 1950s in connection with the loss of lake and marshland habitat, due to introduced plant and fish species, conversion to rice paddies, and burning.

Habitat protection and species restoration are just two of the proposals included in conservation measures currently underway for the species. The Peregrine Fund, Madagascar's Ministry of Environment, Water and Forests, and other conservation organisations are collaborating to ensure a coordinated and effective approach is achieved.

For further information see:
The Peregrine Fund website
http://www.peregrinefund.org/press full.asp?id=110&category=Madagascar %20 Project

CAMPBELL TEAL RETURN HOME

The New Zealand Department of Conservation (DOC) in April confirmed that Campbell Island Teal *Anas nesiotis* released onto Campbell Island have bred successfully. Following the world's largest programme of rat eradication on 22,000 ha Campbell Island in 2001, 50 captive-bred Teal were returned to the island in 2004 and another 55 in 2005. During a three week visit to Campbell Island in 2006 a DOC team found five different ages of ducklings including unringed adults that were considered to be 2005 ducklings.

For further information see:
The New Zealand Department of Conservation website
www.doc.govt.nz/whats-new/presult.asp?prID=2145

NEW ZEALAND ZOOS WIN PRESTIGIOUS AWARD

In April 2006, Auckland Zoo and Mount Bruce in New Zealand jointly won the Australasian Regional Association of Zoological Parks and Aquaria (ARAZPA) in-situ Conservation Award 'for exceptional effort towards habitat preservation, species restoration, and support of biodiversity in the wild'. The award was given for the zoos' role in the restoration programme for the Campbell Island Teal. Auckland Zoo particularly

assisted in evaluating and minimising disease threats to the Teal and provided primary health care during the transportation of birds to their new sub-antarctic home.

For further information see:
Auckland Zoo website
http://www.aucklandzoo.co.nz/aucklandzoo/news_item.php?id=1144025517
Pukaha Mount Bruce website
http://www.mtbruce.org.nz/Latest_news_PMB.htm

SAVING THE LAYSAN DUCK

The plight of the Laysan Duck
Fossil evidence shows that the Laysan Duck *Anas laysanensis* was once widely distributed across the Hawaiian Islands before the arrival of human beings around 1,500 years ago. Hunters and introduced predators extirpated the species from everywhere except Laysan Island, a tiny coral atoll 1,500 km north-west of Honolulu. Laysan has an area of just 3.7 km^2 and although there is a large lake, this is hyper-saline. The only fresh water trickles from a few springs and it is because of these that the ducks have been able to cling to survival, often in critically small numbers. In years of drought the ducks have survived by drinking the dew off grass stems and by eating the invertebrate life that lives in the guano of the island's seabird colonies.

In the late 19th Century the island's large seabird colony attracted guano miners who killed and ate the Laysan Ducks, as did feather hunters who raided the island (for albatrosses) in 1909-1910. The miners also introduced rabbits to the island to improve the 'supply' of fresh meat. The rabbits grazed the island's vegetation to the point of no return with the effect of reducing the ducks' food supply and exposing their nest sites to predators. By 1911 there were an estimated 6-12 ducks left and only seven were counted in 1912, although 20 were recorded in 1923.

There is a popular story that in 1930, the Laysan Duck became the most endangered species in the world when it was reported that its population comprised one pair. When the drake disappeared in a storm, all that remained was a gravid female. This widowed bird laid a clutch of eggs, which were eaten by a Bristle-thighed Curlew *Numenius tahitiensis* (this shorebird is known to use rocks as tools to crack eggshells). The lone duck re-laid and hatched her second clutch. There may be no truth in this story but it's a good one! The population subsequently increased to 33 by 1950 and since then has fluctuated between 100 and 600 birds.

Conservation action for the Laysan Duck
Three other bird species endemic to Laysan became extinct in the early part of the 20th Century and, although the rabbits died out around 1924, most from starvation, and Laysan Island became fully protected, conservationists believed that the long-term survival of the Laysan Duck remained precarious. With the only population restricted to one island, there was always a chance that a single disaster such as a drought, hurricane, tsunami, disease outbreak or predator introduction could wipe out the entire species. Thus the creation of at least one other wild population became a high priority in the US Government's Recovery Plan for the species. This prompted Michelle Reynolds, John Klavitter and their US Geological Survey (USGS) and US Fish and Wildlife Service (UFWS) colleagues to compile and put into action a re-introduction plan for the Laysan Duck. The plan described how to establish a second wild population on an island less prone to catastrophic events. After much debate, Midway Atoll National Wildlife Refuge (NWR), 2,000

km north-west of Honolulu, was selected as the place to create a new 'insurance' population. Midway was chosen because it lies within the prehistoric range of the species, has predator-free status, and because it is home to a team of biologists who would be able to manage habitat and study and monitor the survival of any re-introduced ducks.

USGS and USFWS staff spent almost two years restoring wetland habitat on Midway, prior to 20 ducks being successfully translocated from Laysan Island to Midway's Sand Island in October 2004. Upon arrival, the ducks were held in aviaries for 2–14 days to become accustomed to local food resources before being released in small groups. All were radio-tracked so that their movements, behaviour, and survival could be closely monitored after release. Supplemental food was offered several times per week for the first two months.

As a further measure to rescue this critically endangered species from extinction, a second release of birds in the on-going re-introduction project was planned for Sand Island and nearby Eastern Island. The release on the second island meant that extra avicultural support was required, prompting Michelle Reynolds to approach WWT for help. WWT's Aviculture Manager, Nigel Jarrett, thus assisted with the release of 22 birds on Midway Atoll in October 2005.

The 22 ducks, aged between three and four months, were captured and crated at night by a team of duck biologists and then moved by boat 600 km (360 miles) from Laysan Island to Midway Atoll NWR. The journey took two days, and the birds, which were each given a thorough health check, were fed, watered and monitored day and night by a skilled veterinarian support crew. On Midway the birds were housed in specially built aviaries before each was fitted with a radio transmitter and leg bands and released onto newly created freshwater ponds.

Before settling the ducks into their new surroundings, the tiny, steep-sided and heavily vegetated release pools were checked to ensure they were ready to accommodate birds and that ample food was available. One of the most satisfying yet simple contributions made was to install floating loafing sites on release ponds. These 'loafing logs' enabled researchers to read the birds' leg-ring codes when they came ashore to preen. As a result it was straightforward to monitor each bird's health status post-release. The 'loafing log' idea was borrowed from the New Berkeley Decoy at Slimbridge, UK, where, for generations, duck-catchers have attracted birds into decoy pipes by positioning floating boards at the entrance to the netted pipes.

For the first time in hundreds of years birds are now found on three islands, and are flying between Midway's two islands. Thanks to the success of this conservation action, the Laysan Duck, once possibly the rarest bird on Earth, has now gained a more secure future.

For further information on Laysan Duck read:

Marshall, A.P. 2005. Laysan Duck Anas laysanensis. In: Ducks, Geese and Swans (Ed. Kear, J.). Oxford University Press, Oxford. pp. 528-531.

Moulton, D.W. & Marshall, A.P. 1996. Laysan Duck (Anas laysanensis). In: The Birds of North America, 242. The Academy of Natural Sciences and AOU.

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STOP PRESS

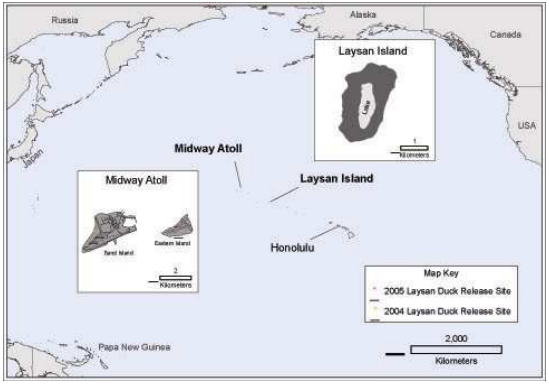
The US Geological Survey (USGS) has reported that 2006 was a very successful breeding season for Laysan Duck at Midway Atoll National Wildlife Refuge; 56 juveniles fledged. Since birds were first moved to Midway in 2005 the population has more than doubled - increasing to 104 birds - and researchers are now optimistic that the translocation project will contribute to the long-term survival of this endangered species.

In 2006, 38 nests were monitored and researchers have observed interesting differences in reproductive effort between the populations on Laysan and Midway; the birds on Midway are breeding at an earlier age and laying more eggs than those on Laysan, suggesting that Laysan has limited food or habitat compared with Midway, which has a smaller population and abundant habitat and food, perhaps helping to increase reproductive effort.

Laysan Ducks on Midway appear to be faring well. Of 20 ducks translocated to Midway in October 2004, 18 survive; of 22 ducks translocated to Midway in October 2005, 20 survive; and of 12 ducklings fledged at Midway in 2005, 10 survive.

US Geological Survey website (accessed 30 October 2006)
http://www.usgs.gov/newsroom/

Figure 1. Map of study sites: Laysan Island Hawaiian Islands National Wildlife Refuge and Midway Atoll, NWR.



WHITE-HEADED DUCK ACTION PLAN PUBLISHED

The AEWA Single Species Action Plan for the White-headed Duck *Oxyura leucocephala* was published by the AEWA secretariat in June 2006 and can be downloaded from *http://www.unep-aewa.org/publications/technical_series.htm*.

The plan was compiled Baz Hughes (WWT, UK), James Robinson (RSPB, UK), Andy Green (Biological Station Doñana, Spain) and David Li & Taej Mundkur (Wetlands International-Asia) with the help of 110 White-headed Duck experts from around the world. The plan was adopted under Resolution 3.12 at the Third Session of the Meeting of the Parties to AEWA in Dakar, Senegal, October 2005.

The Executive Summary of the plan is as follows:

The White-headed Duck is listed as Endangered on the IUCN Red List of Threatened Animals. It is also listed on Annex I of the European Union Directive on the Conservation of Wild Birds (79/409/EEC) (Birds Directive), on Appendix II of the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention), on Appendix I of the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), and Appendix II of the Convention on International Trade in Endangered Species (CITES Convention).

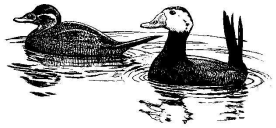
The White-headed Duck is a highly aquatic diving duck of the stifftail tribe Oxyurini. Globally, there are four populations; two of which are declining, one stable and one increasing. The decreasing populations include the main Central Asian population of 5,000-10,000 birds and the Pakistan wintering population, which is on the verge of extinction. The resident North African population (400-600 birds) is stable and the Spanish population (*ca*. 2,500 birds) increasing. The White-headed Duck occurs regularly in 26 countries, and in another 22 as a vagrant. Nine countries hold significant breeding numbers (Algeria, Islamic Republic of Iran, Kazakhstan, Mongolia, Russian Federation, Spain, Tunisia, Turkey, and Uzbekistan), but most are concentrated in Mongolia, Kazakhstan, Russian Federation, and Spain. Birds occur commonly on migration in 10 countries, and in winter (December to February) in 13. The most important wintering countries differ from year-to-year, presumably depending on weather conditions. In recent years, 10 countries have held over 1,000 birds (Azerbaijan, Bulgaria, Greece, Islamic Republic of Iran, Israel, Kazakhstan, Russian Federation, Spain, Turkey, and Uzbekistan – see Table 2). Seven countries hold significant numbers of birds throughout the year (Algeria, Islamic Republic of Iran, Russian Federation, Spain, Tunisia, Turkey, and Uzbekistan).

White-headed Duck population declines have been attributed mainly to habitat loss and over-hunting. The main threats to the Central Asian population are habitat loss due to unsustainable use of water resources and the recent drought in Central Asia. These impacts are likely to be exacerbated by the effects of global climate change. The greatest long-term threat to the White-headed Duck, however, is introgressive hybridisation with the non-native North American Ruddy Duck *Oxyura jamaicensis*. Ruddy Ducks have now been recorded in 21 Western Palearctic countries with breeding records in at least 11, and regular breeding attempts in six (France, Ireland, Morocco, Netherlands, Spain, and the UK). However, outside the UK only France holds a significant numbers of breeding pairs (ca. 20). The number of

countries taking action against Ruddy Ducks has increased significantly in recent years. By 2004, at least 14 countries in the Western Palearctic had taken some action to control Ruddy Ducks (Belgium, Denmark, France, Hungary, Iceland, Ireland, Italy, Morocco, Netherlands, Portugal, Spain, Sweden, Switzerland, and the United Kingdom). This compares with only six countries in 1999. At least 471 Ruddy Ducks and hybrids have now been controlled in six countries excluding the UK (Denmark – 1, France - 246, Iceland - 3, Morocco - 2, Portugal - 3, and Spain - 217) and a further three countries have indicated that attempts will be made to shoot birds if they occur (Hungary, Italy, Slovenia). Concerted eradication programmes are in operation in four countries (France, Portugal, Spain, and the UK) and one is planned in Morocco. A total of 5,069 Ruddy Ducks have been shot in the UK since 1999. The Ruddy Duck has now been listed on Annex B of the EC CITES Regulations (338/97) on the grounds that they pose an ecological threat to indigenous species. This now gives member states the opportunity to place restrictions on or ban the keeping of Ruddy Ducks in captive collections. Other threats include inadequate wetland management (leading to the dry out of wetland habitats), competition with introduced carp, drowning in fishing nets, lead-poisoning, pollution and human disturbance.

This International Single Species Action Plan provides a framework for the conservation for the White-headed Duck and is based on the format for the AEWA International Single Species Action Plan prepared by BirdLife International. Successful implementation of this plan will require effective international co-ordination of organisation and action. The long-term Goal of this Action Plan will be to remove the White-headed Duck from the IUCN Red List of Threatened Animals. In the short-term, the aim of the plan is to maintain the current population and range of the species throughout its range, and in the medium to long-term to promote increase in population size and range. The plan has been developed using internationally agreed standards for identifying actions and has been prepared to facilitate the monitoring and evaluation of subsequent implementation, linking threats, actions and measurable activities.

This plan will need implementation in 41 countries, including 26 White-headed Duck Range States and 21 countries with Ruddy Duck records. The 26 activities identified in this Action Plan focus on measures to prevent further habitat loss and degradation; to reduce direct mortality of adults and improve reproductive success; and to remove the threat of hybridisation with the introduced North American Ruddy Duck. These measures include protecting the White-headed Duck and its habitats, appropriate management of key sites, eradicating the Ruddy Duck from Europe and North Africa, and increasing public awareness of the need to conserve the White-headed Duck. Each country within the range of the White-headed Duck should be committed to implement this plan and to develop National Action Plans and establish White-headed Duck Working Groups to help facilitate this. All countries with records of Ruddy Ducks should endorse and implement the International Ruddy Duck Eradication Strategy of the Bern Convention, and produce official statements of intent regarding Ruddy Duck control.



WHITE-HEADED DUCKS IN MANYCH WETLAND, RUSSIA, APRIL 2006

In April 2006, a remarkable build-up of White-headed Duck *Oxyura leucocephala* was reported at Manych Wetland, Stavropol Region, Russia. The first birds were reported on 6 March when 10 birds occupied a small area of open water in the ice. By 17–20 March the ice had melted and 130 birds, in two small groups, were present. On 1-3 April there were 3,850 birds, though this count should be viewed as a minimum. Counting of distant birds was quite difficult, as the water was rather choppy due to a westerly wind throughout. Last year, the ducks departed on or about 10 April.

The ducks were quite evenly spread over 7 km² although they tended to remain separate from other waterbirds at the site; also present were numerous Red-crested Pochard *Netta rufina*, Common Pochard *Aythya ferina*, Tufted Duck *Athya fuligula,* Common Goldeneye *Bucephala clangula* and Smew *Mergellus albellus* plus a large number of Great Crested Grebe *Podiceps cristatus* and Red-necked Grebe *Podiceps* grisegena.

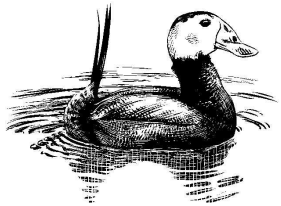
Local observers have witnessed White-headed Ducks gathering at the site in March/April for many years but were unaware of the potential importance of the event. There is, therefore, little information available on numbers visiting the site in previous years. Hopefully, however, this information will now be collected each year, and it will then be possible to look at trends in usage of the site in the future.

UPDATE
In October 2006, two flocks of c360 and c1,400 birds were counted during an *ad hoc* trip to the wetland.

Photographs of the ducks at the Manych Wetland can be seen at:
http://uchkeken.onfinite.com/album/846512/

Report received through
WestPalBirds@yahoogroups.com

Jeff and Olga Gordon
jeffandolga@gmail.com



POPULATION STRUCTURE AND LOSS OF GENETIC DIVERSITY IN THE ENDANGERED WHITE-HEADED DUCK

This news item is a summary of the paper Muñoz-Fuentes, V., Green, A.J., Negro, J.J. & Sorenson, M.D. 2005. Conservation Genetics 6: 999-1015.

The White-headed Duck *Oxyura leucocephala* is a globally threatened species native to the Palaearctic with a range extending from Spain in the west to the western edge of China in the east. Its populations have become fragmented and undergone major declines in recent decades. To study genetic differences between populations across the range and change in genetic diversity over time, we sequenced a portion of the mitochondrial DNA control region from

67 museum specimens (years 1861-1976) as well as 39 contemporary samples from Spain and seven from Greece (years 1992-2003). In the historical sample, we found a lack of significant genetic structure between populations in different areas. We found evidence that the species experienced a rapid expansion in the past, perhaps from glacial refugia centred around the Mediterranean following the last ice age. In Spain, the population went through a dramatic bottleneck in the 1970s and early 1980s, when only a few dozen individuals remained in the wild. Although population size has since recovered to a few thousand individuals, we found a highly significant loss of mitochondrial haplotype diversity between the historical and contemporary samples. Given ongoing declines in other areas, losses in genetic diversity that may reduce the adaptive potential of White-headed Ducks in the future are a continuing concern throughout the geographic range of this species.

HYBRIDIZATION BETWEEN WHITE-HEADED DUCKS AND INTRODUCED RUDDY DUCKS IN SPAIN

This is a summary of the paper Muñoz-Fuentes, V., Vilà, C., Green, A.J., Negro, J.J. & Sorenson, M.D. in press. Molecular Ecology.

The Ruddy Duck *Oxyura jamaicensis* was introduced to Great Britain in the mid-20th century and has recently spread to other Western European countries. In Spain, Ruddy Ducks hybridize with the globally endangered White-headed Duck, *Oxyura leucocephala*. We assessed the effects of hybridization on the Spanish White-headed Ducks, which constitute 25% of the global population of this species, using a panel of eight nuclear intron markers, 10 microsatellite loci, and mtDNA control region sequences. These data allowed parental individuals, F1 hybrids, and the progeny of backcrossing to be reliably distinguished. We show that hybrids between the two species are fertile and produce viable offspring in backcrosses with both parental species. To date, however, we found no extensive introgression of Ruddy Duck genes into the Spanish White-headed Duck population, probably due to the early implementation of an effective Ruddy Duck and hybrid control programme. We also show that genetic diversity in the expanding European Ruddy Duck population, which was founded by just seven individuals, exceeds that of the native Spanish White-Headed Duck population, which recently recovered from a severe bottleneck. Unless effective control of Ruddy Ducks is continued, genetic introgression will compromise the unique behavioural and ecological adaptations of White-headed Ducks and consequently their survival as a genetically and evolutionary distinct species.

THE RUDDY DUCK IN EUROPE: NATURAL COLONIZATION OR HUMAN INTRODUCTION?

This is a summary of the paper Muñoz-Fuentes, V., Green, A.J., Sorenson, M.D., Negro, J.J. & Vilà, C. 2006. Molecular Ecology 15: 1441-1453.

Native to North America, Ruddy Ducks *Oxyura jamaicensis* now occur in 21 countries in the western Palaearctic (including Iceland) and their expanding population threatens the native White-Headed Duck *Oxyura leucocephala* through hybridization and possibly competition for food and nest sites. We used mitochondrial DNA sequences and nuclear microsatellites to test whether

the European Ruddy Duck population is descended solely from the captive population in the UK, which traces to seven individuals imported from the USA in 1948, or, alternatively, has been augmented by natural dispersal of birds from North America. Limited genetic diversity in the European population is consistent with a founder population as small as seven birds. In addition, shifts in allele frequencies at several loci, presumably due to genetic drift in the founding population, result in significant differentiation between the European and North American populations. Despite the recent separation of these populations, almost all individuals could be unambiguously assigned based on their composite genotypes, to one of two distinct populations, one comprising all of the European Ruddy Ducks we sampled (including those from Iceland and captive birds in the UK) and the other comprising all North American samples. Our results confirm that the European Ruddy Duck population is likely to derive solely from the captive population in the UK and we find no evidence of recent arrivals from North America or of admixture between Ruddy Ducks from Europe and North America.

BROWN TEAL RELEASED AT PORT CHARLES, NEW ZEALAND

Taken from Brown Teal Conservation Trust press release 26/5/05:

The Brown Teal *Anas chlorotis* is the world's fourth rarest duck species and it is endemic to New Zealand where it has been present for over 10,000 years. Prior to the arrival of Europeans, it was widespread throughout every type of wetland. Numbers in the early 1800s are believed to have been in the millions. But when Europeans arrived, accompanied by cats, rats, hedgehogs, ferrets, stoats and weasels, Brown Teal commenced their headlong race towards extinction. By 1999 the total population was no more than 1,000, with 750 on Great Barrier Island and 250 in Northland. The predicted date for extinction was 2015, introduced predators being largely responsible for this disastrous situation.

Since a major audit of the recovery programme was carried out in 2000, together with a healthy injection of government funding, comprehensive predator control programmes have been implemented on Great Barrier Island, in Northland, and at Port Charles, historically a favoured site with several hundred teal once resident there.

On 19 May 2005, 62 captive-reared Brown Teal were released at Port Charles, at the top of the Coromandel Peninsula. This was the third of five planned annual releases and was the highest number released for fifteen years. Eleven of these birds came from the Brown Teal Conservation Trust (BTCT). The survival of captive reared birds at Port Charles has been exceptionally high and several broods of teal have been reared by released birds.

The Brown Teal recovery programme now involves predator control at critically

important sites, habitat protection, creation and enhancement, and a major captive breeding programme. This year's release was witnessed by 120 local people, including two bus loads of school children, all of whom are ardent supporters of the recovery programme. The exercise was sponsored by Banrock Wines of Adelaide, a company that supports wetland and waterfowl projects throughout the world. Representatives from BTCT were present at the Port Charles release and were able to present detailed information to the school children present, and to locals, about the unique values of Brown Teal, their natural history, their vulnerability to predation and about why we should attempt to save the species. The BTCT believes that the recovery programme is now rapidly turning from one of imminent disaster to one of imminent success.

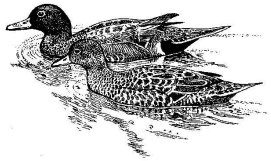
ROUNDUP 14 NOVEMBER 2005

Since the 19 May release there have been 12 deaths of monitored birds (nine of the 2005 released birds and two of the 2004 released birds). Of the 2005 birds, there were three vehicle deaths, five predation deaths and one unknown death (bird found buried in creek); there are now 31 (78%) of the monitored 2005 release birds still alive. In late October we removed transmitters from two released birds due to transmitter attachment problems but apart from that there have been no further transmitter or harness failures, so the whereabouts of all the monitored birds are know.

Breeding Season
There are a lot of almost fledged Brown Teal around, and several of the broods monitored will fledge 100% of the ducklings hatched. During three nights James Fraser and dog Percy netted 34 birds: 20 were fledglings large enough to take leg bands, but only nine were large enough to take transmitters. This is part of a shift in monitoring toward following ducklings through to their first breeding.

Predator Control
Recent predator trapping at Port Charles site has caught two cats, one possum, three rats and 14 hedgehogs.

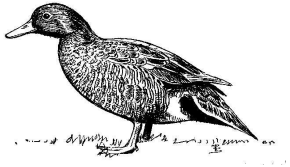
Vehicle Deaths
A hazing fence has been erected to stop Brown Teal crossing the road from the release site into one of their favoured feeding paddocks, forcing them to either fly over, or use the culvert under, the road. There have been no vehicle deaths on that stretch of road since the fence was erected. Negotiations continue with the District Council to replace the two culverts under Carey Road. Local residents and visitors are being strongly advocated to slow down and be careful while driving. However, as mentioned above, there continue to be vehicle-related deaths although numbers are reduced around Port Charles.



ROUNDUP 14 FEBRUARY 2006

Since the November Roundup the predator trapping programme has caught three cats, and four more Brown Teal have died: one juvenile killed by a cat, one juvenile run over not far from the cat kill, one avian predation (a 2004 bird) and one dead in a drain (a 2005 bird). This brings the total dead since the 19 May release to 16 (three of the 2004 birds; 11 of the 2005 birds; and two juveniles). There are now 30 of the 40 monitored 2005 release birds still alive. Of the nine juveniles given transmitters in November, two have died, two are missing, and the other five have dispersed.

Breeding Season
The occasional brood is still seen and there are considered to be more birds (un-tagged) in the area.



Vehicle Deaths
Still no vehicle deaths on the road by the hazing fence, but one was hit around New Year's Eve at Parakete. The tally of vehicle deaths for wild teal between Waikawau Bay and Colville is now up to ten and further signage to help with this problem is planned.

ACKNOWLEDGEMENTS
The author, The Brown Teal Conservation Trust and TWSG editors are indebted to everyone who has assisted in the Port Charles release, particularly Jason Roxburgh, Lettecia Williams and Rebekah Caldwell, and *http://www.brownteal.com* for help in compiling these notes. The BTCT congratulates the Department of Conservation, its staff and the people of Port Charles for their dedicated contribution towards saving the unique Brown Teal.

Updates on Port Charles release from Brown Teal Roundup
www.brownteal.com

Neil Hayes
Brown Teal Conservation Trust
haltd@actrix.co.nz

USE OF WING TAGS AND OTHER METHODS TO MARK MARBLED TEAL IN SPAIN

This news item is a summary of the paper Green, A.J., Fuentes, C., Vázquez, M., Viedma, C. & Ramón, N. 2004. Ardeola 51: 191-202.

Aims
To design methods to mark Marbled Teal *Marmaronetta angustirostris*, to test these methods in captive conditions and to apply them in field research in Spain.

Location
Marked birds were released at El Hondo, Valencian community (eastern Spain) and Doñana (south-west Spain). Captive trials were conducted at nearby recovery centres.

Methods
Colour and Darvic rings, nasal markers and wing tags were tested in captivity. Various designs of wing (patagial) tags varying in shape, size, nature of the code and attachment methods were also tested. Nasal markers were rejected after most fell off within a month in captivity. The other methods were used to mark birds that were released into El Hondo (following their rescue when they became trapped in an irrigation channel) or Doñana.

Results
PVC colour rings stuck with superglue often dropped off within months, probably owing to the high temperatures. Especially designed Darvic rings with two digit alphanumeric codes were used, but these were rarely legible in the field. Initially a wider wing tag was used to mark 52 birds released in 1996, after testing with pinioned birds in captivity. It was then discovered that these tags caused feather wear on the opposing wing in full-winged birds, owing to the

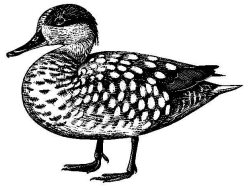
spinning of the tags during wing flapping. A narrower tag that greatly reduced this problem was developed and it was used to mark 288 birds released in 1997-1999. Observations of marked birds showed that most birds released at El Hondo remained there, although some were observed at Albufera de Valencia and Marjal del Moro. One bird was also recovered from Algeria. No birds released at El Hondo were recorded in Doñana, although one bird tagged in Doñana was observed at El Hondo. Tagged females in their first and second years were observed with broods, providing the first breeding observations for Marbled Teal of known age in the wild.

Conclusions
Wing tags provided much more data than rings, but there were major problems of tag loss, poor visibility and feather wear. They are most appropriate for intensive studies in the first few months after marking, and are not suitable for general use in this threatened species. El Hondo is likely to be the source for the recent expansion of Marbled Teal into Albufera de Valencia, Marjal del Moro and other valencian breeding sites. There is little connectivity between El Hondo and Doñana, the two main breeding areas in Spain.

SURVIVAL OF MARBLED TEAL RELEASED BACK INTO THE WILD

This news item is a summary of the paper Green, A.J., Fuentes, C., Figuerola, J., Viedma, C. & Ramón, N. 2005. Biological Conservation 121: 595-601.

Reintroduction or re-enforcement programmes are major tools in species conservation, but there is a need for more studies that assess the influence of different husbandry and release methods



on the survival of released animals. We investigated the survival of globally threatened Marbled Teal *Marmaronetta angustirostris* taken into captivity as ducklings when they became trapped in an irrigation channel, then released again after fledging. We used wing tags and mark–recapture models to estimate the survival of released teal. Ducklings rescued in 1996 (n = 53) were released soon after fledging in September and their survival was modelled for seven months until April 1997. Their apparent monthly survival rate (lower than true survival owing to loss of wing tags) was 0.85 ± 0.12 (± s.e). Ducklings rescued in 1997 (n = 44) were released together in February 1998 over five months after fledging, and their survival was modelled for six months from February until August. Their apparent monthly survival rate was 0.54 ± 0.06. Ducklings rescued in 1998 (n = 159) were released in August–September soon after fledging and their survival was modelled for 10 months from August until June. Their apparent monthly survival rate was 0.83 ± 0.07. Monthly survival was significantly higher for the 1996 and 1998 cohort, suggesting that retaining birds in captivity after fledging had a negative impact on post-release survival. When birds were released in February, a lower proportion survived until the breeding season three months later than when they were released five months earlier in September.

INTERSPECIFIC ASSOCIATIONS IN HABITAT USE BETWEEN MARBLED TEAL AND OTHER WATERBIRDS WINTERING AT SIDI BOU GHABA, MOROCCO

This news item is a summary of the paper Green, A.J. & El Hamzaoui, M. 2006. Ardeola 53: 99-106.

Aims
To study the spatial associations of non-breeding Marbled Teal *Marmaronetta angustirostris* with other wintering waterbirds. To assess the information such interspecific associations can provide about habitat requirements of globally threatened species.

Location
Sidi Bou Ghaba (34°10'N, 06°39'W), a closed-basin lagoon on the Atlantic coast of northwest Morocco.

Methods
Flock-scan sampling during eight days in February 1995, five in March 1995 and two in October 1997.

Results
In February and March, Marbled Teal showed a positive spatial association with Gadwall *Anas strepera*, Green Winged Teal *A. crecca* and Crested Coot *Fulica cristata* and a negative association with Mallard *A. platyrhynchos* and gulls. There was a very different pattern in October, when Marbled Teal had a positive association with Mallard and a negative one with Crested Coot. In March, individual Marbled Teal positioned at different distances to the shoreline were significantly associated with different waterbird species along a continuum from Crested Coot (closest to shoreline) to Greater Flamingo *Phoenicopterus ruber* (farthest). Similarly, individuals in different behaviours were associated with different waterbird species, those swimming being most associated with flamingos and Northern Pintail *A. acuta*. This is because swimming Teal tended to be in the most open areas frequented by these species.

Conclusions
The interspecific associations of Marbled Teal covary with the behaviour and microhabitat use of individual birds. Studying the spatial association between a threatened species and other birds can provide misleading information on the habitat requirements of the former if results are inconsistent over space and time. This illustrates the complexities of studying the habitat selection of waterbirds.

LEAD ISOTOPES AND LEAD SHOT INGESTION IN THE GLOBALLY THREATENED MARBLED TEAL AND WHITE-HEADED DUCK

This news item is a summary of the paper Svanberg, F., Mateo, R., Hillström, L., Green, A.J., Taggart, M.A., Raab, A. & Meharg, A.A. 2006. Science of the Total Environment 370: 416-424.

Lead isotope ratios ($^{206}Pb/^{207}Pb$ and $^{208}Pb/^{207}PB$) and concentrations in the livers and bones of Marbled Teal *Marmaronetta angustirostris* and White-headed Duck *Oxyura leucocephala* found dead or moribund were determined in order to establish the main lead source in these waterfowl species. Lead concentrations in bone (dry weight) and liver (wet weight) were found to be very high in many of the White-headed Ducks (bone: geometric mean = 88.9ppm, maximum = 419ppm; liver: geometric mean = 16.8ppm, maximum = 57.0ppm). Some of the Marbled Teal had high lead levels in the bones but liver lead levels were all low (bone: geometric

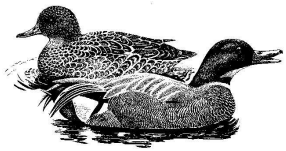
mean = 6.13ppm, maximum = 112ppm; liver: geometric mean = 0.581ppm, maximum = 4.77ppm). Ingested lead shot were found in 71% of the White-headed Duck and 20% of the Marbled Teal. The $^{206}Pb/^{207}Pb$ ratio in livers and bones of White-headed Ducks and Marbled Teals showed no significant differences compared to the ratios obtained from lead shot. The $^{206}Pb/^{207}Pb$ ratio in bones of Marbled Teal ducklings with the highest lead concentrations tended to resemble the ratios of lead shot, which supports our hypothesis that the lead was derived from the hens. We also found that the lead ratios of lead shot and lead ratios described for soils in the area overlapped, but also that the isotopic ratio $^{206}Pb/^{207}Pb$ in lead shot used in Spain has a narrow range compared with those used in North America. The principal source of lead in many of these birds was, however, most likely lead shot, as supported by the similar isotopic ratios, high lead concentrations in tissues and evidence of ingested shot.

FALCATED DUCK IN RUSSIA

The Falcated Duck *Anas falcata* is not currently included in the IUCN list of globally threatened Anseriformes. However, recent studies in Russia have suggested that this species should be included in future. The following abstract is from the International Conference on Birds and Environment 2004, Haridwar, India.

Falcated Duck: biology and presumable reasons for dramatic population decline
Data were collected from 1976 to 2003 in the Amur River region from the Arkhara River (49°00′N, 130°00′E) up to the mouth of the Amur, and on Sakhalin and along the Okhotsk seacoast up to Ul'banskiy bay (53°33′N, 137°15′E).

The breeding range of the Falcated Duck covers a vast territory, from the Enisey River through Cis- and Transbaikalia, Southern Yakutia, Priamurie, Primorie, Manchuria to Sakhalin and Kamchatka. Most birds breed in the Priamurie (Amur River basin). Open lakes and streams on flood-plains with grassy shores and rich in aquatic plants are the most favorable biotopes for the Falcated Duck. The species is characterized by late arrival at the breeding grounds and a long breeding period. It is stenotopic, *ie* tolerant of only a narrow range of environmental factors, and specializes in grass feeding, which suggests that the species originated in conditions similar to the present optimum. It probably evolved in the lake country occupying the ancient Amur basin in the Pliocene.



The Priamurie is characterized by alternating years of floods and low water. In the flood season many waterfowl nests are destroyed, while in seasons of low water breeding habitats decrease in number. The Falcated Duck is well adapted to such conditions. During the nesting period it is strictly territorial. The population structure allows occupation of both flood-plains and uplands; this reduces nest loss by predators and insures the population against complete loss of broods due to flood. After hatching, Falcated Duck become the most social of the dabbling ducks: brood amalgamations are common. Depending on the density, amalgamations may be simple with recognizable separate broods in them or complex with up to 80-100 ducklings. At

the end of the 1970s, on Lake Udyl (52° 98′N, 139°49′E) 80% of broods were in amalgamations, comprising 86% of chicks. Until the beginning of the 1980s, in the optimum habitats Falcated Teal comprised about 60-85% of the total waterfowl population. In the last decades, the population has declined dramatically, and its share of the whole duck population now seldom exceeds 30%. On Lake Udyl, the total number of Falcated Duck has fallen from 530 to 120 broods and only 60% of broods were in amalgamations.

There are several reasons for the decline. Falcated Duck inhabit easily accessible habitats and suffer from disturbance and poaching more than other species. The ducklings are shot first of all because of late breeding: many of them are still flightless at the beginning of the autumn hunt. Loss of habitats (including on the wintering grounds) and pollution have had an affect too. The present Falcated Duck world population numbers only 35,000 birds. The species should be defined as Globally Threatened and put on the Red Data List.

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FERRUGINOUS DUCK ACTION PLAN PUBLISHED

The AEWA Single Species Action Plan for the Ferruginous Duck *Aythya nyroca* was also published by the AEWA secretariat in June 2006 and can be downloaded from
http://www.unep-aewa.org/publications/technical_series.htm.

The plan was compiled by James Robinson and Baz Hughes of WWT (UK) with the help of 57 Ferruginous Duck experts from around the world. The plan is based on information collected at an action-planning workshop organised by Nicky Petkov of the Bulgarian Society for the Protection of Birds/BirdLife Bulgaria. The plan was adopted under Resolution 3.12 at the Third Session of the Meeting of the Parties to AEWA in Dakar, Senegal, October 2005.

The Executive Summary of the plan is as follows:

The Ferruginous Duck is a little studied, partial migrant, widely distributed in Europe, Asia and Africa. During the first quarter of the 20th century, it was described as one of the most plentiful Anatidae species over a great part of its range. Since then, it has undergone a large, long-term decline globally. The species is regularly recorded in 77 countries and in at least 26 others as a vagrant.

The most important known countries for breeding birds are Romania (5,500-6,500 pairs), Azerbaijan (1,000-3,000 pairs), Croatia (2,000-3,000 pairs) and Kazakhstan (2,000-3,000 pairs). In winter, significant numbers of birds have been counted in Bangladesh (70,000 birds), Turkmenistan (21,000 birds), Mali (up to 14,300 birds), Kazakhstan (10,500 birds), Uzbekistan (>7,000 birds), Sudan (>5,000 birds), Egypt (7,500 birds), and Azerbaijan (1,000-9,000 birds).

Simply adding the national population estimates for the 35 countries with data on numbers of breeding pairs resulted in an estimated global breeding population of 14,000-23,000 pairs. Assuming winter numbers = breeding pairs x 3, this would equate to a wintering population of 42,000-69,000. Such calculations are fraught with difficulty, and taking into account recent winter counts of 70,000 birds in Pakistan, 21,000 in Turkmenistan, 14,000 in Mali, and 8,530 in Chad, it does seem that the global population is somewhat higher than the previous estimate of 50,000

birds. A minimum of at least 100,000 birds seems likely, but the true value may be even higher.

The Ferruginous Duck is thought to breed in 45 countries worldwide. Of the 43 countries with trend data, no estimate of population trend was available for 16 (37%) countries. Most (13 or 48%) of the remaining 27 countries had decreasing numbers of breeding Ferruginous Ducks over the last seven year period and only two (Greece and Italy) had increasing numbers. Six of the 27 countries (22%) experienced declines of at least 50%, and seven (26%) declines of 20-49%. In eight countries (30%) breeding numbers were stable and in four (15%) numbers fluctuated with changes of at least 20%, but with no clear trend since 1995. Trends in wintering numbers are unclear. Of 69 countries thought to hold wintering Ferruginous Ducks, no estimate of population trend was available for 52 (70%) countries. Of the 17 countries for which data were available, 10 countries (56%) had fluctuating numbers. Of the seven remaining countries, two experienced declines of at least 50%, three declines of 20-49% and two an increase of 20-49%.

The Ferruginous Duck is listed as Near Threatened on the IUCN Red List of Threatened Animals. The species nearly qualifies for listing under criteria A1c and A2c. It is also listed on Annex I of the European Union Directive on the Conservation of Wild Birds (79/409/EEC) (Birds Directive), on Appendix III of the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention), on Appendix I of the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), and in Table 1, Column A of the African-Eurasian Waterbird Agreement action plan. The principal known threats to the Ferruginous Duck are habitat loss and degradation, climate change/drought, and over-hunting. Others include lead poisoning, drowning in fishing nets, pollution, introduction of non-native species (particularly Grass Carp Ctenopharyngodon idella and Wels Catfish Silurus glanis), and human disturbance.

This International Single Species Action Plan provides a framework for the conservation for the Ferruginous Duck and is based on the format for the AEWA International Single Species Action Plan prepared by BirdLife International. Successful implementation of this plan will require effective international co-ordination of organisation and action. The broad aim of this Action Plan will be to remove the Ferruginous Duck from the IUCN Red List of Threatened animals. In the short-term, the aim of the plan is to maintain the current population and range of the species throughout its range, and in the medium to long-term to promote increase in population size and range. The plan has been developed using internationally agreed standards for identifying actions and has been prepared specifically to facilitate the monitoring and evaluation of subsequent implementation, linking threats, actions and measurable activities.

This plan will need implementation in 77 countries. The 30 activities identified in this Action Plan focus on measures to prevent further habitat loss and degradation; to reduce direct mortality of adults and improve reproductive success; and to increase knowledge on the Ferruginous Duck. These measures include protecting the Ferruginous Duck and its habitats, appropriate management of key sites, and increasing public awareness of the need to conserve the Ferruginous Duck. Each country within the range of the Ferruginous Duck should be committed to implement this plan and to develop National Action Plans and establish Ferruginous Duck Working Groups to help facilitate this.

FEATURES

WHAT ACTUALLY IS THE STATUS OF THE PINK-HEADED DUCK?

Recently there have been some tantalising reports that the enigmatic and extraordinary Pink-headed Duck *Rhodonessa caryophyllacea*, a holy grail among wildfowl enthusiasts, may have been rediscovered after an apparent absence of 60-70 years (Kear 2005). However, there has been no change to the bird's official status. So, is the Pink-headed Duck back from the wilderness? We need to look at recent surveys for this bird in Myanmar to get a better understanding of current thoughts.

In March and November 2003, surveys were carried out in Kachin State by BirdLife International and their local partner in Myanmar, the Biodiversity and National Conservation Association (BANCA), organised by Wildbird Adventure Travels and Tours. The second survey concentrated effort along the Chindwin River from Tanai, particularly in the Hukaung Valley Wildlife Sanctuary. Here, two independent and credible reports of Pink-headed Duck were received from fishermen in the area's ox-bow lakes but survey members did not find any ducks themselves.

In November-December 2004 the same team went back to northern Kachin State, this time joined by members of the Leicestershire and Rutland Wildlife Trust. This survey concentrated on Indawgi Lake, the Tanai area and the upper Chindwin River. It was here that a flying duck was tentatively identified as a Pink-headed. However, while Indian Spotbill *Anas poecilorhyncha* was ruled out, the less well known appearance of the Chinese Spotbill *Anas (poecilorhyncha) zonorhyncha* (here possibly the even more poorly known *harringtoni* form) meant that observers could not say that they were all 100% confident of the distant duck's identification.

So, full of hope, a further survey went back to northern Kachin, to ox-bow lakes of the Nat Kaung River north of Kamaingin, in October-November 2005. This time there were to be no repeat sightings, however fleeting. In 2006, hopefully, teams intend to return to Myanmar and surveys are proposed further south including the Mandalay area and Arakan.

The observers of the 2004 bird remain confident of rediscovery but doubts still remain about 'that' bird. Further surveys, we passionately hope, will get that totally convincing sighting and TWSG wishes all concerned the best of luck. For further information and reports of the surveys, including further details of collaborators and supporters (including the Darwin Initiative) visit *http://www.birdlifeindochina.org/* and read Jonathon Eames', BirdLife Indochina Programme Manager, notes in Babbler issues 8 (2003), 12 (2004) and 16 (2005). A report of the sighting by Karin Eberhardt can also be found in Babbler 15 (2005). The reports include details of other endangered waterbirds, including White-winged Duck *Cairina scutulata*, seen during each of the surveys.

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REPRODUCTIVE RATE AND DEVELOPMENT OF DUCKLINGS OF BRAZILIAN MERGANSER AT SERRA DA CANASTRA NATIONAL PARK, MINAS GERAIS, BRAZIL, 2001-2005

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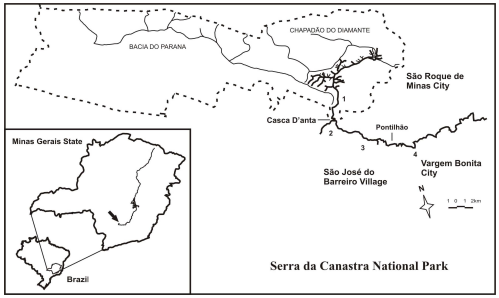
SUMMARY
The Brazilian Merganser *Mergus octosetaceus* is one of the rarest and most threatened species in the world with the population estimated at 250 individuals. Although knowledge about the biology of this species has improved in the last ten years, information on breeding biology is still limited. We studied four pairs of Brazilian Merganser on the São Francisco River in Serra da Canastra National Park and its environs from 2001 to 2005. This paper presents new data on breeding success, development of ducklings, and parental care, including the length of time young remain within their parents' territories. A total of 15 broods comprising 70 ducklings (mean 4.6, range 2-8) were reared by the four pairs over the five year period, emphasizing the importance of the Serra da Canastra National Park for the Brazilian Merganser and the need to protect the São Francisco River.

INTRODUCTION
The Brazilian Merganser is one of the rarest and most threatened waterfowl in the world, categorized by IUCN as Critically Endangered (IUCN 2006), with an estimated population of 250 individuals (BirdLife International 2000). The species is found mainly in Brazil, although small remnant populations survive in Argentina and possibly Paraguay. Most recent records are from Brazil (Brazilian Merganser Recovery Team 2006). The Serra da Canastra in Minas Gerais State, Brazil, is the most important site in the world for the Brazilian Merganser. Since the rediscovery of the species by Bartmann in 1981 (Bartmann 1988), this mountain range and its environs has been the main site of research into its biology and ecology (Bartmann 1988; Silveira & Bartmann 2001; Lamas 2002; Bruno & Bartmann 2003; Bruno 2004; Lamas & Santos 2004; Lamas 2006). Lamas (2002, 2006) estimated the population of Brazilian Merganser in Serra da Canastra National Park (SCNP) and its environs at about 80 individuals.

Our study began in 1992, when Bartmann & Bruno found two pairs of Brazilian Mergansers on São Francisco River (one with two ducklings in the highlands, another without ducklings just above the Casca D'Anta waterfall), both within the SCNP. Following Wolf Bartmann's death in 2003, the study has been continued by S.F. Bruno (Bruno & Bartmann 2003, Bruno 2004). This study aims to collect long-term data on the breeding success, development of ducklings, and parental care of Brazilian Mergansers on the São Francisco River. This paper updates information previously presented by Bruno & Bartmann (2003), covering the period 2001 to 2005.

STUDY AREA AND METHODS
Situated in west central Minas Gerais State, southwest Brazil, the Serra da Canastra National Park (20°15'S, 46°40'W; Figure 1) is a 73,000 ha area of highland plateau, 900-1,400 m (2,953 to 4,594 ft) in elevation, characterized by rolling, rocky grasslands with steep escarpments, deep valleys and numerous water courses.

Figure 1. River stretches used by four pairs of Brazilian Merganser in the SCNP, 2001-2005. Territories are denoted by numbers, SCNP limits by dashed lines, and main road by thin, solid lines (modified from IBAMA 1981).



All river habitats used by the mergansers are characterized by clear, oxygenated water that flows over rocks, stones and numerous exposed cliffs alternating with wider channels or pools with reduced currents which may be quite deep. The meandering mountain streams are in some areas bordered by high banks with overhanging vegetation of gallery forest.

Throughout this paper, we make the assumption that the same birds are present within each territory. Although we have no evidence to prove or disprove this assumption, we make it as Brazilian Mergansers are thought to pair for life and remain faithful to the same territory (Brazilian Merganser Recovery Team 2006).

Four pairs of Brazilian Merganser inhabit the São Francisco River, from its source to Vargem Bonita city, 44 km downstream. Pair 1 occupies a 14-km territory on the upriver stretch of the São Francisco River within the SCNP; Pair 2 lives on a 10-km stretch from the base of the Casca D'Anta waterfall almost to São José do Barreiro Village, most of which is outside the park; Pair 3's territory stretches 9 km from São José do Barreiro Village to the first bridge that crosses the São Francisco River, known locally as 'pontilhão' (20°19'S, 46°28'W), all of which is outside the park; Pair 4 inhabits a 11-km stretch between the 'pontilhão' and the Limeira farm (20°19'S, 46° 22'W), all of which is again outside the park (Figure 1).

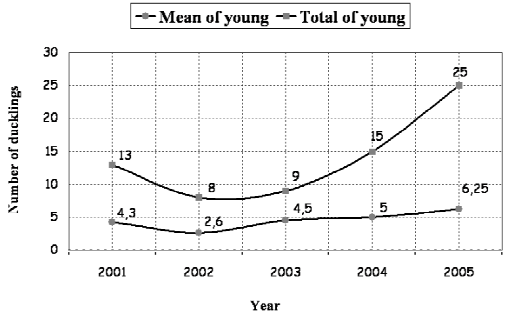
Nine visits were made to the SCNP between 2001 and 2005, totalling 105 days of fieldwork. Surveys were conducted on foot and birds located by scanning long river stretches from nearby hills or from hides close to the water. Birds were observed either by eye orusing 10x25 binoculars and tele-lens photography.

RESULTS
Assuming that Brazilian Mergansers breed once a year, four pairs in five years could produce a maximum of 20 broods. Our four study pairs produced 15 broods (75%) totalling 70 ducklings (mean 4.6, range 2-8) over the five-year period (Table 1). The total number of young produced per year ranged from 8 to 25 and the mean brood size 2.6 to 6.25 (Figure 2).

Table 1. Number of ducklings raised by four pairs of Brazilian Merganser in SCNP, 2001-2005.

Pair	2001	2002	2003	2004	2005	Total
1	2	2	7	7	5	23
2	3	0	-	3	7	13
3	8	3	0	0	7	18
4	0	3	2	5	6	16
Total	13	8	9	15	25	70

Figure 2. Total and mean number of Brazilian Merganser ducklings, 2001-1005.

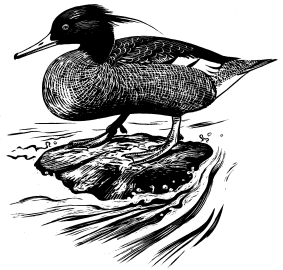


In 2001, Pair 3 was first located on 6 August 2001 at 1130h accompanied by eight ducklings almost the same size as their parents, with white eye-rings, dark upper mandibles, whitish cheeks and necks, no crests and dark heads. Pair 2 was sighted on 8 August, with three young. On 9 August, Pair 1 was found at 1415h with two ducklings with black upper parts, three white patches (on the wing, back, and sides of rump) and white underparts.

In 2002, only the male of Pair 2 was seen – on 29 July at 1155h and 2 August at 1015h. On 1 August, Pair 4 was seen with three ducklings and Pair 1 with two young, both broods a similar age and plumage as the young of Pair 1 in 2001.

In 2003, the SCNP was visited twice. On 1 August at 1505h, Pair 1 was found with seven ducklings at the same stage of development as those pairs mentioned above. On 4 August, there was no sign of Pair 2 in their territory; some feathers not present five days previously and thought to be from Brazilian Mergansers were found at the edge of the Luciano stream. On 4 August, only the male of Pair 3 was found, but both birds were located at 1200h on 5 August and 1345h on 6 August. Also on 6 August, Pair 4 was found with two ducklings, again the same size as previously reported. On 1 October 2003, Pair 1 was found with the same seven ducklings seen in August. Pair 3 was observed from 7 to 11 October; on the morning of 9 October they were accompanied by a

male Brazilian Merganser, and showed no aggression towards it. The birds swam calmly down the river for about five minutes and then moved away (Figure 8; see page 33).



At 1115h on 4 April 2004, five birds in adult plumage were sighted in the territory of Pair 1 (Figure 10) near the top of the Casca D'Anta waterfall. At 1530h the same individuals were relocated 2 km upstream of the first site. In September 2004, Pair 2 was found with three ducklings. These had a similar plumage to that described for Pair 3 in 2001, but were smaller.

On 5 February 2005, Pair 1 were still accompanied by the young observed in September 2004 (Figure 7). The full-grown young had adult plumage, but with a smaller crest and with orange on the base of the beak. On 5 August 2005, Pair 1 was found with five ducklings which had just left the nest and on 18 July Pair 2 was found with seven newly hatched offspring. Pair 4 was seen by IBAMA staff with six young on 21 July and Pair 3 was located on 5 August with seven young the same size and plumage as those of Pair 3 in 2001.

DISCUSSION

Development of ducklings

Partridge (1956) described the upper parts of downy Brazilian Mergansers as black with three white patches: on the wing, back, and sides of rump. The under parts are pure white. A white stripe extends from the lore to below the eye and there is a white spot in front of the eye. The iris is grey; the bill black; legs and feet drab grey with black webs. Ducklings from Pair 1 in 2001, 2002, 2003 and 2005, from Pair 2 in 2005 and Pair 4 in 2003, were probably about one week old when observed (Figure 3).

When the young reach two weeks old, the plumage is basically the same, but the size has increased (Figure 4). At three weeks old, the back and head are still black but not as intense as before. The lores are darker than other black parts of the body and the white eye-ring is more evident. The breast and neck are white and the upper mandible is darker than the lower mandible. At four weeks old, the head, hind neck and back have turned brown (Figure 5).

Silveira & Bartmann (2001) described young almost the same size as adults as having a dark upper mandible, reddish lower mandible, a white eye-ring, no crest, whitish cheeks and neck, and a dark head, giving a capped appearance. The breast was grayish, the back grey, as in the adult, the wing-bars were present, and the feet were red. We suggest that young acquire these characteristics when about two months old (Figure 6). According to our observations, the increase in the length of the crest and the blackening of the face are the last characteristics to develop in sub-adults. Young in February, probably about six months old, still had a short crest and an orange colour at the base of the bill (Figure 7). Sub-adults about nine months old (Figure 10) were indistinguishable from adults.

Parental Care and General Behaviour

Silveira & Bartmann (2001) suggested that juvenile Brazilian Mergansers probably remain with their parents until December/January, after the moulting period, when the parents are thought to drive the young from their home range. Our observations confirm that ducklings may remain with their parents until at least February, as observed in 2005 (Figure 7). According to Bartmann (1995), the Brazilian Merganser has a long-lasting family bond and the young are allowed to stay in their parents' territory until nearly the forthcoming breeding season. Bartmann (1988) observed three individuals swimming together on the São Francisco River in March 1983. In April 2004, we saw a group of five birds (Figure 10) thought to be part of the brood of seven ducklings watched in October 2003. Although the fate of young and their dispersion routes remain a mystery (Silveira & Bartmann 2001), it appears that after leaving their parents, sub-adults remain together in their parents' territory at least until April. Our results suggest that other occasional visits can occur after the young have left their parents such as the situation in October 2003 (Figure 8), when three adults were sighted together for a short time with no aggression.

According to Partridge (1956), incubation is performed only by the female. While females are on the nest, males spend most of their time loafing nearby, as observed for Pair 3 in August 2003 when the male was seen both alone and in the presence of his mate.

Breeding season, breeding success and conservation threats

The Brazilian Merganser's incubation period remains unknown. Other mergansers have an incubation period of 26 to 37 days (Hoyo *et al*. 1992) with mean of 28.6 to 32.3. Ducklings can be aged by their plumage and size. During 2001 to 2005 it was possible to observe different stages of development of the ducklings and, combined with other results (Partridge 1956; Bartmann 1988; Silveira & Bartmann 2001) has been used to estimate subjectively the age of the young when observed. This estimative was important to confirm and identify more specifically when the incubation starts.

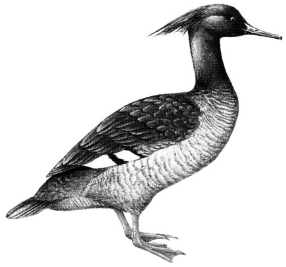
Partridge (1956) and Bartmann (1988) stated that nesting takes place from June to October, with July being the most common month for incubation and August for hatching. Bruno & Bartmann (2003) observed hatching mainly in July, suggesting incubation takes place mainly in June. This present work confirms this finding. Based on the estimated ages of the eight broods for which it was possible to estimate the probable hatch date (and thus back-calculate an incubation start date), two incubations probably started in the second week of June (Pair 3 in 2001 and 2005), one in the third week of June (Pair 2 in 2005), three in the fourth week of June (Pair 1 in 2002 and 2003; Pair 4 in 2003), and two in the first week of July (Pair 1 in 2001 and 2005). This suggests that nesting takes place mainly between the second week of June and the second week of July. This confirms that most broods hatch in July, but specifically from the second week of July to the second week of August.

The reproductive rate of Brazilian Mergansers is thought to be lower than others mergansers (Silveira & Bartmann 2001). For example, the Scaly-sided Merganser lays 7-14 eggs and has a brood size at fledging of 6-7 (Hughes 2005), compared to a mean of 4.6 in our study. The brood of eight ducklings recorded in 2001 is the highest ever observed in this species (Bruno & Bartmann 2003).

Breeding success at Serra da Canastra National Park may have increased over

the last ten years. From 1996 to 2000 in the same region, Silveira & Bartmann (2001) found that five of six pairs studied produced 10 broods totalling 27 ducklings (mean 2.7). Our four pairs from 2001 to 2005 produced 15 broods with a total of 70 ducklings (mean 4.6). The reason for this increase is unknown. Since 1996, there has been no mechanised diamond exploration along the river (which leads to increased siltation and a reduced habitat quality for mergansers), but this is more likely to explain an increase in numbers rather than an increase in breeding success.

Age is known to influence the breeding success of Brazilian Mergansers (Silveira & Bartmann 2001). Our observations, especially of Pair 1, suggest that mature pairs can reproduce in at least 5 consecutive years (Table 1).



Between 2001 and 2005, Pair 1 raised the most ducklings (23), 27% more than the second highest Pair (Pair 3 – 18 ducklings) and 50% more than birds breeding in the same territory between 1996 and 2000 (Silveira & Bartmann 2001). This high breeding success by Pair 1 may be due to the fact that this territory is completely within the SCNP and thus relatively free from human disturbance. This highlights the importance of protected areas for the conservation of this rare species.

Although most of the São Francisco River is not polluted, certain stretches are being affected by increased levels of siltation caused by erosion of dirt tracks and subsequent run-off during rain storms (Figure 8). This is most notable in the stretch of river inhabited by Pairs 2, 3 and 4. Siltation of rivers caused by erosion from various sources, such as deforestation, construction of roads and buildings next to rivers, run-off from agricultural land, and cattle ranches is a major threat to the Brazilian Merganser (Brazilian Merganser Recovery Team 2006).

This study showed that four pairs of Brazilian Mergansers produced 70 ducklings in five years, a major contribution to the estimated world population of 250 birds. This emphasises the importance of the SCNP for this species and the need to protect the São Francisco River and its environs.

ACKNOWLEDGEMENTS

We thank the staff of IBAMA (Instituto Brasileiro do Meio Ambiente e dos Recursos Renováveis) at SCNP for field support and Mr Tertuliano Francisco Neto (Ziro) and his family for their help and friendship. Special thanks to Baz Hughes for the careful review, comments and suggestions. This paper is dedicated to the memory of Wolf Bartmann.

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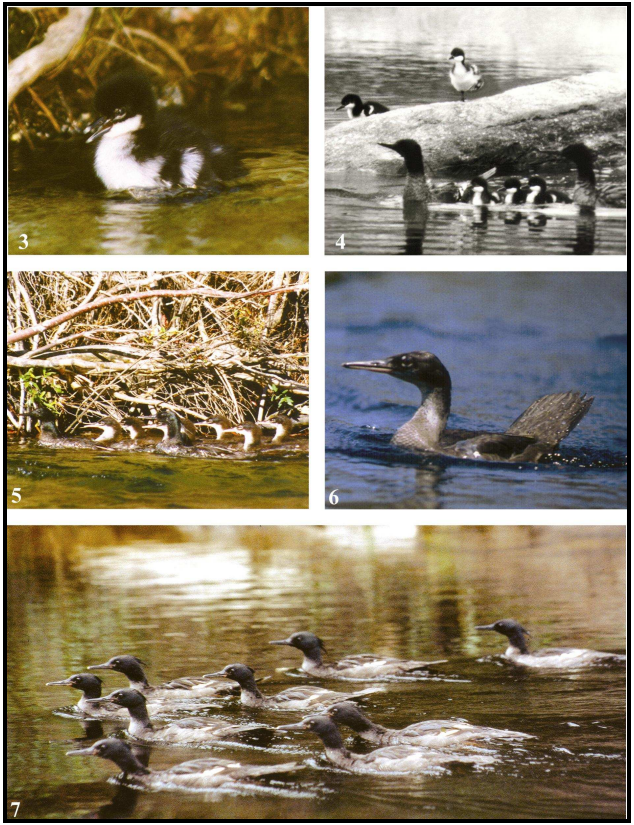
Figures 3–7: Fig. 3. Young about one week old (Photograph by Sávio Bruno); Fig. 4. young about two weeks old (Wolf Bartmann); Fig. 5. young about four weeks old (Sávio Bruno); Fig. 6. young about eight weeks old (Wolf Bartmann); Fig 7. A pair with seven sub-adults observed on 8 February (Sávio Bruno). Adults have entirely black faces and orange at the base of the bill.



Figures 8-10: Fig. 8. Male accompanying Pair 3 with no sign of aggression. Fig. 9. Siltation from the Luciano stream entering the São Francisco River in the Serra da Canastra National Park. Fig. 10. Five Brazilian Mergansers, thought to be sub-adults, on the São Francisco River in April 2004. Photographs by Sávio Bruno.

Colour versions of these photographs can be found on the TWSG website *http://www.wwt.org.uk/threatsp/twsg/*

NESTING SURVEY OF THE WHITE-BACKED DUCK AT LAKE ANTSAMAKA IN WESTERN MADAGASCAR

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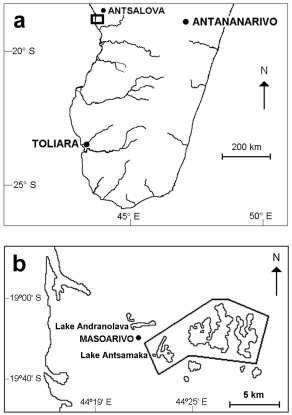
INTRODUCTION

The White-backed Duck *Thalassornis leuconotus* is distributed throughout sub-Saharan Africa and Madagascar. The endemic Malagasy subspecies *T. l. insularis* is smaller and more strongly marked than the nominate race with blacker barring, a paler belly and a darker crown (Morris & Hawkins 1998). *T. l. insularis* is widespread but rare throughout Madagascar, is declining due to habitat loss and hunting, and is currently listed as Endangered (TWSG 2003). Very little has been documented regarding the White-backed Duck in Madagascar and this note presents the results of a nest survey at Lake Antsamaka in western Madagascar in May 2001.

STUDY SITE AND METHODS

Lake Antsamaka (19°02′S, 44°22′E), also called Antsamaky, is a shallow temporary lake varying from 131-174 ha in size. It is one of four lakes comprising the Manambolomaty complex designated as a Ramsar site in 1999 (Figure 1) (see also Projet ZICOMA 1999, 2001). Lake Antsamaka is 7 m above sea level with a maximum depth of 3 m at the end of the wet season (March). It is entirely dependent on rainfall for its existence and is generally dry by the end of the dry season (October). At least 46 species of waterbirds have been recorded at Antsamaka, twenty of which are either endemic species or subspecies. Antsamaka is an important moulting site for a number of wildfowl species, including the Endangered Madagascar Teal. *Anas bernieri* Vegetation is dominated by water lilies *Nymphea stellata* and *N. lotus*, with some patches of emergent *Juncus* sp., *Cyperus rotundus*, *Logorosipho madagascariensis* and *Phragmites* sp.

Figure 1. Map of southern Madagascar with study area in rectangle which is enlarged in Figure 1b. The Manambolomaty Complex Ramsar site is within the polygon in Figure 1b.



The lake is an important resource for the nearby village of Masoari vo (3 km north of Antsamaka) providing forage and water for cattle. The surrounding forest of Tsimembo is an important source of wood for pirogues (a type of boat), firewood, building and medicine. The Durrell Wildlife Conservation Trust (DWCT) has been working co-operatively with nearby communities since 1997 and employs a team of local researchers to study the Madagascar Teal.

Lake Antsamaka was surveyed on three consecutive mornings (0830-1130h) during 9-11 May 2001. All vegetation on the lake was searched thoroughly for nests. Surveys of the open water and sparse vegetation were conducted by pirogue. The larger reed beds were searched on foot by a team of three. Although the focal species was White-backed Duck, nests of all species were recorded. Information was recorded on location of nest, type of vegetation, stage of nest, clutch size and nest fate (if known). It was also noted if any adults were nearby.

RESULTS

In addition to the nesting White-backed Duck, seven other species of wildfowl were moulting at Lake Antsamaka during the survey: Comb Duck *Sarkidiornis melanotos* (331 birds counted during a survey on 30 April), Fulvous Whistling-Duck *Dendrocygna bicolor* (186), White-faced Whistling-Duck *D. viduata* (148), African Pygmy Goose *Nettapus auritus* (61), Red-billed Pintail *Anas erythrorhyncha* (71), Hottentot Teal *A. hottentota* (46), and Madagascar Teal (5). Thirteen White-backed Duck were counted during that survey.

The results of the nest survey are summarised in Table 1. A total of 37 White-backed Duck nests were found, 20 of which contained viable eggs. Mean clutch size of the 20 active nests was 4.85 ± 1.81. Two nests had been partially predated. Twelve nests were empty and four nests had hatched membranes. One nest had been swamped and contained four dead eggs. All nests were in *Juncus* sp. (Figure 2). No ducklings were seen.

Figure 2. White-backed Duck nest in *Juncus* on Lake Antsamaka, 10 May 2001.

Of interest was the observation that two of the active White-backed Duck nests were located directly below empty Purple Swamphen *Porphyrio porphyrio* nests. In both cases the nests were attached to the same reed stems with the Swamphen nest 1.5 m above the duck nest, creating a two-tiered effect with the duck nest at water level and the Swamphen nest at the top of the reed bed.

Nests of four other species were recorded during the survey, all in *Juncus*. Of 19 Purple Swamphen nests, 18 were empty and of the nest building stage while one nest contained two eggs. Twenty-four Moorhen *Gallinula chloropus* nests were recorded. Twenty-two were empty, one contained a dead adult and the other held two dead nestlings. One pair was observed with two young. Four nests of the Madagascar Swamp Warbler *Acrocephalus newtoni* contained zero, one, one and three eggs. Seventeen Madagascar Red Fody *Foudia madagascariensis* nests were recorded at varying stages from nest building to nestlings.

Table 1. White-backed Duck nests recorded at Lake Antsamaka, 9-11 May 2001.

Area	Number of nests (clutch size and fate)	Comments
South	**7** (empty) **2** (5 & 5 eggs)	A hen exhibited displacement behaviour near an active nest.
Around island	**2** (empty) **5** (1, 4, 4, 6 & 8 eggs)	Two of the nests (1 & 6 eggs) were under *Porphyrio* nests.
Northwest	**1** (empty) **2** (2 & 5 eggs) **1** (2 predated eggs & 4 hatched membranes)	
Northeast	**2** (empty) **9** (3, 3, 5, 5, 5, 5, 7, 7 & 8 eggs) **1** (3 dead eggs & 1 membrane) **1** (2 live eggs in nest & 2 dead eggs in water) **1** (1 predated egg, 1 dead egg & 1 membrane) **1** (4 live eggs in nest & 1 dead egg in water) **1** (4 dead eggs swamped in nest) **1** (2 dead eggs & 4 membranes)	A dead egg was found floating near one of the empty nests.

THREATS

White-backed Duck nests were concentrated at the northern end of the lake. Nearly all of the nests along the southern shore were empty, in an area where human activity was the greatest. All of the empty nests on the lake were within 5 m of the shoreline and in < 1.0 m of water. Nests in the north were in reed beds in 0.9-1.2 m of water and 15-20 m from the shoreline. There was considerable human and domestic dog activity along the shore of the lake. Two separate groups of three dogs were roaming the south shore on 9 May and a man with four dogs was observed walking along the north shore on 11 May. The presence of the Madagascar Teal research team at Masoarivo has made a significant effort toward the protection of Antsamaka from over-use, but some ducks are still being trapped. Eight snares were removed from the western edge of the lake on 27 April and one *D. viduata* was released unharmed from one of the snares. Illegal night fishing by a few individuals still occurs on the lake.

DISCUSSION

Lake Antsamaka is an important nesting site for White-backed Duck in western Madagascar. Efforts to minimise over-use of the lake should be continued. This would be particularly important during the months of April, May and June when the White-backed Duck breeding season overlaps with the moulting period for Madagascar Teal. A nest survey should be made of nearby Lake Andranalova as this site is regarded by local villagers to be an important nesting site for White-backed Ducks.

ACKNOWLEDGEMENTS

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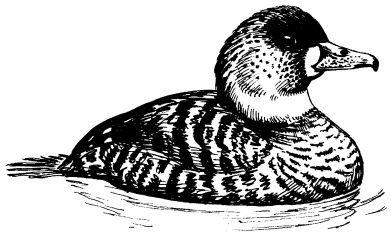

MADAGASCAR WHITE-BACKED DUCK: WHAT IS ITS TRUE STATUS?

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White-backed Ducks *Thalassornis leuconotus* are widespread in Madagascar and, unlike the island's other endemic wildfowl past and present, are not restricted to any of the Island's quite distinctive biological regions. The Madagascar White-backed Duck is smaller than its African relative and noticeably darker; it too, however, prefers quiet, water-lily covered pools and lakes where it can feed and hide during the hottest parts of the day. The plumage patterns of this quiet, secretive duck are well suited to disappearing amongst the curled, browning edges of lily-pads. This duck typically feeds by diving down to the submerged bases of the aquatic plants on which it feeds. It is not a strong flier and confident in its unobtrusiveness it will, unmolested, tolerate a high degree of human presence.

Historically the White-backed Duck has been recorded at many wetlands in Madagascar; however, a perceived decline in overall numbers over recent years has led to it being considered Endangered. With no country-wide surveys for this species and only rare sightings for more than 20 years, a declining population of 2,500-5,000 was estimated (Delany and Scott 2002). It is most likely, however, that even this low population estimate is too optimistic.

White-backed Duck was formerly described as common in many parts of Madagascar in places such as Lake Alaotra in the east, lakes Kinkony and Ihotry in the west, and in wetlands near Vohemar in the north (Rand 1936). Jean Delacour visited Madagascar with Rand and recalled that he "observed and collected many specimens in all parts of the island during 1929 and 1930"; he also described the duck as "not rare in suitable localities" (Delacour 1959). Cecil Webb, who too first visited Lake Alaotra with Delacour, wrote that White-backed Ducks were found on the west side of Lake Alaotra "where aquatic vegetation is several miles deep" (Webb 1936). Lake Alaotra has, since these visits, suffered from serious habitat modification including high levels of siltation, anoxia and pressures from introduced plants and fishes (Young & Kear 2006). Two endemic waterbirds previously found almost exclusively in this large lake system, Madagascar Pochard *Aythya innotata* and Alaotra Grebe *Tachybaptus rufolavatus* are now lost from this area (Hawkins *et al*. 2000; Young & Kear 2006). No White-backed Ducks were found during extensive wildfowl surveys at Alaotra in 1989 (Young & Smith 1989) and 1993-1994 (Pidgeon 1996). None was seen in dry and wet season surveys near Vohemar in 1998-1999 (Safford 2000).

White-backed Ducks are threatened by modification of their preferred habitat and the introduction of herbivorous and carnivorous fish especially the Asian Snakehead (fibata) *Channa striata* which may predate ducklings. This duck is also

highly vulnerable to accidental capture in mono-filament gill-nets set in the submerged vegetation by fishermen. Their large eggs are a prized find.

White-backed Ducks have in recent years only been recorded regularly on the island's west coast e.g. at Lake Antsamaky (85 in February 2001, 13 on 30 April 2001, 76 in July 2003, 63 in March 2004, 79 on 23 October 2004, 12 on 23 March 2005) and Lake Andranolava (118 on January 1998, 59 in February 2001, 22 on 22 October 2004, 41 on 31 March 2005) in Melaky, western Madagascar. Fifty were reported from Lake Ihotry in September-October 1992 (F. Symons *in litt*. 1992) and 57 on other smaller lakes (but not Ihotry itself) in the area in August-September 2005. Sixteen ducks were recorded in four lakes in the Lake Kinkony area (but again, not on the large Lake Kinkony itself) in July-August 2005, three in the same area in March-April 2006 and 55 in July-August. Fourteen were seen at Lake Bemamba in July 2006 and there have been sporadic reports from other western wetlands such as lakes near Andranomena south of Kirindy in the early 1990s and one near there on 14 October 2004 (Hofland 2006), four near Cap St André in 1998, a single bird at Lake Amboromalandry on 1 November 1995 (Hornbuckle 1996), two there later in the month (Vermeulen 1995) and five in pools near Mahajunga in November 2004. Away from the west there have also been occasional sightings including on the Central Plateau e.g. two at Lake Alarobia in Antananarivo in 1996, one west of Alaotra in 1998 and two at Domaine D'Anjozorobe, a tiny wetland north of Antananarivo, in March 2000. A single bird was seen near Maroansetra in September-October 2005 (Wings 2006). Three birds were seen at Lake Ranobe near Tulear on 15 October 2000 with six there on 22 October 2001 (A. Riley *in litt*. 2002). Olivier Langrand (pers. comm. 1993) has seen White-backeds very occasionally on other small wetlands in and around Antananarivo.

The species is undoubtedly highly dispersive and can occur briefly on almost any wetland: a pair was found on a tiny forested pool (Étang Andrano-vorinampela) in the Andranomena Special Reserve in Menabe western Madagascar on 2 October 2004. This pool had no water-lilies or other emergent vegetation and had been surveyed only a few days earlier when no White-backeds were present. Two birds have been captured by fishermen/trappers at Alaotra (in 1993-1994 and 1999-2000) suggesting that they at least continue to visit this wetland. Lakes such as Antsamaky and Andranolava are highly seasonal and typically become unsuitable (often very saline) as water-levels drop – the ducks nest there when water levels are high and lilies are plentiful (Woolaver & Nicholls 2006) but all must leave as water levels drop and lilies die off (the name Antsamaky refers to the flamingos that visit in the dry season).

It is apparent that even while the exact locations of White-backed ducks are known in the wet season but unknown during the dry season, there are not large numbers of this secretive and almost nomadic duck surviving in Madagascar. We suggest that a population estimate of fewer than 1,000 is undoubtedly more appropriate and that the continuing decline of this bird is a major cause for concern. The willingness of this bird to live in proximity to man if its chosen habitat is preserved does give reason for optimism; however, we need to know much more about its movements in Madagascar before a fully encompassing conservation strategy can be developed.

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WHITE-HEADED DUCK AND ITS PROTECTION IN UZBEKISTAN

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INTRODUCTION

With intensive irrigation programmes and development of natural areas in Uzbekistan during the last century, there has been a significant transformation of water and water-related ecosystems. This has resulted in the loss of both biodiversity and whole natural ecosystems, especially in the plains where the majority of riverine gallery forests and river delta complexes, historically rich in biodiversity, have been lost. However, these have been replaced with new wetland habitats, as reservoirs have been developed in irrigated desert regions. These reservoirs are now important ecological elements of the landscape having an important socio-ecological status. The largest in Uzbekistan are at Aidar-Arnasai, Dengizkul, Sudochie and Jiltarbas.

By 1985, irrigation-waste lakes had become the dominant type of reservoir in the flat country of the Aral Sea basin and the total area of such lakes in Uzbekistan is estimated to cover 8,000 km². The water in these irrigation-waste lakes is mainly brackish, salinity ranging from 4-15 g/dm³, and in the largest lakes, Aydar and Sarykamysh, from 8-14 g/dm³. While the waste lakes have become ecological oases, zones rich in biodiversity, they have also entered the social and economic sphere as they are used by people for relaxation, fishing, hunting, cattle-grazing and haymaking etc. Preservation or loss of the wetlands' social and environmental importance may depend on modern ecological conditions, and also on probable technical hydromeliorative actions and decisions.

WHITE-HEADED DUCK IN UZBEKISTAN

In 1983, the White-headed Duck *Oxyura leucocephala* was included in the first edition of the Red Data Book of the Uzbek Republic as single birds occasionally occurred throughout Uzbekistan (Red Data Book of Uzbek SSR 1983). Birds had been observed in the Amu Darya delta and in other parts of central Uzbekistan (Kashkarov 1987) and the species was considered close to extinction, following declines as a result of the transformation of traditional natural habitats.

Unexpectedly, however, in the autumn of 1999, on the Sudochie wetland, more than 3,000 migratory White-headed Ducks were counted during the "Rehabilitation of Sudochie wetland" ecological monitoring project conducted within the framework of the GEF/World Bank project on stabilization of the environmental situation in the Amu Darya delta (Kreuzberg-Mukhina & Lanovenko 2000). In the 2000/01 winter more than 1,000 White-headed Ducks were counted on Dengizkul Lake by a team from the State Biocontrol Body who were conducting winter surveys of wetlands in Uzbekistan (Lanovenko *et al.* 2000). At the Sudochie wetland, the White-headed Duck has now been observed on most of our 10 field expeditions conducted during spring, summer and autumn. The first ever breeding record in Uzbekistan was confirmed at this site in summer 2000 (Kreuzberg-Mukhina & Lanovenko 2001). However, the period 2000/01 was characterized by extremely low precipitation and the subsequent drought severely reduced the number and extent of wetlands in the lower Amu Darya delta, resulting in significant fluctuations in the numbers of White-headed Duck (and other waterfowl) (Kreuzberg-Mukhina 2003). Winter surveys,

conducted with the support of Wetlands International and other sponsors, found White-headed Ducks concentrated on Dengizkul Lake. Other wetlands on the right bank of the Amu Darya are also used. The White-headed Duck has only recently begun wintering in Uzbekistan in any numbers, following the creation of new water reservoirs. The White-headed Duck now occurs regularly in Uzbekistan but is more numerous in winter.

SURVEY 2005-06

The project "Survey and Protect the Globally Threatened White-headed Duck in Uzbekistan" was conducted from January 2005 to January 2006 by members of the Uzbekistan Zoological Society (ornithological branch) with financial support of the National Committee of the IUCN Netherlands (since spring 2005) and RSPB (2005 winter waterbird count in Bukhara region). The main goal of this project was to conduct surveys and develop a national Action Plan for the protection of the White-headed Duck in Uzbekistan. A total of 18 reservoirs were surveyed in five regions of Central and Southern Uzbekistan. In January 2006, Dengizkul held 1,178 White-headed Ducks.

Our surveys have shown that numbers of waterbirds using secondary-water reservoirs and transformed wetlands in the Amu Darya river delta fluctuate significantly. White-headed Ducks were observed throughout the year but significant numbers accumulated on the southern lakes of Bukhara region only during the winter. In other seasons the White-headed Duck was found in small numbers on small fresh or brackish wetlands overgrown with reeds.

Birds were seen during spring and summer on Zekry, Tudakul, Hadicha, Sudochie and Aksay Lakes. Following the first confirmed breeding in Uzbekistan in summer 2000, the first nest was not found until June 2005 (located by a student of local zoologist Dr. Maxet Ametov in Karakalpakstan).

THREATS TO WHITE-HEADED DUCK IN UZBEKISTAN

The main threat to the White-headed Duck, and other waterbirds, is probably the unstable character of secondary-water reservoirs due to an absence of management plans. These waterbodies are not yet considered as having an economic value for local development and there are threats from human pressure: poaching, disturbance and modification as a result of human activity.

In practically all irrigation-waste lakes surveyed, a fishing economy had developed but in many of them it had collapsed in recent years due to a number of reasons including congestion by aquatic vegetation, shallowing of the lakes, an absence of supporting measures such as fish re-stocking and an increase in salinity (for example in Lake Dengizkul salinity has already reached critical levels). In the 1970-80s, during the appearance of irrigation-waste lakes, the main problem was water quality following pollution with chlorine, phosphorus and organic pesticides. In recent years, however, as a result of a reduction of pesticide use in agriculture and increases in the lakes natural abilities to clear up this problem, water quality has gradually improved. The greatest problems now are in the larger and deeper irrigation-waste lakes through gradual salinization and hydrosulphuric pollution of benthic layers during the summer.

CONCLUSIONS

The status of wetland ecosystems in the majority of Uzbekistan is far from optimum, and the majority of water areas have been lost. Secondary water-reservoirs with anthropogenic eutrophication and dominated by halophyte species have appeared and replaced natural wetlands. The new

hydrographic network created by economic activities – water reservoirs, channels, collection and irrigation-waste lakes, and associated water ecosystems – is not yet fully assessed. But it is clear that these sites play a very important role in supporting wetland biodiversity. Considering a new role for secondary irrigation-waste lakes as the basis for the development of a fish farming economy, for recreation and for biodiversity protection, a study is needed to estimate their potential use for wetland management (hunting, fishing, musk rat production, preparation of rough forages etc.) and biodiversity protection through the development of environmentally friendly initiatives. Many of these wetlands are Important Bird Areas (IBA) in Uzbekistan and these sites, and their waterbird and wetland communities, now need to be protected. The designation of such protected areas is justified at a national level as the White-headed Duck is listed in the Uzbekistan Red Data Book (2003). Such measures are also needed under the various international treaties which Uzbekistan has signed in recent years – CMS (1998), Ramsar Convention (2001), AEWA (2004) and CBD (2005).

ACKNOWLEDGEMENTS

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BLUE DUCKS DEMAND, AND GET, GREATER ATTENTION

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It is looking a little blue for Blue Ducks *Hymenolaimus malacorhynchos* in New Zealand. Despite concerted conservation effort over the past two decades, the conservation status of the species has worsened (TWSG News 14: 8-9) and declines in some key South Island populations have not been arrested. It has been the declines of important populations in two large National Parks (Kahurangi and Fiordland) at either end of South Island that have really sounded alarm bells and forced a major rethink of where conservation effort should be directed.

In 2003, the New Zealand government announced its 'Operation Ark' initiative. This was a response to the periodic irruptions of House Mouse *Mus musculus* following mast seeding of southern beech trees *Nothofagus* sp. and the resulting plagues of their principal predator, the Stoat *Mustela erminea*. Stoats become so abundant, and then so hungry, that several species of hole-nesting forest birds, along with Kiwi and Blue Ducks, suffer catastrophic levels of predation on both nesting adults and their young. 'Operation Ark' will see a number of key forest valleys throughout South Island fortified by extensive lines of traps backed up by an equally extensive network of bait stations which will dispense mammal-specific toxic food pellets. Blue Duck is one of the three main bird species at which this protection is aimed.

Lowering predation impact in a few valleys in the worst years is not enough, however. Setting video cameras at Blue Duck nests to monitor their outcomes has shown that Stoats are a major problem, even when at very low densities, and that a so-called mammalian herbivore, the Australian Common Brushtail Possum *Trichosurus vulpecula* also has a real taste for eggs. Rats *Rattus* sp. too visit nests, but have not yet been seen to actually break and eat an egg, while a native rail, the Weka *Gallirallus australis* is a further occasional egg stealer.

A full review of the Blue Duck recovery programme was completed at the end of 2004 and the resulting report pulled no punches and was critical of the prolonged focus on habitat quality issues at the expense of dealing with the predation impact. The report recommended a pulling back from numerous small conservation attempts on small populations in favour of concerted management at only five sites, each site to embrace about 50 pairs within 2-4 adjacent river catchments. Three South Island and two North Island sites were identified within which the primary focus will be to reduce all known mammalian predators to almost undetectable levels of abundance and monitor the resulting response of the Blue Ducks. This redirection of effort has now been accepted as the focus of Blue Duck conservation efforts for the next decade.

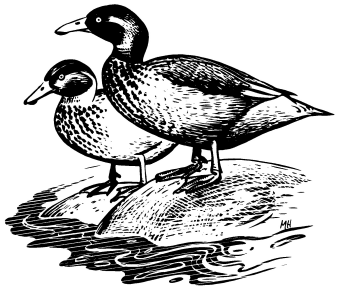
While this change of management focus and intensity has not been greeted with warmth by everyone, there is some support for the approach from work within one North Island national park, Te Urewera. Within this park a central 3000 ha area of forest is deluged with traps and toxic baits targeting every known mammal that intrudes its hoof or paw into the site. Initially this work was for the benefit of a rare endemic wattlebird, the Kokako *Callaeas cinerea*, but the

response of all native fauna within this forest has been astounding. Blue Ducks on a river within this defended area have proliferated and their densities are now akin to that reported by some of the early European explorers 150 years ago. From this defended area, young Blue Ducks are dispersing to settle on nearby rivers where they haven't been seen for some time. They are dispersing within and beyond a surrounding 20,000 ha area of forest and waterways in which predator control is not as intensive but seemingly efficient enough to allow the ducks to settle and breed successfully.

Does this mean that habitat issues will be disregarded in the years to come? Possibly so, but it is hard to see them being totally ignored when selection of new sites for population establishment or enhancement are considered. Part of this new conservation strategy will see birds raised in captivity being released to augment existing populations, especially on those rivers or streams that are presently on the edge of the new management sites and which are somewhat under-populated. While the ability to establish effective predator control at these sites will drive their initial selection, assessment of habitat quality will still play a role in the decision-making process.

It is a fairly radical switch in direction, and the retraction of effort to just five sites is uncomfortable for many with a long history of involvement with their cherished local population. Some of these small populations will undoubtedly perish as a consequence, and that will be hard to accept. This change of focus reflects the growing belief that the fundamental driver of all faunal declines in New Zealand is predation by introduced mammals, and that the war against them cannot be fought piecemeal and everywhere.

For further information see:
Operation Ark
www.beehive.govt.nz/ViewDocument.aspx?DocumentID=19425
Blue Ducks
www.biodiversity.govt.nz/news/media/current/03feb05.html



A SURVEY OF MADAGASCAR TEAL AND OTHER WATERBIRDS IN NORTH-WEST MADAGASCAR, NOVEMBER-DECEMBER 2003

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INTRODUCTION

The Madagascar Teal *Anas bernieri* is currently classified as Endangered by IUCN. The species distribution is limited to the west coast of Madagascar, and although population size and distribution are not accurately known, both are suspected to be declining – the most recent population estimate is 1,500-2,500 (Delany & Scott 2002). It has been implied that this Teal was once more widespread prior to European arrival in the late 16th Century but Young (2002) has suggested that, while aridification of the southwestern portion of Madagascar has been responsible for declines of waterbird populations in general, Madagascar Teal has always had a small, localised population on Madagascar's west coast.

Ecologically Madagascar Teal is an interesting species capable of living in a diverse range of habitats such as marshes, mangroves, dense deciduous forest, open water and in herbaceous savannah, especially areas characterised by grasses *Hyparrhenia* and *Heteropogon*. However, the species is mostly associated with coastal mangrove forest, bays, estuaries and shallow saline wetlands on the land-side of the mangroves.

Madagascar Teal show a seasonal distribution moving into coastal areas to breed during the wet season (December-March). All breeding areas discovered to date have been in the coastal strip dominated by Grey Mangrove *Avicennia marina*. Breeding ecology is not yet fully understood and the only research published concerns captive specimens at Jersey Zoo where first breeding only occurred as recently as 1998. Young (2002) postulated that the Madagascar Teal, a hole-nester, has always been restricted to mangroves for breeding (extensive mangrove is only found on the west coast of Madagascar). The degree of interspecific competition for suitable nest-cavities, and the level of territoriality, are not known but several diverse animals in western Madagascar including Comb Duck *Sarkidiornis melanotos*, parrots *Coracopsis* sp. and nocturnal lemurs (*Lepilemur* sp. and *Cheirogaleus* sp.) require cavities for either reproduction or shelter. Hole-occupying lemurs, very common in most forest types, are absent in mangrove, as is the large, voracious, predatory Fossa *Cryptoprocta ferox* – an arboreal mammal that routinely seeks out hole-dwelling lemurs.

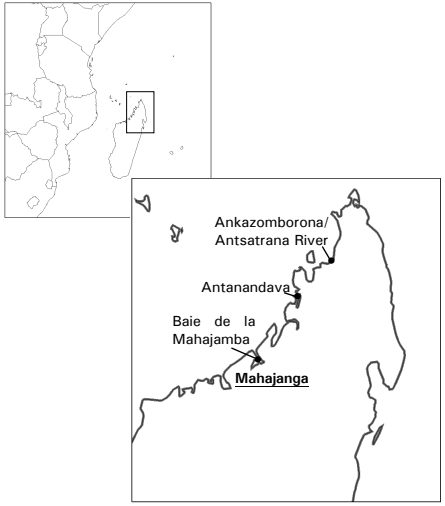
As with all cavity-nesting wildfowl, Madagascar Teal require a primary excavator or a process to create the tree cavities. In Madagascar there are no woodpeckers (principal excavators of duck nest holes: see Kear 2003) or hornbills, and only three species of parrot. The ecological niche otherwise filled by the woodpecker family is represented in Madagascar by the insectivorous Aye-aye *Daubentonia madagascariensis*; however, this lemur is not a cavity creator and cavity creation relies largely on naturally occurring actions and decomposition processes. Throughout the tropics, in areas subject to seasonal storms and hurricanes, damage to tree limbs is substantial. The further actions of fungi, termites and ant

species (*Isoptera* and *Formicidae* respectively) on storm-damaged trees will inevitably lead to the formation of cavities of varying dimensions.

In Madagascar, mangrove and coastal forest are afforded little or no national protection. Due the over-exhaustion of the land there is a steady human migration from the High Plateau to coastal regions and this has influenced local Malagasy traditions to the detriment of the habitats in the low country. Freshwater systems have been further heavily influenced by extensive rice cultivation, rice being Madagascar's major produce; despite being shallow and muddy, rice paddies appear unsuitable for Teal.

Young's (2000) hypotheses on Teal habitat choice, that the species is principally a bird of coastal mangrove and adjacent areas, required testing in the field. This study represents a preliminary venture into one area of western Madagascar in order to evaluate sites with a view to overcoming potential logistical problems ahead of more in-depth fieldwork. Three separate areas in north-west Madagascar – Baie de la Mahajamba and Sofia Bay (15°23'S 47°06'E), Antanandava (14°06'E 48°00'E) and Ankazomborona and Antsatrana River (13°23'S 48°46'E) (Figure 1) – were visited to provide an insight into their suitability for future research. Numbers of other threatened waterbird species were recorded during the visits.

Figure 1. Madagascar Teal: survey sites Nov-Dec 2003.



METHODS

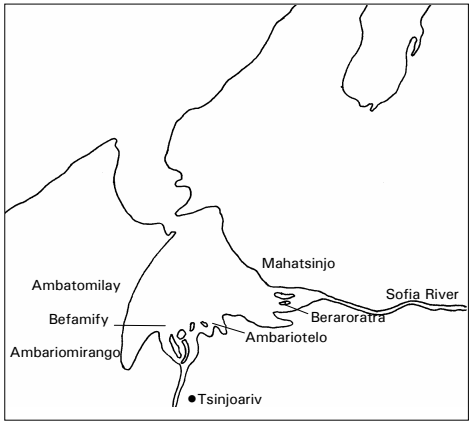
The Baie de la Mahajamba was surveyed over seven days 23–29 November 2003, Antanandava on 4 December and Ankazomborona over two days 6–7 December. Surveys were conducted on foot and by pirogue (a type of boat). Pirogue surveys were more commonly used as they permitted a greater area to be covered. All waterbirds and birds of prey were recorded using 10x42 binoculars. For key species, namely Madagascar Teal, Madagascar Heron *Ardea humbloti*, Madagascar White Ibis *Threskiornis bernieri* and Madagascar Fish-eagle *Haliaeetus vociferoides*, the stationary silhouette and the flight patterns were discernable even if the colouration was not. Throughout the surveys, pirogues were powered by a boatman leaving the two-strong team to conduct the census.

Foot surveys were conducted at two areas inaccessible by pirogue, i.e. within mangroves stands (in deep mud): in the mangroves east of the River Antsatrana and those west of Ankazomborona. The area surveyed on foot was considerably less than that conducted from a pirogue due to restricted visibility within the mangroves and difficulty in moving. All waterbird species observed were recorded and times and state of the tide noted – surveys were generally timed to coincide with low tides as the period of greatest avian activity within areas of tidal influence.

RESULTS

Madagascar Teal were found in southern and eastern areas of Baie de la Mahajamba (Figure 2) and at Ankazomborona; no Teal were observed at Antanandava. Individuals in Baie de la Mahajamba were observed on mudflats, either in the actual bay or on smaller mudflats within the mangrove system (Table 1).

Figure 2. Baie de Mahajamba, north-west Madagascar.



The greatest number of Teal (79) was observed on a single expansive mudflat in the south-east of the Bay. The majority were observed during ebb to low tide, with the fewest present during flood to high tide.

In Baie de la Mahajamba 110 individuals were counted and within the mangroves of Ankazomborona 46 were counted; interestingly, all here were at or around stagnant pools within the mangrove system.

Table 2 shows the survey results for the Madagascar White Ibis. These were encountered in relatively small numbers, the most (19 individuals) being recorded at Antanandava.

Only four Fish-eagles were recorded, all in Baie de la Mahajamba.

Madagascar Heron was the only key species observed in all three study areas; nine were counted with no more than two birds present in any given survey. The tidal state did not appear to influence presence or activity.

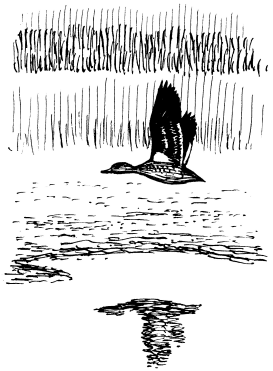


Table 1. Madagascar Teal observed in Baie de la Mahajamba and Ankazomborona area, north-west Madagascar, Nov-Dec 2003.

Area	Tidal state	Number observed
Baie de la Mahajamba		
Tsinjoarivo - Ambariotelo	flood	17
Ambariotelo - Mahatsinjo	high - ebb	6
Mudflats in south-east of Bay	ebb - low	79
Ambariomirango	low - flood	8
Total		110
Ankazomborona		
River Antsatrana - Ankazomborona	flood - high	3
Within mangroves at Ankazomborona	low	43
Total		46
Grand Total		156

Table 2. Madagascar White Ibis observed in Baie de la Mahajamba and Antanandava, north-west Madagascar, Nov-Dec 2003

Area	Tidal state	Number observed
Baie de la Mahajamba		
Ambariotelo - mouth of Sofia	high - ebb	13
Mahatsinjo - mouth of Sofia	low - flood	6
Mahatsinjo - Befamify	high - ebb	4
Ambatomilay	ebb - low	3
Ambatomilay - Tsinjoarivo	high - ebb	1
Total		27
Antanandava	high - ebb	19
Grand Total		46

DISCUSSION

In Baie de la Mahajamba, 110 Teal were counted and we estimated the population for this area at approximately 150-200 birds. All observations were of pairs or small loose flocks consisting of paired birds foraging in open areas. The mudflats in the centre of the bay appeared to be particularly favoured feeding grounds: areas that were only exposed during the low tide and were submerged rapidly with the onset of the flood tide providing the birds with only a brief period (approximately two hours) of foraging time.

No Teal were found in the western section of Baie de la Mahajamba. Sections of the area were surveyed during each stage of the tidal cycle but no birds were sighted. Reports from the local fishermen confirmed that Teal were not a common species in the area but that there used to be many especially on the mudflats in the south-west area of the bay. Reasons for their current absence, or why the birds have left the area, are unclear.

Madagascar White Ibis were observed solitarily during all stages of the tidal cycle (Table 2). During high tide individuals were observed preening and resting, often in dead mangrove trees, and on an ebbing tide individuals began foraging and continued until the subsequent flooding tide would force them to retreat. On one occasion, in Antanandava, Ibises were observed in a loose flock of ten birds foraging in mangrove during the ebbing tide.

The greatest number of Ibis encountered on any single survey, not including the aforementioned loose flock, was 17 individuals. These birds were distributed as singletons across an extensive network of mudflats in the south-east area of Baie de la Mahajamba. The only reports received from local fishermen concerning Ibis breeding suggested that nesting occurs on an 'island' of mangrove in the Antanandava area and it was within this stand of mangroves that the flock of ten was seen.

Madagascar Fish-eagle as expected was encountered only rarely. They were absent from two sites, Ankazomborona and Antanandava, and in Baie de la Mahajamba there were an estimated three pairs (Table 3) although evidence of breeding was not discovered. The observed birds were all in the eastern section of the bay except for a solitary individual in the Mahajamba estuary. The reason for this is not clear although the eastern section offered larger expanses of water surface which would perhaps provide a greater hunting opportunity.

Madagascar Heron were observed at all sites and during all stages of the tidal cycle (Table 4); demonstrating an ability to utilise a variety of habitats including freshwater in the River Mahajamba near Tsinjoarivo, and coastal habitats. Birds were seen foraging in the mangrove channels, on mudflats in sheltered bays and on coastal mud/sand banks. There was, however, no evidence of breeding, all birds observed foraging singly or resting at the water's edge.

It should also be noted that exceptionally high numbers of Crab Plover were present, some 993 at Ankazomborona exceeded the 1% threshold of 700 used to identify sites of international importance for this species under the Ramsar Convention (Delany & Scott 2002).

Appendix 1 gives total numbers of all bird species seen during the expedition.

Table 3. Madagascar Fish-eagle observed in Baie de la Mahajamba, north-west Madagascar, Nov 2003.

Area	Tidal state	Number observed
Ambatomilay	ebb - low	3
Tsinjoarivo	flood	1
Grand Total		4

Table 4. Madagascar Heron observed in Baie de la Mahajamba, Antanandava and Ankazomborona areas, north-west Madagascar, Nov-Dec 2003.

Area	Tidal State	Number observed
Baie de la Mahajamba		
Mahatsinjo - mouth of Sofia	low - flood	2
Ambatomilay	ebb - low	2
Ambatomilay - Ambariotelo	high - ebb	1
Tsinjoarivo	ebb	1
Total		6
Antanandava	flood	1
Ankazomborona	ebb - low	2
Grand Total		9

Threats to key species are unclear. Localised mangrove felling (predominantly of Red Mangrove *Rhizophora mangle*, destined for Mahajanga) was noted. This was, however, localised and only witnessed in the western part of Baie de la Mahajamba. In several areas there was also evidence of disturbance to colonial nest-sites, and egrets (*Egretta* and *Bubulcus*) seemed to be particularly targeted. Within these areas sections of mangrove had been felled in order to rob the nests of egrets. The main areas of such activity were between Befaroratra and Ambatomilay in the east of Baie de la Mahajamba.

Fishing for both shrimp and fish was evident at all sites. Within Baie de la Mahajamba fishermen could be observed at all stages of the tide in all habitats fishing with gill-nets and hook-and-line. Crab collecting, typically of large mangrove-inhabiting species, was a further source of income for the local human population and disturbance caused through crab collection may be an important aspect in the breeding success of Teal.

Shrimp fishing in the Ankazomborona area was exceedingly prominent; the coastline was, almost literally, swept daily for planktonic shrimp. This activity appears not to disturb many bird species in the area, e.g. Whimbrel *Numenius phaeopus* and Crab Plover *Dromas ardeola*, while some, e.g. terns *Sterna* sp. and Frigate-birds *Fregata* sp. actually appeared to benefit from the harvest.

CONCLUSIONS

The population of Teal observed in Baie de la Mahajamba and in the mangroves of Ankajamborona was estimated at approximately 150-200 individuals for each site. The actual population of Teal at Ankazomborona may be higher than this as the area is large and there are stands of dense mangrove that potentially harbour more individuals. Due to Teal migration into breeding habitat they were naturally encountered less frequently. The visual field for the surveyor was also considerably reduced in comparison to estuarine mud flats. Local accounts reveal the area as an important Teal breeding ground and the prominent presence of paired birds makes this an area a high consideration for potential research into the reproductive ecology of the species.

ACKNOWLEDGEMENTS

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Appendix 1: Combined bird counts from all sites.

Species		Baie de le Mahajamba	Antanandava	Ankazomborona
White-faced Whistling Duck	*Dendrocygna bicolor*	97	-	225
Comb Duck	*Sarkidiornis melanotos*	11	-	60
Madagascar Teal	*Anas bernieri*	104	-	51
Long-tailed Cormorant	*Phalacrocorax africanus*	19	-	-
African Darter	*Anhinga rufa*	1	-	-
Greater Frigate-Bird	*Fregata minor*	-	-	2
Lesser Frigate-Bird	*Fregata ariel*	-	-	8
Black-crowned Night Heron	*Nycticorax nycticorax*	4	-	-
Cattle Egret	*Bubulcus ibis*	43	206	-
Striated Heron	*Butorides striatus*	111	-	69
Black Egret	*Egretta ardesiaca*	88	13	91
Dimorphic Egret (white)	*Egretta dimorpha*	154	28	65
Dimorphic Egret (blue)	*Egretta dimorpha*	107	24	44
Great Egret	*Ardea alba*	50	5	38
Purple Heron	*Ardea purpurea*	3	1	1
Grey Heron	*Ardea cinerea*	9	-	2
Madagascar Heron	*Ardea humbloti*	5	1	2
Yellow-billed Stork	*Mycteria ibis*			1
Madagascar White Ibis	*Threskiornis bernieri*	27	19	-
Glossy Ibis	*Plegadis falcinellus*	8	6	-
African Spoonbill	*Platalea alba*	9	-	6
Yellow-billed Kite	*Milvus aegyptius*	108	-	-
Madagascar Fish-eagle	*Haliaeetus vociferoides*	4	-	-
Madagascar Harrier-hawk	*Polyboroides radiatus*	2	-	-
Madagascar Buzzard	*Buteo brachypterus*	1	1	5
White-throated Rail	*Dryolimnas cuvieri*	40	-	-
Crab Plover	*Dromas ardeola*	4	6	993
Black-winged Stilt	*Himantopus himantopus*	-	-	38
Greater Ringed Plover	*Charadrius hiaticula*	1	-	-
Madagascar Plover	*Charadrius thoracicus*	3	-	16
White-fronted Plover	*Charadrius marginatus*	-	-	6
Lesser Sand Plover	*Charadrius mongolus*	-	-	6

Species		Baie de le Mahajamba	Antanandava	Ankazomborona
Greater Sand Plover	*Charadrius leschenaultii*	-	-	2
Grey Plover	*Pluvialis squatarola*	15	14	42
Bar-tailed Godwit	*Limosa lapponica*	3	-	-
Whimbrel	*Numenius phaeopus*	175	101	627
Eurasian Curlew	*Numenius arquata*	2	-	16
Marsh Sandpiper	*Tringa stagnatilis*	-	-	2
Terek Sandpiper	*Xenus cinereus*	4	-	149
Common Sandpiper	*Actitis hypoleucos*	113	51	610
Ruddy turnstone	*Arenaria interpres*	-	-	4
Sanderling	*Calidris alba*	6	29	169
Caspian Tern	*Sterna caspia*	1	-	103
Lesser Crested Tern	*Sterna bengalensis*	131	-	-
Roseate Tern	*Sterna dougalli*	32	-	7
Saunder's Tern	*Sterna saundersi*	23	-	-
Common Tern	*Sterna hirundo*	19	-	234
Greater Vasa Parrot	*Coracopsis vasa*	142	-	-
Lesser Vasa Parrot	*Coracopsis nigra*	166	-	2
Grey-headed Lovebird	*Agapornis canus*	49	-	-
Madagascar Malachite Kingfisher	*Alcedo vintsioides*	48	3	-
Pied Crow	*Corvus albus*	29	-	-

CONSERVATION OF ANDAMAN TEAL

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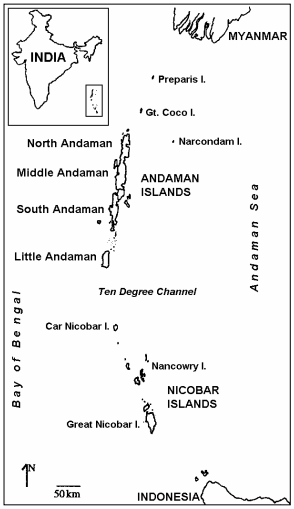
INTRODUCTION

The Andaman Teal *Anas gibberifrons albogularis*, once abundant, has always been restricted to the Andaman Islands, a group of oceanic islands in the Bay of Bengal in India (Figure 1). This endemic species (Fullagar 2005) has traditionally been considered a sub-species of the Australasian Grey Teal *Anas gracilis*, and it has long been considered globally endangered at the sub-species level (Anon. 2001). This species is the only threatened endemic duck in India, with the exception of the Pink-headed Duck, which is believed to be extinct. The Andaman Teal inhabits freshwater streams, ponds, swamps and brackish water swamps, tidal creeks and estuaries (Ali & Ripley 1987; Green 1992). This species has three closely related taxa also distributed in the islands and Australasia (Howard & Moore 1991) of which one (*A. g. remissa*) is considered extinct (Green 1992). The Andaman Teal is considered a priority species requiring immediate attention and conservation action (Rao 1989; Vijayan 1996; Vijayan *et al.* 2000; Vijayan in press). Hence, a study was conducted during 1995-98 to determine the status of the Andaman Teal and understand its biology with emphasis on the ecological requirements. Another rapid survey was undertaken recently (2003-04) to assess the status.

STUDY AREA

The study was conducted in the Andaman and Nicobar Islands (6°45′ to 13°41′N and 92°12′ to 93°57′E) (Figure 1). Surveys were conducted in four main areas, namely North (1,348 km^2), Middle 1,070 km^2), South and Little Andaman (3,990 km^2 combined).

Figure 1. Study area: Andaman and Nicobar Islands, India



The approximate area of forests and wetlands surveyed in each of the four areas was 87 km^2, 42 km^2, 130 km^2 and 39 km^2, respectively. Although more localities were surveyed during 2003-04 for general bird counts, five sites with Teal records could not be covered. Most Teal localities were covered in summer (as these birds concentrate at this time of year at specific locations) with the exception of Dhaninala (Rutland) which was surveyed in winter.

Table 1. Number of Andaman Teals counted during the surveys in the Andaman Islands (*not surveyed)-

		1995-98		2003-04
Place		**Min**	**Max**	**Max**
North Andaman				
1	Paschim Sagar	4	4	0
2	Shearme Island	1	1	*
3	Interview Island	0	46	14
4	North Reef Island	3	33	26
5	Mohanpur	6	28	4
6	Hanspuri	12	24	*
Middle Andaman				
7	Kadamtala	0	15	12
8	Betapur	0	55	1
South Andaman				
9	John Lawrence Island	0	107	*
10	Constance Bay (Jarawa Reserve)	7	7	410
11	Dhaninala (Rutland)	30	230	110
12	Redskin	0	7	0
13	Dhanikari Reservoir	0	1	76
14	Sippighat	0	4	0
15	Katakatchang	0	6	0
16	Sonapahar Reservoir (Jarawa Reserve)	*	*	18
Little Andaman				
17	At km 6	0	6	0
18	At km 2	0	2	0
19	Jackson creek	6	6	*
20	Vishnunala Dam	0	0	3
Total		69	582	674

RESULTS AND DISCUSSION

Population and distribution

Some 20 sites held Teals in 1995-98 or 2003-04 (Table 1). Constance Bay (Jarawa Reserve), Dhaninala (Rutland) and Dhanikari Reservoir held the majority of birds in 2003-04. Four sites, namely Dhaninala, John Lawrence Island, Betapur, Interview Island and North Reef Island, held fewer Teal in 2003-04 than during previous surveys. Fluctuation in numbers was very high because of local movements and the counts were not simultaneous, hence it was difficult to get a realistic population estimate. Taking the maximum number counted at each location during the two studies, the totals seen were 582 and 674 during 1995-98 and 2003-04, respectively. The population of the Andaman Teal was previously estimated at between 500 and 600 (Vijayan 1996; Vijayan *et al.* 2000)

and it seems that this estimate remains valid after the recent survey. However, a detailed and long-term study is required involving population counts along with banding and telemetry techniques to gain a better picture of the status of this species.

Ecology

Habitat

Andaman Teal used a variety of habitats at different times. Feeding locations in summer were shallow areas with sparse vegetation, whereas during the breeding season (autumn) they foraged among reeds, *Phragmites karka* and *Scirpus* sp., with thicker cover nearer to the nest. Teal were found loafing in open water or resting on wooden logs, mounds, small trees, or bushes in water or on the banks and mud banks (Vijayan *et al.* 2000). Teal were in single species flocks or mixed flocks with the Lesser Whistling-duck *Dendrocygna javanica*. Detailed analysis comparing feeding and non-feeding sites showed that insects and small molluscs in the soil were crucial factors in determining feeding locations for Teal (Vijayan in press).

Food

Molluscs and arthropods formed the major part of the Andaman Teal's diet. Seasonal differences in food were observed: a higher proportion of animal food (88%) was found in the diet in summer than during the monsoon (60%), similar to observations of Grey Teal in North Queensland (Lavery 1971; Lavery 1972). Andaman Teal was previously recorded as mostly vegetarian, feeding also on invertebrates (Ali & Ripley 1987).

Breeding

Altogether 13 nests were found in two locations during 1997 and 1998, six at Mohanpur and seven at Hanspuri; birds were apparently breeding at 10 further sites but nests could not be located. Nesting was found from July to October with a variation in the peak, depending on the monsoon. The nest is a platform of grass or reed mat 20-35 cm above water among the reeds, 20-50 cm from open water. Nesting pools were 20-50 cm deep, mainly brackish and located in coastal areas, 50-100 m from the high tide line. All these wetlands had natural or man-made bunds for collecting rainwater which reduced salinity. This species selected a nesting site based on optimum water levels and availability of food for the young, as found in many other studies (Sridharan 1989; Vijayan 1991; Svingen & Anderson 1998). Nesting success was high during the study (85%) as there were very few predators. However, poaching of eggs by humans and predation by Water Monitor Lizards were the major causes of egg loss. Predation by raptors may also occur. Parents with ducklings spent most of their time in thick vegetation, coming into open water with sparse vegetation only for very short periods.

Conservation perspectives and recommendations

The rarity of a species with a small distribution and a declining population, as is the case for many island endemics, is the most important issue in the conservation of the Andaman Teal. This bird is hence considered as endangered (Anon. 2001). Historically there was a drastic decline in the population of this species, mainly because of habitat loss due to reclamation of wetlands, over-hunting and poaching of eggs (Abdulali 1964; Kear & Williams 1978). An accurate population estimate for this species is still lacking. Long-term monitoring and information on the extent of wetlands are very desirable for the management of the species and the sustainable utilisation of wetland resources. Although the species is legally protected under the Wildlife (Protection) Act 1972, very few of the Teal habitats are within protected areas. Lack of awareness of the status of this species and the value of wetlands to the local

population has been the major conservation problem (Vijayan *et al.* 2000). Site-specific recommendations for the conservation of the rare endemic avifauna of the Andaman Islands, especially the Andaman Teal (Vijayan *et al.* 2000; Vijayan in press), include:

1. Declaring Dhaninala and the surrounding areas in Rutland Island as an Andaman Teal Sanctuary.
2. Providing increased protection to a few sites, namely John Lawrence and Henry Lawrence Islands in Jhansi Rani Marine National Park, South Andaman, and Jackson Creek, Little Andaman.
3. Declaring Mohanpur and Hanspuri (North Andamans), and Katakatchang and Sippighat-Bimblitang (South Andaman) as 'Andaman Teal Conservation areas'.
4. Wetlands, both freshwater and brackish water, have not been given proper attention, and hence need extensive surveys and studies for their conservation and management.

ACKNOWLEDGEMENTS

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SCALY-SIDED MERGANSER SURVEYS IN PRIMORYE, RUSSIA, 2003-05

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ABSTRACT

Surveys for pairs and broods of Scaly-sided Mergansers *Mergus squamatus* took place in the Primorye in 2003-05. In 2003, 19 rivers were surveyed: low densities (less than 0.1 pairs/km) occurred along four rivers, medium densities (0.1-0.3) along 11 rivers, and high densities (>0.3) along four rivers. River size, mountain slope, human population, visual estimate of broadleaved forest and water transparency did not explain breeding density. Low densities on upper and lower reaches, and high densities on middle reaches, characterize the Scaly-sided Merganser's distribution. The spring population consisted of 32% adult males, 41% adult females, 7% subadult males, 6% subadult females, 3% non-breeding subadult males, and 11% non-breeding subadult females. Brood density was correlated with breeding pair density in the Kievka basin ($R_P = 0.908$) during 2000-05.

INTRODUCTION

The Scaly-sided Merganser is among the rarest seaducks in the Old World. The world population is poorly known and was estimated as 2,400–4,500 individuals in the 1990s, and at least 10,000 in the early 2000s (Hughes & Hunter 1994; BirdLife International 2001; Shokhrin & Solovieva 2003). The majority of the breeding population occurs in the Primorye (BirdLife International 2001). The breeding population of the Sikhote-Alin mountain range declined significantly during the 1960s to the early 1980s when numbers started to stabilize and even slightly increased in early 1990s (Kolomiytsev 1992; Bocharnikov & Shibnyev 1994). The Scaly-sided Merganser is included in the Red Data Books of IUCN, Russia (category 3 – rare), China and South Korea. This cavity-nesting duck inhabits clean fast mountain rivers fringed with old broadleaved forest.

This paper presents up-to-date results of annual breeding surveys along the rivers of the Primorye. The sex and age structure of the breeding population is also described.

STUDY AREA AND METHODS

Spring surveys for breeding Scaly-sided Mergansers were conducted in 2003-05 with summer surveys for broods conducted in 2002-05. Large-scale surveys took place in spring 2003 (Table 1, Figure 1). In some years we surveyed various other rivers in the Southern Primorye in order to study annual fluctuations in breeding numbers (Tables 1 & 2). Rivers under investigation ranged between 40 and 450 km in length and were situated on both slopes of the Sikhote-Alin Range. We distinguish between large and small rivers, those shorter than 60 km being considered as small. All large rivers of the east slope are independent and flow into the Sea of Japan while all large rivers of the western slope are tributaries of the Ussuri River; no small rivers were surveyed on the west slope. Short rivers were completely surveyed while large rivers were only surveyed in part.

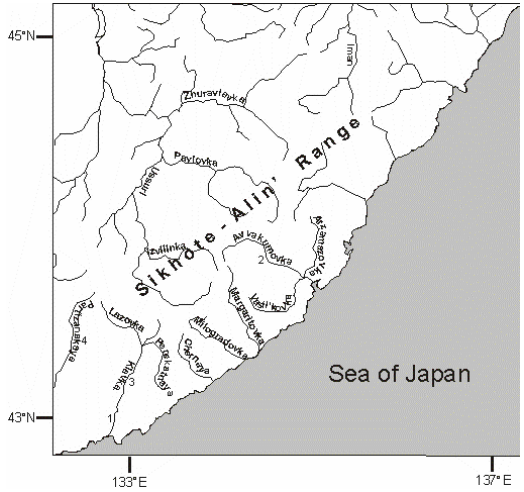
Table 1. Survey dates and length of rivers surveyed during Scaly-sided Merganser breeding surveys in the Primorye, Russia.

River	Survey length	2003	2004	2005
Avvakumovka	52 km	19 Apr	17-18 Apr	26-27 Apr
Alexeevka	10 km	16 Apr		
Arzamazovka	35 km	20-21 Apr		
Benevka	12 km	09 May	15 Apr	
Chernaya	25 km	27 Apr		
Izvilinka	6 km	24 Apr		
Iman	16 km	30 Apr		
Kievka	83 km	13-15 Apr	12-14 Apr	16-18 Apr
Krivaya	10 km	15 Apr	15 Apr	23 Apr
Lazovka	18 km	14 Apr	12 Apr	16 Apr
Margaritovka	15 km	17 Apr	21 Apr	28 Apr
Milogradovka	12 km	17 Apr		
Mineral'naya	15 km	18 Apr		
Partizanskaya	34 km	16 Apr		
Pavlovka	51 km	23 Apr		
Sergeevka	7 km	16 Apr		
Ussuri	20 km	24 Apr		
Vasilkovka	36 km	20-21 Apr	19-20 Apr	
Zerkal'naya	40 km	22 Apr		
Total (km)		**497**	**226**	**178**

Table 2. Survey dates and length of rivers surveyed during Scaly-sided Merganser brood surveys in the Primorye, Russia. Numbers in brackets after each date are the length of river surveyed in km.

River	2002	2003	2004	2005
Avvakumovka		16-17 July (52)		
Benevka	mid July (12)	12 July (12)		
Chernaya	mid July (25)	8 July (25)		18 July (14)
Kievka	mid July (75)	28 Jul-5 Aug (81)	16-27 July (83)	7-10 July (83)
Krivaya	mid July (12)	15 July (10)	27 July (12)	10 July (12)
Lazovka	mid July (12)	13 July (18)	25 June (18)	6 July (18)
Margaritovka	mid July (20)	15 July (15)		
Perekatnaya	mid July (25)	10-11 Aug (25)		20 July (25)
Ussuri		19 July (20)		
Total (km)	**181**	**258**	**113**	**152**

Figure 1. Scaly-sided Merganser study area in the Primorye, Russia. Small rivers are numbered: 1 - Krivaya; 2 - Mineral'naya; 3 - Benevka; 4 - Sergeevka.



The combined method of rubber boat and foot survey was used (Kolomiytsev 1990) and counts were started soon after the Scaly-sided Merganser's arrival and river ice break-up. Brood counts were conducted in the time prior to fledging (survey methods are described in detail in Shokhrin & Solovieva 2002). Breeding density was estimated as the number of breeding pairs per kilometre of river. Pairs, trios (male and two females) and single males were all considered to represent breeding pairs (families) during spring surveys. A single female was considered a breeding pair only when it had a large abdomen, indicating egg laying, and if no single male was reported within the nearest 3 km.

We distinguished between adult and subadult (one- and two-year-old) males according to their plumage. Additional females in trios were considered to be subadults, thus each trio includes a male, an adult female and a subadult female with all of them presumably breeding. The position of some nests close to conspecifics (minimum distance 25 m), nest parasitism, and direct observation of female nest change-over suggested that both females in a trio make nesting attempts (Solovieva *et al*. 2005). Flocked females were considered to be subadult non-breeding females and all birds from mixed flocks of subadult males and females were considered non-breeders. Brood density was estimated as number of broods per kilometre of river.

In spring 2003, water transparency and broadleaved forest quality were evaluated during surveys. Water transparency was measured using a 24 cm secchi disc. Water depth did not allow for full disappearance of the secchi disc, so we estimated transparency as two grades: Grade 1 – absolutely clean water, where no changes in the secchi disc appearance occurred during submerging to bottom; Grade 2 – if black and white sectors of the disc did not appear clear when on the bottom. Forest quality within 50-100 m of the river was estimated for each kilometre of river: Grade 4 – floodplain never subjected to logging; Grade 3 - bank covered by solid young forest with a high percentage of old-grown trees; Grade 2 - solid young forest with rare old-grown trees; Grade 1 - fields with small forest patches; Grade 0 - totally deforested agricultural areas and roads. Data were analysed with Statistica 99 software.

RESULTS

During spring surveys a total of 334 adult mergansers were counted in 2003, 45 of which were in flocks; in 2004 we counted 203 birds with no flocks; and in 2005 126 birds with 13 birds in flocks. The majority of the spring population were paired territorial birds, considered to be breeding pairs although their actual nesting status is unclear.

Breeding density

Breeding pair densities differed between rivers. Low densities (less than 0.1 pairs/km) occurred on four rivers, medium densities (0.1-0.3) on 11 rivers, and high densities (>0.3) on four rivers (Figure 2). Of the three independent river basins of the east slope, the lowest density occurred in the Partizanskaya basin (0.11±0.02), medium density in the Avvakumovka basin (0.18±0.01) and high density in the Kievka basin (0.45±0.09), although these differences were not significant. Of the rivers of the west slope, the lowest density was found on the upper reaches of the Ussuri River while some of its tributaries (Iman and Pavlovka) supported high densities. Breeding density did not differ between small (0.26±0.04) and large rivers (0.25±0.06), or between large rivers of the east (0.22±0.04) or west slope (0.31±0.06). There was no significant correlation between human population and Scaly-sided Merganser breeding density (R_P = -0.06). A negative correlation (R_P = -0.427) was found between broadleaved forest quality and merganser density. Water transparency during survey did not affect breeding density (R_P = 0.126).

Breeding distribution

Breeding pairs were not equally distributed along the rivers (Figure 3). As previously reported (Kolomiytsev 1990; Shokhrin & Solovieva 2002), we found that Scaly-sided Mergansers do not use the uppermost reaches (about 20-30 km) of any river. Middle reaches are preferred with lower reaches supporting lower densities. The Kievka River (Figure 3) can be split into three sections based on merganser breeding densities: the upper 20-40 kms, the middle 40-80 kms, and the lower part to the river mouth (approximately 105 km). We distinguished two parts of Avvakumovka River because our survey began at 35 km from the source and we missed the upper reaches. A high merganser density was found on the middle reaches, from 35-75 km from the source.

Figure 2. Scaly-sided Merganser breeding density (pairs per km) along 19 rivers of the Primorye, Russia, in 2003. Rivers are: Alexeevka, Arzamazovka, Partizanskaya, Ussuri, Chernaya, Zerkal'naya, Benevka, Izvilinka, Vasil'kovka, Mineral'naya, Lazovka, Milogradovka, Margaritovka, Sergeevka, Avvakumovka, Iman, Pavlovka, Kievka, and Krivaya.

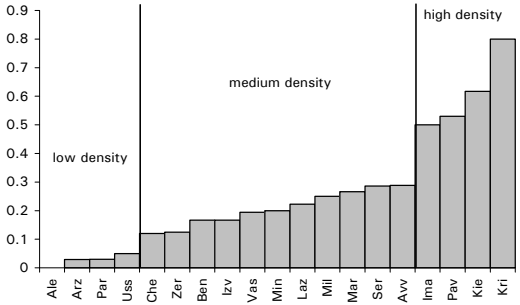
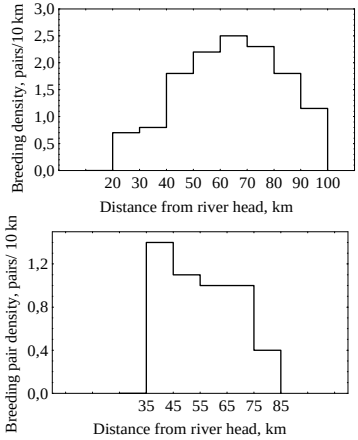


Figure 3. Scaly-sided Merganser breeding pair distribution 2003-05 along the Kievka (top) and Avvakumovka (bottom) Rivers, Primorye, Russia.



Annual variation in breeding density
Annual surveys from 2000 to 2005 showed that when numbers were higher on the Margaritovka River, numbers tended to be lower on the Avvakumovka and vice versa (Figure 4). Breeding density on the Kievka River was consistently high.

Sex-age structure of spring population
The proportion of trios in the breeding population varied between years, averaging 13% (Figure 5). In 2005 no trios were observed – all families were pairs. The spring population consisted of 32% adult males, 41% adult females, 7% subadult males, 6% subadult females, 3% non-breeding subadult males, and 11% non-breeding subadult females. Some adult females which skip nesting may be confused with non-breeding subadult females because it is not possible distinguish between female age classes. Pairs with subadult males were reported in 5.4% of cases. No trios with subadult males were observed.

Brood surveys
Brood densities along all rivers surveyed in 2002-05 are given in Table 3. Only the Kievka River with two main tributaries (the Lazovka and Krivaya) has been surveyed annually, except for spring survey 2002. Brood density correlates well with breeding pair density in the Kievka River basin (Figure 6).

Figure 4. Annual variation in Scaly-sided Merganser breeding density on the Avvakumovka, Kievka and Margaritovka Rivers, Primorye, Russia.

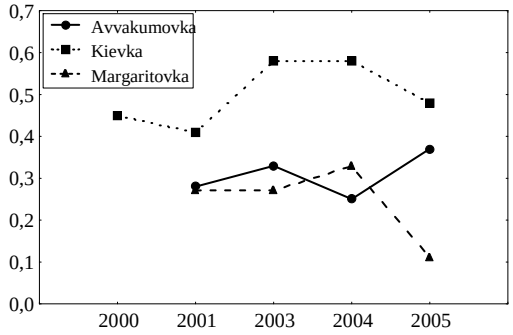


Figure 5. Annual variation in the proportion of Scaly-sided Merganser trios observed in the Kievka-River basin, Primorye, Russia, 2000-2005. The total number of family groups observed is given to the right of each bar.

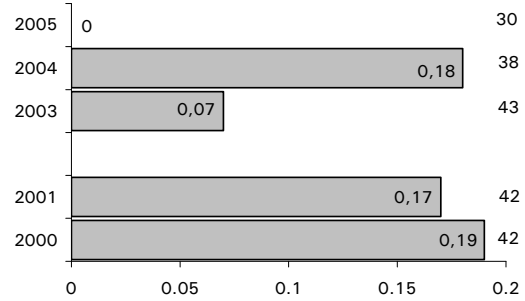
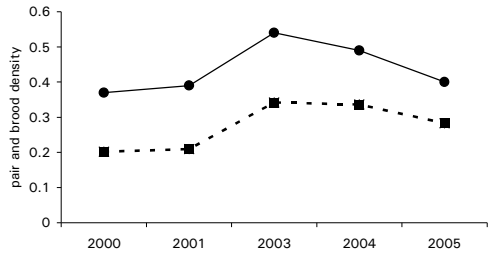


Table 3. Scaly-sided Merganser brood densities (birds/km) in the Primorye, Russia.

River	2002	2003	2004	2005
Avvakumovka		0.27		
Benevka	0.17	0.25		
Chernaya	0.04	0.08		0.14
Kievka	0.21	0.37	0.39	0.34
Krivaya	0.25	0.4	0.25	0.17
Lazovka	0.25	0.17	0.17	0.11
Margaritovka	0.2	0.13		
Perekatnaya	0.08	0.12		0.12
Ussuri		0.2		

Figure 6. Scaly-sided Merganser breeding pair (solid line) and brood density (dotted line) in the Kievka River basin (Kievka, Lazovka, and Krivaya Rivers), 2000-05.



DISCUSSION

Breeding density

The breeding density of Scaly-sided Mergansers was not related to the geographical or anthropogenic factors we measured. Although forest quality did not explain duck distribution, this was probably due to the method we used to classify forest type – which does not reflect nest site availability. Additionally, ducks live along several kilometres of river and the point at which they are first seen may lie far away from the nest. Although visual observations suggested that some rivers were less clean than others, the standard method of water transparency did not give comparable data for the shallow and relatively clean rivers of the Sikhote-Alin Range. Factors such as prey abundance, which is difficult to estimate without special investigation, probably determine merganser numbers along the rivers.

Breeding distribution

The merganser distribution observed typifies the Scaly-sided Merganser's avoidance of narrow streams and channels. Birds prefer the middle reaches of the rivers where the stream is wide and fast-flowing with frequent stony beaches. The upper part of each river is narrow, while the lower part comprises networks of narrow channels with slow currents. Future surveys in unstudied areas of the breeding range should ensure coverage of the part of the river 50-80 km from the source.

Annual variation in breeding density

As nest site fidelity is not high in the Scaly-sided Merganser (our data), the birds may use different rivers in different breeding seasons. A movement of nesting females between the nearby Avvakumovka and Margaritovka Rivers may be responsible for the negative correlation in breeding density on these two rivers. The Kievka basin, situated about 100 km away from Avvakumovka and Margaritovka, has a notable variation in breeding density between years.

Sex-age structure of spring population

The proportion of subadult birds, both males and females, in the Scaly-sided Merganser population is high. This is atypical for seaducks, in which there is normally less than 10% subadults. We suggest that recent Scaly-sided Merganser increases in the Primorye may be related to the high proportion of young birds participating in nesting. The observed number of young birds (total 27%) returning to breeding grounds the following spring suggests a high overwinter survival in recent years. The switch from freshwater breeding habitats to saltwater wintering grounds is known to cause increased mortality in juvenile seaducks. Scaly-sided Mergansers are known to winter on fresh water bodies, mainly rivers, during winter (He Fen-Qi *et al.* 2002; Duckworth & Chol 2004; Birds of Korea Website). However, a lack of past wintering data means we cannot determine if the switch from marine to river habitats occurred recently. A male-female ratio of 0.78 among adult birds seems to be typical for Siberian populations of mergansers *Mergus* sp., Common Goldeneye *Bucephala clangula* and Smew *Mergus albellus* (Pronkevich 2005).

Summer surveys for broods

In the Kievka basin we observed a pair to brood ratio of 0.62±0.04 (range 0.54–0.70). As complete nest depredation is very rare (from 21 known nests only one was depredated – our data), we therefore believe this is due to high mortality of newly-hatched ducklings (Kolomiytsev 1992; Solovieva *et al.* 2005). Predation pressure on very young ducklings seems to be similar between years.

ACKNOWLEDGEMENTS

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PHYSICAL CONDITION AND AGE STRUCTURE OF RED-BREASTED GEESE WINTERING AT DURANKULAK LAKE, BULGARIA, FEBRUARY 2005

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INTRODUCTION

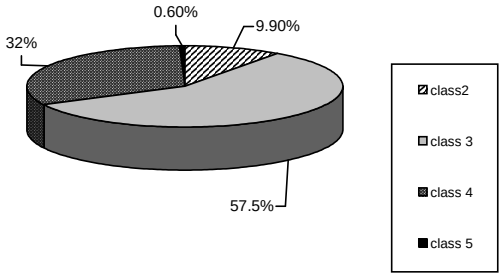
Shabla and Durankulak Lakes are known to hold up to 70% of the global population of the Red-breasted Goose *Branta ruficollis* (Kostadinova & Dereliev 2001) currently listed by IUCN as Vulnerable (BirdLife International 2000). The monitoring of the Red-breasted Goose is one of the longest running species monitoring programmes of BSPB/BirdLife Bulgaria. The species has been monitored for over nine years. The last three years' monitoring work has been supported by the Wildfowl & Wetlands Trust (WWT). Age data and physical condition (belly profiles) are gathered in foraging areas. The counts are conducted in North East Bulgaria in the area of Shabla Lake (43°34'N, 28°34'E; IBA BG49) and Durankulak Lake (43°40'N, 28°33'E; IBA BG50) each fortnight and are coordinated with similar counts in Romania and Ukraine. The geese are counted at sunrise when they leave roosting sites for their foraging grounds. Preferred foraging areas around the lakes are mapped on non-hunting days. The field studies provide baseline data for the conservation of the Red-breasted Goose in the region, including information needed for a programme of land acquisition to protect foraging grounds (funds provided by ECCONET) assisting the local authorities in enforcing conservation and hunting regulations and restrictions, and declaring the area as a NATURA 2000 site.

METHODS AND STUDY AREA

At the end of February 2005, a field study visit was conducted by a team of WWT Caerlaverock Reserve staff and BSPB staff to collect age and body profile data and conduct the coordinated count. Data were collected over a four-day period in the fields around Eagle Marsh of Durankulak Lake complex. The hunting season was over and geese were tamer and easier to approach. There were an estimated 2,500-3,500 Red-breasted Geese in the area with some 1,500-2,000 White-fronted Geese *Anser albifrons* and 10 Lesser White-fronted Geese *Anser erythropus*. During most of the winter period the numbers of wintering geese were low due to mild weather conditions and probably many remained in the area of Romanian Danube Delta and Ukraine.

Age structure was expressed as the ratio of adult to immature birds and belly profiles were recorded using the system devised by WWT for Barnacle Geese *Branta leucopsis*, a closely related species similar in physical structure to the Red-breasted Goose. Belly profile data were collected for 15 samples of 172 individuals from a flock of some 3,000 Red-breasted Geese. Samples were taken from all parts of the flock to avoid bias caused by positioning and distribution of the birds in the flock. A total of 508 birds from the same flock were aged, again sampling all parts of the flock.

Figure 1. Belly profiles of Red-breasted Goose at Durankulak Lake in late February 2005



RESULTS

Belly profile data showed a predominance of class 3 and class 4 (Figure 1). However some geese had an extreme belly profile of class 2 (very thin) and class 5 (very fat). Some 23.4% of birds in the samples were immatures.

DISCUSSION

This study suggests that Red-breasted Geese in February 2005 were in good physical condition at the end of the wintering period, compared with the previous 2-3 years. Prior to the winter of 2004/05 there were several consecutive years when autumn drought and deep snow cover provided very poor conditions for the wintering goose flocks. During these years most birds were in poor physical condition with belly profiles of class 0 to 2 with fewer birds of class 3 or 4. Many fatigued birds were located in fields, undernourished and unable to fly. In 2004/05 the conditions changed dramatically providing the geese with enough food for premigratory fattening. The geese were foraging in the immediate vicinity of the lake in fields to the north and west of the Eagle Marsh. This is the most favoured foraging location for the species in February and early March when the last Red-breasted Geese leave the area for the north.

The high proportion of juveniles (23%) suggested an improved survival rate of immature birds compared with the previous 2-3 years, when the percentage young has been as low as 10%. Dereliev *et al.* (2005) reported a higher percentage of young (34%) in the same area during the same time of year, and from a higher sample of birds. These differences are likely due to sampling bias.

For the last few winters the total number of Red-breasted Geese recorded by coordinated winter counts in Bulgaria, Romania and Ukraine has been much lower than the peak in the early 2000s. This could be due to poor breeding success in the Arctic, combined with poor wintering conditions in the last 2-3 years with insufficient foraging resources – a lack of winter wheat and heavy snow cover preventing geese from accessing the green shoots of the crops. Unfavorable wintering conditions may have resulted in poor survival rate and body condition prior to the breeding season, which, combined with the

stronger predator pressure, led to low productivity and a population decrease. The good body condition and high percentage of young in 2004/05 might result in the stabilization of the population. However, if this recovery is not observed in the next 1-2 years the IUCN status should be re-evaluated and the Red-breasted Goose upgraded to Endangered.

ACKNOWLEDGEMENTS

The work was part of the BSPB/BirdLife Bulgaria Red-breasted Goose conservation programme, funded by the Wildfowl & Wetlands Trust. Sincere thanks to Ivaylo Ivanov, the BSPB Regional Coordinator, Petar Iankov, Dimitar Georgiev and Brian Morrell and Larry Griffin from WWT. Special thanks go to Dr. Baz Hughes, Head of the WWT Species Conservation Department.

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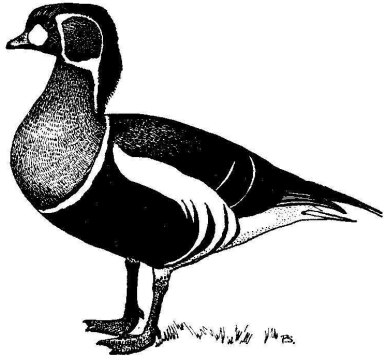

ACTION PLAN FOR AUSTRALIAN COTTON PYGMY GOOSE

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COTTON PYGMY-GOOSE (AUSTRALIAN)
Nettapus coromandelianus albipennis (Gould 1842)
Conservation status: Near Threatened

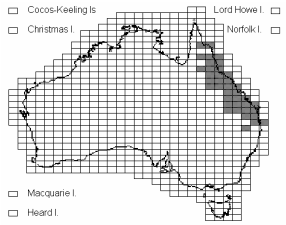
REASONS FOR LISTING
The population of this subspecies seems small, and appears to have declined in density over at least the southern half of its historical range (Near Threatened: criterion c).

	Estimate	Reliability
Extent of occurrence	400,000 km^2	High
Trend	Stable	High
Area of occupancy	1,500 km^2	Low
Trend	Stable	Medium
No. of breeding birds	5,000	Low
Trend	Stable	Medium
No. of sub-populations	1	High
Generation time	5 years	Low

INFRASPECIFIC TAXA
N. c. coromandelianus (south-east Asia) does not occur in Australia and has a status of Least Concern.

PAST RANGE AND ABUNDANCE
Princess Charlotte Bay, Queensland, to Hunter River, New South Wales, inland in the headwaters of the Dawson, Fitzroy and Burdekin Rivers (Frith 1982; Marchant & Higgins 1990). From limited data, the population was estimated at 1,500 individuals in the early 1960s (Lavery 1966).

PRESENT RANGE AND ABUNDANCE



Major centres of population: Dawson, Fitzroy, Burdekin and Barron River catchments (Blakers *et al*. 1984). Locally common in suitable habitat near Brisbane (G. Beruldsen). Now vagrant outside Queensland (Marchant & Higgins 1990). Largest recent counts: 300 on Ross River Dam near Townsville (Garnett & Cox 1987) and 350 at Lake Powlathanga near Charters Towers in 1990 (P. Britton). No recent estimates of total population size. Frequency of sightings near Rockhampton has apparently declined (Longmore 1978; M. Crawford).

ECOLOGY
Cotton Pygmy-Geese are found on freshwater lakes, swamps and large water impoundments. They congregate in flocks on permanent water-bodies during the dry season. They lay 6-9 eggs in the

hollows of trees that stand in or beside water (Beruldsen 1977; G. Beruldsen). Principal foods are pondweed *Potamogeton* seeds and other aquatic vegetation (Frith 1982).

THREATS
The species has been adversely affected by drainage of wetlands or their invasion by introduced weeds, particularly water hyacinth *Eichhornia crassipes* (Beruldsen 1977) and the exotic ponded-pastures *Echinochloa polystachya* and *Hymenachne amplexicaulis* (A. Taplin), but benefited by creation of new wetlands, such as Ross River Dam and Tinaroo Dam.

RECOMMENDED ACTIONS
1. Survey to determine the size and status of the population and the favoured breeding habitat.
2. Monitor spread of introduced ponded-pasture species and, if detrimental, control ponded-pasture in prime Cotton Pygmy-Goose habitat.

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NOTES ON THE TERRITORY SIZE OF SALVADORI'S TEAL IN CRATER MOUNTAIN WILDLIFE MANAGEMENT AREA, PAPUA NEW GUINEA

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Salvadori's Teal *Salvadorina waigiuensis* is a secretive inhabitant of fast-flowing streams and alpine lakes between 500 and 3,700 m in the mountains of New Guinea (Beehler *et al*. 1986) and, as one of only four waterfowl species adapted to life on fast-flowing rivers, is the sole endemic duck species of New Guinea (Diamond 1972). The World Conservation Union (IUCN) has listed the species as vulnerable, and the total population may be slowly declining (Delany & Scott 2002; IUCN 2006). The status is, however, uncertain because few surveys have been conducted to provide reliable population estimates. In addition, very little is known about the basic biology of Salvadori's Teal. Information is needed on distribution, breeding biology, territoriality, and habitat needs in order to direct conservation and management efforts for the species.

In March 2002, I began a two-year study to collect basic natural history information about Salvadori's Teal in Papua New Guinea. In 2003, I published preliminary results of a population survey in the Crater Mountain Wildlife Management Area (CMWMA), indicating that the ducks were fairly common in this area, although widely dispersed along the rivers (Straus 2003). This report describes the results of a small-scale radio-tracking study conducted in the same area in June 2003.

I captured two female ducks (birds were sexed by eye colour) in June 2003 with nylon mist-nets stretched across the Wara Whali River where birds were previously observed in 2002. The birds were fitted with back-mounted, battery-powered radio transmitters weighing 2 g with a whip antenna and a life expectancy of two weeks. I used hand-held yagi antennas to locate birds by walking along the stream until a signal was heard and then walking towards the bird to verify its location visually. All locations were marked with a global positioning system (GPS) and loaded into a geographic information system (GIS).

Transmittered ducks were always found on the river, so territory sizes were calculated as the linear distance between the lowest downstream location and the highest upstream location. Territory sizes for our birds were 1,200 m and 1,600 m in length, and there was some non-synchronous overlap of river sections used by the two birds. One bird was often found using a small tributary of the Wara Whali while the other bird was seen most often on the main river. Both females were normally found with an unmarked bird, presumably their mate. No nests or nesting activity was recorded and there was no evidence of moulting or brood patches on either bird.

Previous estimates of territory size for these ducks have varied greatly depending upon the river surveyed. Bell (1969) located a pair every 160 m on the Ok Menga River (600 m elevation), but observations on the Baiyer River (central Papua New Guinea) indicated territory sizes closer to 1,500 m (Kear 1975), similar to the results of our study. As noted in my earlier article, the large territory sizes of these ducks may contribute to their perceived rarity. The birds may may be using small tributaries

rather than mainstem rivers - as one of our transmittered birds frequently did - on which they are likely not to be detected.

My results indicate that the birds are fairly common in the CMWMA, but widely spaced along the rivers and thus unlikely to be seen by the casual observer making them appear rarer than they really are. Because of the difficulties in capturing and observing these birds, future researchers may want to gather distribution and nesting data by using a questionnaire circulated to landowners within the CMWMA. Symes & Marsden (2003) had some success using such surveys to study breeding biology of many birds in the area, including Salvadori's Teal. A questionnaire distributed annually may give insight into population changes over time, which could help direct conservation efforts for this little-known species.

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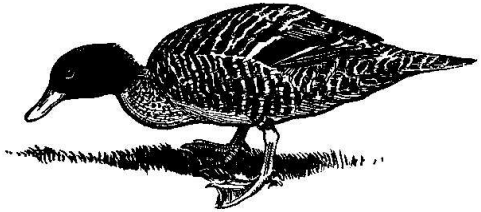

BAIKAL TEAL WINTERING STATUS AND DISTRIBUTION IN SOUTH KOREA

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INTRODUCTION

The Baikal Teal *Anas formosa* is one of the least studied ducks in East Asia. During the last century its population was severely reduced and the cause of this decline is still unknown, though thought to be mainly overhunting and habitat loss. In Yakutia, Russia, research has been conducted since 1968, and in Korea since 1996. Joint fieldwork was carried out in the Lungha River (Russia) in July 2002 (Degtyarev *et al*. 2003), and in the lower reaches of the Geum River (Korea) from 9-24 February 2003.

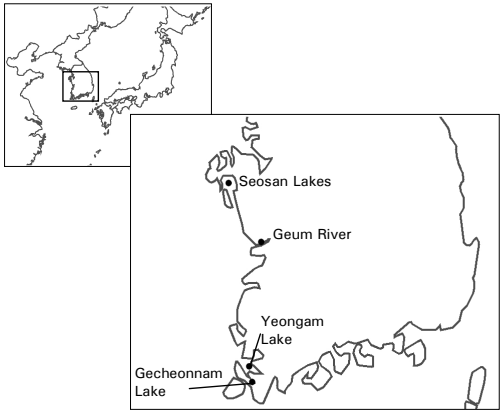
In Yakutia, in the heart of the Baikal Teal breeding range, the sharp decline in the population happened in the mid 1960s with less severe declines subsequently (Degtyarev & Perfiliev 1998). The first signs of a population recovery were noticed in 1999 and 2000 when 300-500 birds were seen during spring migration in the southern regions of Yakutia (up to 60-65°N) (Degtyarev 2000). In 2001-2003 the growth of the population continued, with birds recorded in the regions south of 62-67°N and with numbers of birds recorded on spring migration increasing by thousands. In summer in former nesting areas, however, the population of Baikal Teal has remained low with only 0.4-0.5% of previous numbers recorded previously (Degtyarev 2004).

In the 1940s Baikal Teal were common in Korea during migration (Austin 1948). The first aggregation of 5,000 wintering birds was recorded in 1984/1985, since when the population has increased annually. In 1996, 135,000 birds were recorded in three regions; and in 1999/2000 some 250,000-270,000 in two regions (Kang & Cho 1996; Miyabashi & Mundkur 1999; Moores & Koyung-Won 2000).

NUMBERS AND DISTRIBUTION IN SOUTH KOREA

According to our data the population of Baikal Teal in Korea began to increase considerably from 1998. In 2001/2002, 350,000 birds wintered in three regions, and the next year 400,000. In 2004 during simultaneous censuses 658,140 birds were counted in Korea, including 600,000 in the lower reaches of the Geum River. During this period, fewer than 10,000 birds wintered in Japan and China (Perennou *et al*. 1990; Miyabashi & Mundkur 1999), suggesting most Baikal Teal wintered in Korea. The current main wintering sites are located in three regions of the Korean peninsula (Figure 1). Baikal Teal arrive at Seosan Lakes (Cheonsu Bay) (36°40′N, 126°25′E) in September, building to a peak through October and November. During mid-winter, birds move south to the Geum River (36°02′N, 126°46′E) and, as temperatures fall below zero causing ponds to freeze and as food resources are exhausted, the birds migrate southwest to Gocheonnam and Yeongam Lakes (34°42′N, 126°28′E) and 34°32′N, 126°29′E respectively). The Teal return to the Geum River, and other northern sites, later in the winter where they remain until they start their spring migration in mid March/early April.

Figure 1. The main wintering sites for Baikal Teal in South Korea



NUMBERS AND BEHAVIOUR ON THE GEUM RIVER

In February 2003, 250,000-260,000 birds inhabited the Geum River 3 km above the first bridge (Figure 2). The size and density of bird aggregations was most likely caused by weather conditions. In calm and foggy weather during daytime all of the Baikal Teal would remain in one roosting flock occupying an area of 0.06-2 km^2. In bright and windy weather Baikal Teal formed flocks of 5,000-50,000 birds and often flew 1-3 km, the flocks sometimes joining up or sometimes fragmenting into small groups. Most were single-species aggregations but from time to time, at their peripheries, we observed small groups of Mallards *Anas platyrhynchos* and Eurasian Teal *A. crecca*. Of the 1,238 Baikal Teal sexed, 54.9% were males and 45.1% females.

By 1800h birds typically gathered into one compact group, the density of which gradually increased to its maximum, four individuals per square metre, within one hour. At 1900h the Baikal Teal from the centre of the aggregation began to fly up, moving into a 'spire', often in a clock-wise direction, and by 1930h all birds were in the air, the flock taking the shape of a funnel revolving on its axis, the lower part reaching the water and the upper a height of 300-600 m. Later, flocks of 50-100 birds left the upper funnel to fly in the same direction to feeding areas. Foraging sites changed daily. Up to 6 km away from the river, the aggregation of flying birds remained

compact, covering a 1.5 km front 6-7 km long. Among the large flocks were smaller ones of 30-50 individuals, and sometimes flocks were followed by groups of Northern Pintail *A. acuta*, Eurasian Teal and Mallard.

Dense aggregations of Baikal Teal in the wintering sites may be detrimental to the species as there is an increased possibility of them suffering from infectious diseases. In Cheonsu Bay within eight days in October 2002 approximately 12,000 ducks died of avian cholera including 10,000 Baikal Teal (Lee 2000). On 12 February 2003, along the coastal line of a reed island 200 m long, we found 17 dead or weak Baikal Teal unable to fly. The birds were not injured, were in reasonable body condition, and there was no visible, unusual pathology in birds' internal organs. However, the oesophagus and stomachs were filled with rice suggesting the birds may have pesticide poisoning. Based on the weight of rice (40-50 g) from the digestive organs of the birds examined, the daily food consumption of the Baikal Teal population in the Geum River was not less than 10 tonnes.

Threats to the Baikal Teal in Korea include disturbance. Flight distances for Baikal Teal are 500-600 m compared with 80-200 m for Greater White-fronted Geese *Anser albifrons*, Whooper Swans *Cygnus cygnus* and Mallards. The birds are also disturbed by low flying airplanes and helicopters (up to 12 per day). The Geum River is also polluted by pesticides from the rice fields as well as household rubbish.

Figure 2. Location of Baikal Teal flocks wintering in the lower reaches of the Geum River. Key: 1, dam with gateway servers; 2, bridge; 3, main directions of feeding flights; 4, sites of Baikal Teal aggregation.

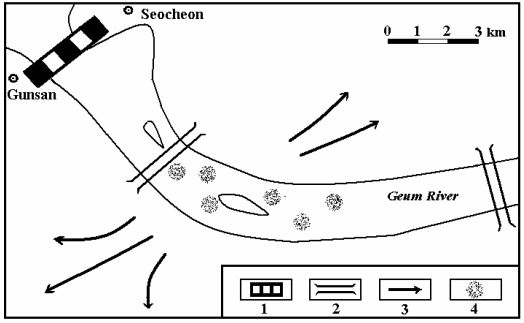
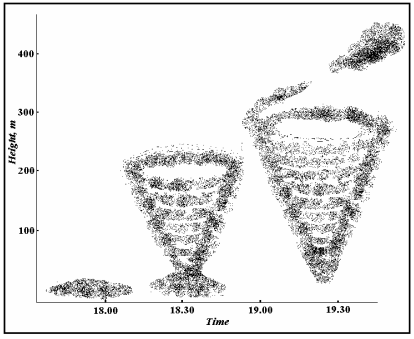


Figure 3. Flight formation used by 250,000 Baikal Teal as they leave their Geum River day roost



The Geum River, 9 km from the mouth, is a reserve area - water transportation is restricted here and there are three observation stations for bird watchers. To provide birds with food under an agreement with Government of Korea, farmers in the five main Baikal Teal wintering areas in Korea, including the lower reaches of the Geum River, left 10% of rice yield in the fields.

The Baikal Teal is listed in the Red Data Books of Korea, Russia and Yakutia (Red Data Book 2003). Hunting for Baikal Teal is banned. To improve species conservation, annual monitoring of the population, including the impact of disease, and control of illegal bird hunting are necessary.

ACKNOWLEDGEMENTS

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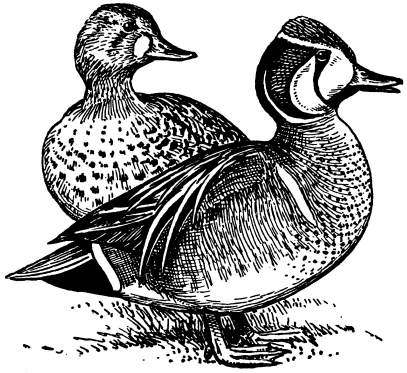

AVES DE LAGUNA REGISTRADAS EN 2006 EN GALÁPAGOS

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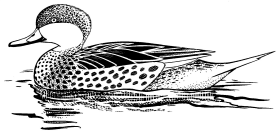
SUMMARY
There are 76 wetlands of different salinities in the Galápagos Islands, where 50 waterbird species have been recorded. Most of these species are migrants, and the residents include the Galápagos Pintail. On 24 January 2006, 21 wetlands were visited on five islands (Floreana, Isabela, Santa Cruz, Santiago and Bainbridge Islands) and 595 birds of 16 species (11 native and endemic, four migratory and one introduced) were recorded. The greatest number of birds was recorded at Poza de las Diablas on Isabela (155 birds). The Galápagos Pintail was the most common species (266 in total, recorded on 13 (62%) of wetlands and on all five islands).

INTRODUCCIÓN
En los últimos años se ha incrementado a nivel mundial la atención sobre el valor de los humedales y las lagunas, y los esfuerzos para su conservación han aumentado (Gelin & Gravez 2002). En Galápagos se han registrado 76 lagunas salinas y de agua dulce (FCD 2006), las cuales se encuentran en las calderas, cerca de la costa (aguas filtradas desde el mar y lluvias), y/o se forman pozas temporales por las lluvias (Vargas 1989).

Las lagunas salobres en Galápagos, la mayoría son permanentes, no exceden de un metro de profundidad, son situadas en la costa y zona árida de las islas, y usualmente están rodeadas de manglar, entre otro tipo de vegetación (Castro & Phillips 1996). La importancia de estas lagunas es que albergan en su hábitat una gran diversidad de especies, entre las cuales se encuentran las aves de laguna.



Se han registrado más de 50 especies de aves en las lagunas salobres, principalmente migratorias (Castro & Phillips 1996). Entre las aves nativas, la especie emblema de las lagunas es el Flamenco de Galápagos *Phoenicopterus ruber*, que se encuentra en la lista roja de aves del Ecuador como vulnerable (Granizo 2002). Mientras, entre las aves endémicas (especies o subespecies) está el Patillo *Anas bahamensis galapagensis* que está igual en la lista roja como en peligro, según la TWSG (2001). Desde 1996 en el monitoreo se registra otras aves de laguna, con el objetivo de conocer su distribución y presencia y ausencia.

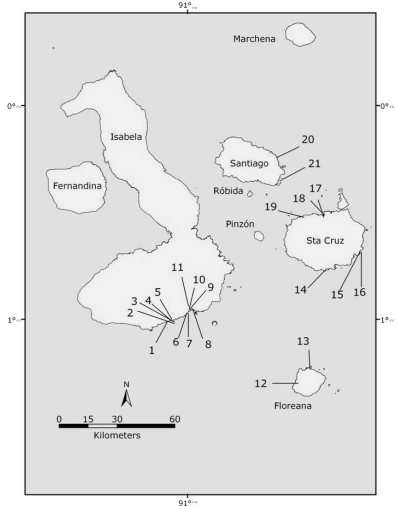
METODOLOGÍA
El 24 de enero de 2006 se distribuyó al personal a las 21 lagunas designadas. El número de lagunas incluidas en el censo ha variado entre 6 y 34 (Vargas *et al.* in prep.), pero desde 1996 se estandarizó la metodología (Jiménez *et al.* 2005).

Las lagunas que se censaron en 2006 fueron en las siguientes islas: Floreana

con 2 lagunas (Punta Cormorán y Montura); Isabela con 11 lagunas (Baltasar, Barahona Occidental, Barahona Oriental, El Manzanillo, Las Salinas, Las Diablas, Las Ninfas, Puerta de Jelí, Tercera Playa, Cuarta Playa y Quinta Playa); Santa Cruz con 6 lagunas (Cerro Dragón, El Garrapatero I y III, Las Bachas I y II, y Tortuga Bay); Santiago con una laguna (El Sartén); y en los Islotes Bainbridge con una laguna del mismo nombre (Figure 1).

A las 10:00 de la mañana todos los censistas comenzaron su trabajo. Se anotó en hojas de registro a los individuos según las características externas.

Figure 1. Distribución de las lagunas censadas en Galápagos en 2006.
Key: Isla Isabela: Quinta Playa (1), Cuarta Playa (2), Tercera Playa (3), Barahona Oriental (4), Barahona Occidental (5), Las Diablas (6), Puerta de Jelí (7), Baltasar (8), Las Salinas (9), Las Ninfas (10), El Manzanillo (11).
Isla Floreana: Montura (12), Punta Cormorán (13).
Isla Santa Cruz: Tortuga Bay (14), El Garrapatero I (15), El Garrapatero III (16), Las Bachas I (17), Las Bachas II (18), Cerro Dragón (19).
Isla Santiago: El Sartén (20). Islotes Bainbridge (21).



RESULTADOS Y DISCUSIÓN

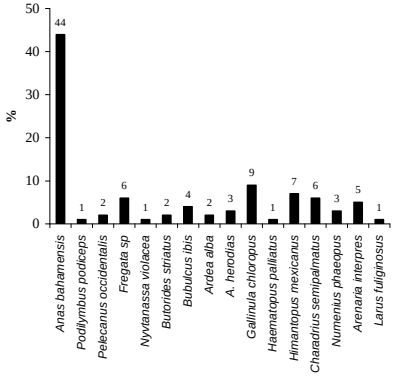
Se observó 16 especies de aves de laguna-costera con un total de 595 individuos en las lagunas monitoreadas. La especie que se observó con el mayor número de individuos fue el Patillo con 266 individuos (45%). La siguiente fue la Gallinula *Gallinula chloropus* con 56 individuos (9%). La tercera especie observada fue el Tero Real *Himantopus mexicanus* con 43 individuos (7%; Figure 2, Table 1).

La isla con mayor cantidad de individuos observados en las lagunas fue: Isabela (74%), Santa Cruz (16%), Floreana (6%), Santiago (2%) e islotes Bainbridge (2%). La laguna donde se observó mayor cantidad de aves en el monitoreo fue en Poza de las Diablas o Cementerio con 155 individuos (26%), seguido por Quinta Playa con 131 individuos (22%), y El Manzanillo con 54 individuos (9%; Figure 2; Table 1), siendo todas estas lagunas de la isla Isabela; razón por la cual Isabela es la isla de mayor cantidad de aves observadas.

De las 16 especies observadas, 11 fueron nativas y endémicas (especies y subespecies): Patillo, Pelícano *Pelecanus occidentalis urinator*, Fragata (*Fregata minor*, *F. magnificens magnificens*), Garza Nocturna o Huaque *Nyctanassa violacea pauper*, Garza de Lava *Butorides striatus sundevalli*, Garza Blanca *Ardea alba*, Garza Morena *Ardea herodias*, Gallinula, Ostrero *Haematopus palliatus galapagoensis*, Tero Real y Gaviota de Lava *Larus fuliginosus*. Cuatro aves migratorias: Sormomujo *Podilymbus podiceps*, Chorlitejo *Charadrius semipalmatus*, Zarapito *Numenius phaeopus* y Vuelve Piedras *Arenaria interpres*. Y una ave introducida: Garza Bueyera *Bubulcus ibis*.

La especie de mayor distribución en las lagunas fue el Patillo, el cual estaba en 13 lagunas (62%), seguido por el Tero Real en 9 lagunas (43%) y el Chorlitejo y Gallinula en 7 lagunas (33%).

Figure 2. Porcentaje según las especies en 2006 en Galápagos.



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WWF–CHINA WATERBIRD SURVEYS IN THE LOWER YANGTZE FLOODPLAIN IN 2004 AND 2005

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INTRODUCTION

Waterbirds of the floodplain

The wetlands of the lower Yangtze River basin are of great importance for a wide variety of waterbirds (Scott 1989). The huge concentrations during the non-breeding season include many globally threatened species, notably almost the entire global populations of the Oriental White Stork *Ciconia boyciana* and Siberian Crane *Grus leucogeranus*, and significant proportions of the global populations of Swan Goose *Anser cygnoides*, Lesser White-fronted Goose *Anser erythropus*, White-naped Crane *Grus vipio* and Hooded Crane *Grus monachus*. Amongst the other threatened waterbird species present within the region are Dalmatian Pelican *Pelecanus crispus*, Baikal Teal *Anas formosa*, Baer's Pochard *Aythya baeri* and Scaly-sided Merganser *Mergus squamatus* (BirdLife International 2003).

Although the importance of the lower Yangtze River floodplain is known, no comprehensive and simultaneous count has been carried out to obtain accurate information on the abundance and distribution of waterbirds when numbers are at a maximum. An analysis of available published count data collected during 1990-2003 shows that the best censused locations are Poyang Hu, East Dongting Hu, Shengjin Hu and the Shanghai coastal region, but it is likely that few of these counts were truly comprehensive. Some of the other lakes within the floodplain have been counted, but mostly only once or twice since 1990. Many lakes and wetlands may never have been counted.

Threats to wetlands and waterbirds

The wetlands of the lower Yangtze River floodplain have been much reduced and degraded by economic activities, principally land-claim for agriculture. The total area of lakes is reported to have declined by 62% between the 1950s and 1980s. More than 1,100 lakes have been totally claimed, notably in Hubei Province where numbers have decreased from 1,066 to 83 lakes over the 1950-1980 period. The surface area of Poyang Hu (the largest lake in China) has been reduced from 5,000 km^2 to 3,600 km^2 and that of Dongting Hu (the second largest lake in China) from 4,350 km^2 to 2,700 km^2. Although the total area of wetlands is still large, their quality has also been greatly affected by development, pollution, overfishing, crab farming, fish farming using fertilisers, planting of poplar plantations and human disturbance, and waterbirds are concentrated in the remaining suitable areas of shallow wetland during the non-breeding season (BirdLife International 2003; G. Lei pers. obs.)

A study of hunting pressure in the lower Yangtze River floodplain in 1987–1992 estimated that c.50% of the total wintering waterfowl in this region were killed each year by local hunters, using

netting, shooting and poisoning. The numbers of waterfowl in the lower Yangtze River floodplain have declined greatly in the last 10 years and hunting appears to be the main reason for recent decreases in the numbers of Swan Goose and the eastern population of Lesser White-fronted Goose (BirdLife International 2003).

The construction and operation of the Three Gorges Dam, which commenced filling in mid-2003, will change the seasonal flow of water in the Yangtze River and could negatively affect the wetlands downstream. There is a danger that by artificially maintaining low water levels during the summer flood season and raising them in the winter (estimated to be one metre higher) the character of the wetlands will be changed, and the shallow areas that most waterbirds require for feeding will be greatly reduced in extent (BirdLife International 2003). Implementation of the South-North Water Transfer project, which plans to draw 48 billion cubic metres from the Yangtze River watershed and send it via three canals to arid areas of northern China, can also be expected to affect water supply to wetlands in the region. Construction of the Eastern Route commenced in 2002 and of the Central Route in 2003.

Recent information, based on data from the breeding areas, indicates that habitat loss and hunting in the staging and non-breeding regions (e.g. the lower Yangtze River floodplain) have caused significant declines in waterbird numbers in east Asia (E. Syrechkovski Jr. *in litt*.). Over recent decades, all geese populations have declined by more than 80%; 10 of the 13 migratory populations of dabbling ducks and six of the 14 populations of diving ducks have also decreased.

THE SURVEYS

Survey objectives

The main objectives of the surveys were to:

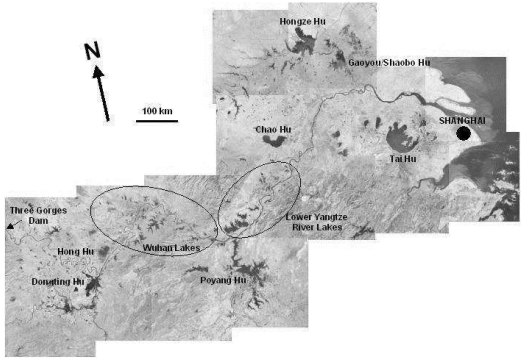
- systematically collect comprehensive data on waterbird abundance and distribution over single time periods;
- collect data on the conservation status of the wetlands surveyed;
- identify key wetlands that are currently unprotected and recommend new protected areas;
- involve provincial, nature reserve and university staff, and local NGOs in the survey so that they can be trained in survey techniques, waterbird ecology, and waterbird identification and counting methods; and
- improve public awareness of waterbirds and their complete dependence on wetland habitats.

The survey area

The survey area covered the middle and lower reaches of the Yangtze River floodplain, extending 1,850 km from the Three Gorges Dam to the river estuary at Shanghai.

The extensive nature of the lakes within the survey area, and their large number, can be seen in Figure 1. Poyang Hu, Dongting Hu, and the Wuhan Lakes are located within the middle reaches, while the lower reaches contain the Lower Yangtze River Lakes and a number of large lakes in southern Jiangsu – Hongze Hu, Gaoyou Hu, Shaobo Hu and Tai Hu.

Figure 1. Montage of satellite images showing the lower Yangtze River floodplain, and associated wetland areas, downstream of the Three Gorges Dam.



SURVEY RESULTS

Two comprehensive, simultaneous counts have been carried out to date – in late January-early February 2004 (Barter *et al.* 2004) and the second half of February 2005 (WWF China unpubl. data), immediately after the Chinese New Year when disturbance is at a minimum. Most of the important wetlands within the Yangtze floodplain were visited. The number of wetlands surveyed increased from 50 in 2004 to 60 in 2005, with 17 being visited for the first time. In 2005 improved coverage was also achieved of most of the wetlands that were visited in both years.

In both years the surveys were conducted by 14 teams comprising around 60 people drawn mostly from provincial forestry bureau, nature reserve and university staff, and local NGOs.

The highest count was in 2005, when a total of 635,967 waterbirds of 95 species was counted. Provincial totals were Jiangxi – 226,175, Anhui – 158,743, Hunan – 110,566, Hubei – 82,104, Jiangsu – 38,361 and Shanghai Municipality – 20,018.

In 2005 the most common species group was the *Anatidae* (ducks, geese and swans) comprising 67% of the waterbirds counted; next were shorebirds (16%), gulls (4%), and egrets and herons (5%). The percentage composition of the different species groups was very similar in both years.

Fourteen globally-threatened species and one near-threatened species were encountered in the two surveys. Twenty-seven species were found to be present in internationally important numbers at one or more sites.

The ten most common species counted (highest counts from either 2004 or 2005) were Bean Goose *Anser fabalis* (105,519 individual, both *middendorfi* and *serrirostris* present, Tundra Swan *Cygnus columbianus* (65,114), Swan Goose (61,178), Common Teal *Anas crecca* (43,037), Dunlin *Calidris alpina* (41,744), Common Black-headed Gull *Larus ridibundus* (32,114), Spot-billed Duck *A. poecilorhyncha* (29,210), Greater White-fronted Goose *A. albifrons* (26,494), Pied Avocet *Recurvirostra avosetta* (20,636) and Falcated Duck *Anas falcata* (18,364).

Very large numbers of several species were recorded, and in several cases the counts exceeded the current flyway population estimates. Large numbers of six globally globally-threatened species were present, namely Lesser White-fronted Goose (the count represented 121% of – i.e. exceeded – the current population estimate), Swan Goose (111%), Hooded Crane (109%), Siberian Crane (93%), White-naped Crane (68%) and Oriental White Stork (57%). Another four species were present in high proportions of their estimated flyway populations, namely Black Stork *Ciconia nigra* (108%), Eurasian Spoonbill *Platalea leucorodia* (105%), Bean Goose (91%), Tundra Swan (76%) and Falcated Duck (53%).

A total of 23 sites were identified in the surveys at which at least one waterbird species was recorded in internationally important numbers. Particularly important sites were: Poyang Hu NNR (15 species present in internationally important numbers), South Poyang Hu (11), East Dongting Hu (10), Caizi Hu (8), North Poyang Hu (7), Shengjin Hu (6) and Wang Hu (5).

There were significant changes in the abundance and distribution of some species between years but analysis of these changes is complicated due to:

- the greatly improved coverage achieved in some Provinces in 2005;
- changes in water levels between years; and
- changes in weather conditions between years throughout the non-breeding ranges of waterbirds occurring in the Yangtze floodplain.

More information will be needed on the extent of these changes in order that reasons for differences in species abundance and distribution can be ascertained. It is planned to explore these changes in detail when three years of results are available after the January 2006 survey is completed.

It is recommended that:

- a waterbird monitoring programme be established;
- data on water levels and weather be systematically collected;
- a compilation of historical count data be made to assist in determining trends in population sizes and waterbird numbers at key sites;
- updated information be obtained on historical wetland habitat loss in the lower Yangtze River floodplain and future plans for wetland modification in the region;
- a study be conducted of waterbird hunting pressure;
- public awareness programmes be instituted to explain the importance of the lower Yangtze River floodplain for waterbirds and measures that can be taken to conserve them.

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