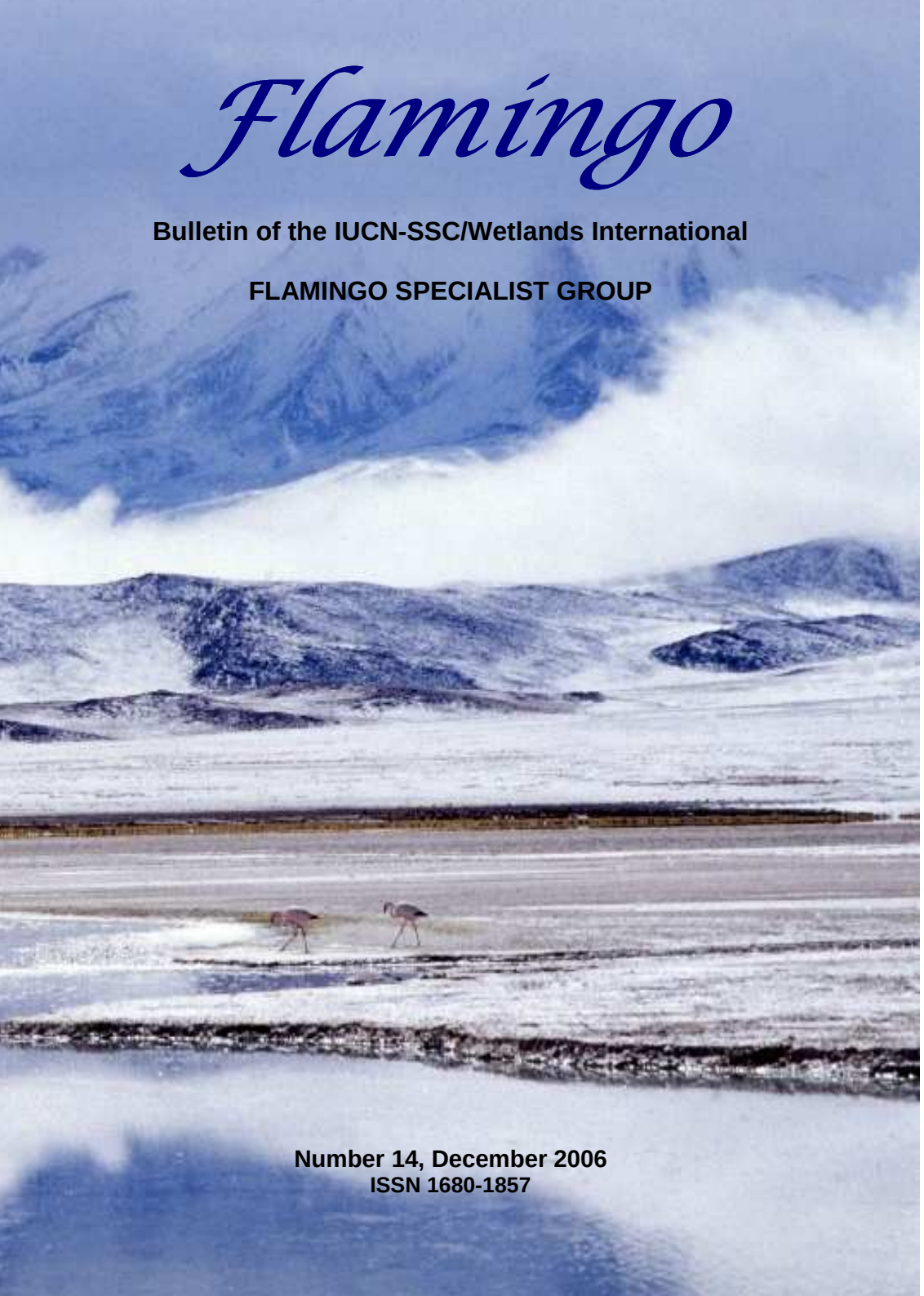

Flamingo

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FLAMINGO SPECIALIST GROUP

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ABOUT THE GROUP

The Flamingo Specialist Group (FSG) was established in 1978 at Tour du Valat in France, under the leadership of Dr. Alan Johnson, who coordinated the group until 2004. Currently, the group is coordinated from the Wildfowl & Wetlands Trust at Slimbridge, UK, as part of the IUCN-SSC/Wetlands International Waterbird Network.

The FSG is a global network of flamingo specialists (both scientists and non-scientists) concerned with the study, monitoring, management and conservation of the world's six flamingo species populations. Its role is to actively promote flamingo research and conservation worldwide by encouraging information exchange and cooperation among these specialists, and with other relevant organisations, particularly IUCN - SSC, Wetlands International, Ramsar, Convention on the Conservation of Migratory Species, African Eurasian Migratory Waterbird Agreement, and BirdLife International.

FSG members include experts in both *in-situ* (wild) and *ex-situ* (captive) flamingo conservation, as well as in fields ranging from field surveys to breeding biology, infectious diseases, toxicology, movement tracking and data management. There are currently 185 members around the world, from India to Chile, and from France to South Africa. Further information about the FSG, its membership, the membership list serve, or this bulletin can be obtained from Brooks Childress at the address below.

Chair
Dr. Brooks Childress
Wildfowl & Wetlands Trust
Slimbridge
Glos. GL2 7BT, UK
Tel: +44 (0)1453 860437
Fax: +44 (0)1453 860437
Brooks.Childress@wwt.org.uk

Assistant Chair
Mr. Nigel Jarrett
Wildfowl & Wetlands Trust
Slimbridge
Glos. GL2 7BT, UK
Tel: +44 (0)1453 891177
Fax: +44 (0)1453 890827
Nigel.Jarrett@wwt.org.uk

Eastern Hemisphere Chair
Dr. Arnaud Béchet
Station biologique, Tour du Valat
Le Sambuc
13200 Arles, France
Tel : +33 (0) 4 90 97 20 13
Fax : +33 (0) 4 90 97 20 19
bechet@tourduvalat.org

Western Hemisphere Chair
Dr. Felicity Arengo
American Museum of Natural History
Central Park West at 79th Street
New York, NY 10024 USA
Tel: +1 212 313-7076
Fax: +1 212 769-5292
arengo@amnh.org

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Cover photographs by Niall Riddell: Andean Flamingos at Laguna Hedionanda, Bolivia; See full report of his photographic expedition to the high Andes on: www.projectflamingo.co.uk

Flamingo

Number 14, December, 2006

CONTENTS

2005-06 FLAMINGO SPECIALIST GROUP ANNUAL REPORT

Aim of the Group

The aim of the Flamingo Specialist Group (FSG) is to actively promote study, monitoring, management and conservation of the world's six flamingo taxa by:

- Developing and maintaining an active and comprehensive international network of *in situ* and *ex situ* flamingo conservation specialists (both scientists and non-scientists)
- Stimulating and supporting information exchange among flamingo conservation specialists
- Encouraging development and implementation of conservation action plans for the three taxa of greatest conservation concern: *P. andinus*, *P. jamesi* and *P. minor*.
- Promoting innovative conservation approaches, such as coordinated management of wetland networks to secure flamingo population processes (e.g. dispersal and seasonal movements) and reconciliation of water conservation for people and for flamingos in the context of climate change and predicted water shortage
- Providing information and advice in support of the programmes of Wetlands International, IUCN - SSC, BirdLife International, Ramsar and others that promote the conservation of flamingos and their habitats

Significant short and long term programmes

To accomplish its strategic objectives, the FSG has organised its 2004-08 work plan into four programme areas corresponding to the objectives:

Programme 1: Developing and maintaining an active and comprehensive international network of *in situ* and *ex situ* flamingo conservation specialists

Four-year objective: To develop an international FSG membership that includes the flamingo specialists in each flamingo range state, those working on flamingo conservation at zoological societies and scientific institutions, and others interested in flamingo conservation, wherever located.

We propose to achieve this objective by:

1. Updating the FSG membership list extant at the end of 2004, including contacts, focal species and expertise or special interests
2. Conducting an active membership drive early in 2005, with the goal of increasing the geographical coverage and expertise of the membership
3. Updating the membership list continuously during the four-year period

Progress during 2005-06: During 2005-06 membership grew 12%. Currently, there are 190 members from 52 countries, 135 of which are involved primarily with the conservation of flamingos in the wild (*in-situ*), while 55 are involved primarily with *ex-situ* conservation.

190 members from 52 countries
135 involved with "in-situ" conservation
55 involved with "ex-situ" conservation

Country	No. Members	Country	No. Members
Algeria	6	Mauritania	1
Argentina	6	Mexico	2
Belgium	4	Morocco	1
Bolivia	1	Namibia	2
Botswana	3	Netherlands Antilles	1
Canada	1	Paraguay	1
Chile	9	Peru	2
Cuba	1	Poland	1
Cyprus	3	Portugal	1
Czech Republic	2	Senegal	3
Denmark	1	South Africa	8
Djibouti	1	Spain	4
Egypt	1	Suriname	1
Equador	2	Switzerland	2
Eritrea	1	Tanzania	4
Ethiopia	3	The Netherlands	7
Finland	1	Tunisia	2
France	8	Turkey	1
Germany	4	Turkmenistan	1
Guinea-Bissau	1	Uganda	1
India	8	United Arab Emirates	5
Iran	2	United Kingdom	28
Italy	3	Uruguay	1
Kenya	4	United States	29
Libya	1	Venezuela	1
Madagascar	2	West Indes	1

Programme 2: Stimulating and supporting information exchange among flamingo conservation specialists

Four-year objective: Develop and maintain convenient facilities and opportunities for FSG members to exchange information and ideas

We propose to achieve this objective by:

1. Developing and promoting an FSG e-mail list-serve for use by members
2. Developing a new tri-lingual (English, French and Spanish) FSG web site
3. Developing and publishing an up-graded bulletin annually
4. Organising international workshops

Progress during 2005-06: A new network of *in-situ* and *ex-situ* conservation organisations was launched to focus on the conservation of the Caribbean Flamingo. This new initiative (Red del Flamenco del Caribe) will be led initially by Dr Nancy Clum of the Wildlife Conservation Society, with the assistance of Dr Felicity Arengo of the American Museum of Natural History, the Western Hemisphere Chair of the FSG. (See separate report in 'Other News and Reports'.)

The list serve continued to provide an active channel of communication for members, with over 100 messages posted during the year concerning subjects as varied as the taxonomic nomenclature of flamingos, building an artificial breeding island for Lesser Flamingos, Lesser Flamingo die-offs in East Africa, breeding and ringing reports from around the world and other subjects of concern *to in-situ* and *ex-situ* flamingo conservationists.

A new format for the annual bulletin/newsletter was introduced with Flamingo 13 in December 2005, and Flamingo 14 follows in that tradition.

Programme 3: Encouraging development and implementation of conservation action plans for the taxa of greatest conservation concern: *P. andinus*, *P. jamesi* and *P. minor*.

Four-year objective*:* Develop a single-species action plan for the Lesser Flamingo (*P. minor*) for submission to the Technical and Standing Committees of the African-Eurasian Migratory Waterbird Agreement (AEWA) and the Convention on Migratory Species (CMS) in 2007. Develop a similar action plan for Andean (*P. andinus*) and James's (*P. jamesi*) Flamingos for presentation to the ninth Congress of Parties (COP 9) of the Convention on Migratory Species (CMS) in 2008.

We propose to achieve this objective by:

1. Compiling a biological assessment report for each species containing current data on population size and trends, breeding biology, feeding ecology, habitat requirements, conservation status, threats and priorities for future conservation action from information supplied by FSG members and specialists in each of each of the species' range states
2. Organising and supporting action planning workshops to finalise the conservation priorities for each species
3. Drafting, reviewing and editing a Lesser Flamingo action plan for submission to the AEWA Technical and Standing Committees in 2007, and to MOP 4 in late 2008.
4. Drafting, reviewing and editing of the action plans for the Andean and James's flamingos for submission to the CMS Technical Committee and to COP 9 in late 2008.

Progress during 2006: An AEWA/CMS Lesser Flamingo action planning workshop was convened in Nairobi, Kenya 25-29 September for the purpose of compiling the range state data and other information needed for the initial draft of a conservation action plan for this species. A 2007 workshop is planned for the high Andes species (See separate report in Other News).

Programme 4: Provide information and advice in support of the programmes and publications of Wetlands International, IUCN-SSC and others that promote the conservation of flamingos and their habitats

Four-year objective: Provide information on the plans and activities of the FSG, including a new quadrennial work plan and annual updates, liaise closely with Wetlands International and the IUCN-SSC, as requested, to provide the most recent research information and advice in support of their programmes and publications, as well as the programmes of other organisations (e.g. BirdLife International, AEWA, CMS) concerned with the conservation of flamingos and their habitats.

We propose to achieve this by:

1. Producing a quadrennial work plan for 2005-2008, with annual updates
2. Liaising closely with relevant staff at Wetlands International and IUCN-SSC
3. Providing input for updates of Wetlands International's *Waterbird Population Estimates*, *No. 4* and the IUCN *Red List of Threatened Species*
4. Participating in conferences, TAG meetings and conservation workshops

Progress during 2006: During 2006, FSG coordinators participated in the following conferences, meetings and workshops:

Meeting: AEWA/CMS Lesser Flamingo Action Plan Workshop, 25-29 September, ICIPE Complex, Nairobi, Kenya
Number of participants: 33
Key outputs: Data on Lesser Flamingo distribution and status in 21 range states were presented along with presentations concerning the likely causes of the recent Lesser Flamingo die-offs in East Africa, a new technique for conducting aerial census counts and the building of an artificial breeding island for Lesser Flamingos.

The delegates agreed the three most important threats to the survival of the species were habitat degradation at key breeding and feeding sites, disruption of breeding colonies and mass die-offs occurring in East Africa. An action plan will be produced by WWT, with the first draft being available for review and comment by the range states early in 2007.

Meeting: Grupo para la Concervación Flamencos Altoandinos, 22-27 February: annual planning meeting and open meeting with Aves Argentinas, mining companies and other stakeholders for strategic planning of the Network for Conservation of Priority Areas for Flamingo Conservation.
Venue: Hotel Antofagasta, Antofagasta, Chile
Number of participants: 18
Key outputs: Review of first phase of implementation of the project and design of second phase for 2006-2008. The second phase will continue with support of long-term monitoring and increase coordination among sites and sharing of experiences among cross-border pilot project sites.

Meeting: British and Irish Association for Zoos and Aquariums (BIAZA) Bird Working Group
Venue: Belfast Zoo, Northern Ireland
Number of participants: 40
Key outputs: Delivery of two presentations:
1. Best practice catching and handling techniques for flamingos in zoos - this presentation described how zoo keepers should restrain flamingos so that they may vaccinate birds against Avian Influenza Virus (*i.e.* once vaccine is released by the UK Government).
2. The BIAZA Flamingo Focus Group – this presentation described how BIAZA's Flamingo Taxon Advisory Group (TAG) is to become known as the Flamingo Focus Group with the remit to develop, demonstrate and disseminate information on best practice husbandry standards for flamingos across BIAZA collections.

Brooks Childress, Chair

IN SITU BREEDING SUMMARY

South America

Argentina
Breeding period: December-February

There are nine known flamingo breeding sites in Argentina (*Flamingo* 13), but it is not know whether there was breeding at any of these sites during 2004-05 (F. Arengo, *in litt.*)

Bolivia
Breeding period: December-February

The following 2005-06 breeding reports were provided by O. Rocha.

Reserva Nacional de Fauna Andina Eduardo Avaroa
- ***Salar de Chalviri (P. jamesi & P. chilensis):*** No breeding
- ***Laguna Colorada (P. Andinus & P. jamesi):*** ~7,185 chicks fledged, combined spp.
- ***Laguna Pelada, (P. andinus & P. jamesi):*** No breeding
- ***Laguna Busch o Kalina (P. andinus, P. jamesi):*** 668 chicks, combined species

Laguna Cachi (P. jamesi): 155 chicks
Laguna Chiar Khota (P. andinus): No breeding
***Laguna Hedionda Sur* (*P. jamesi*):** 185 chicks
Laguna Kara (P. andinus & P. jamesi): 587 chicks, combined species
Lago Loromayu (P. chilensis): No breeding
Lago Poopó (P. jamesi, P. chilensis): No survey
Salar de Uyuni (P. jamesi & P. chilensis): No survey

Peru

There were no reports of breeding in Peru during 2006. (F. Arengo, *in litt.*)

Chile
Breeding period: December-February

There are 15 known flamingo breeding sites in Chile (see *Flamingo* 13). However, for the 2005-06 breeding season, the only breeding report received was for Barros Negros, Salar de Atacama, Bajo Reserva Nacional Los Flamencos, where approximately 5,125 nests and 4,000 chicks were counted. Report provided by CONAF.

Bahamas & Caribbean

Bahamas (*P. ruber*)
Breeding period: April-June

Lake Rosa, Great Inagua: Following four consecutive years of no breeding, there was successful breeding this year on Great Inagua. An aerial survey on 6-7 June counted 8,654 nest mounds and a ground-truthing basically confirmed this number (8,661). The warden there feels that there may have been nests in another area, but that has not been confirmed. (Nancy Clum, nclum@wcs.org)

Bonaire (*P. ruber*)
Breeding period: October-March

Pekelmeer: Although only 1,030 nest mounds were built at Pekemeer, it is estimated that approximately 2,000 chicks were hatched in 2006, with about 1,820 fledging. Breeding takes place over several months, with the nest mounds being reused by succeeding pairs. (Peter.Montanus@bonairegov.com)

Cuba (*P. ruber*)
Breeding period: April-June

El Refugo de Fauna Rio Maximo: Although El Refugo de Fauna Rio Maximo is the most important breeding site for the Caribbean Flamingo, having produced between 17,000 and 42,000 chicks annually between 1998 and 2004 (*Flamingo* 13), there have been no breeding reports from this site for the past two years.

Mexico (*P. ruber*)
Breeding period: April-September

Heavy flooding of the Punta Mecoh breeding site destroyed approximately 10,000 chicks. A new colony containing an estimated 1,500 pairs was discovered about 8 km away, but only one chck was hatched there. Plans are under way to restore the main Punta Mecoh breeding site with financial assistance from the government. (R. Migoya, rodrigomigoya@prodigy.net.mx)

Venezuela (*P. ruber*)
Breeding period: Irregular: breed in both dry (October-March) and wet (April-September)

Refugio de Fauna Silvestre y Reserva de Pesca "Ciénaga de Los Olivitos": Following a successful breeding event in 2004-05 (*Flamingo* 13), approximately 4,600 pairs bred again in October 2005, producing an estimated 4,400 chicks. A breeding event beginning April 2006 produced an estimated 5,600 chicks (Espinoza & Perozo, Research Reports).

Mediterranean & West Africa

Breeding by *P. roseus* in Mediterranean and West African countries during 2006 has been reported at seven sites. Approximately 66,000 pairs attempted to breed and an estimated 38,000 chicks were fledged. The only remarkable event of this breeding season was an unusually late breeding attempt by apparently immature birds in the northern Po delta, a new breeding site. The following reports were provided by Arnaud Béchet and members of the Mediterranean and West African Greater Flamingo Network.

Mauritania (*P. roseus*)

Breeding period: March-July

Banc d'Arguin National Park (Grande Kiaone Island): 15,842 pairs attempted to breed; ~13,260 chicks were fledged

Algeria (*P. roseus*)

Breeding period: April-June

Garaet Ezzemoul: ~ 4,750 pairs attempted to breed; ~ 3,750 chicks fledged (see Boulkhssaïm *et al.* in Research Reports)

Spain (*P. roseus*)

Breeding period: April-June

Ebro Delta: 1,907 pairs attempted to breed; ~960 chicks were fledged

Fuente de Piedra: ~ 18,800 pairs attempted to breed; ~ 10,400 chicks were fledged

Doñana: No breeding at this site in 2006

France (*P. roseus*)

Breeding period: April-June

Camargue (Etang du Fangassier): 10,293 pairs attempted to breed; 5,868 chicks fledged.

Italy (*P. roseus*)

Breeding period: April-June

Comacchio saltpans: 879 pairs attempted to breed and ~ 645 chicks were fledged

Margherita di Savoia: 1,032 pairs attempted to breed and ~ 650 were fledged

Valles Sagreda & Pozzatini, North Po Delta: A late breeding attempt (October) by several thousand apparently mostly immature birds occurred in the valleys of the northern Po delta. Initially, the birds built 3,000-5,000 nests in Valle Sagreda, but no eggs were laid. Following a cold period in early November, the birds moved to adjacent Valle Pozzatini and resumed their activity there. Breeding activity had ceased by 6 Nov. It is anticipated these birds may start a new breeding colony here in 2007, as similar late attempts were observed in the first years at Comacchio and Margherita (N. Baccetti & M. Passarella, *in litt*.)

Molentargius, Sardinia: No breeding attempts during 2006.

Saline di Macchiareddu (Santa Gilla, Sardinia): ~ 7,600 pairs attempted to breed and ~ 6,000 chicks were fledged.

S'Ena Arrubia (Oristano, Sardinia): No report

Turkey (*P. roseus*)

Breeding period: April-June

Acigöl: 100 chicks produced

Camalti Tuzlasi saltpans (Izmir): ~10,245 pairs attempted to breed; ~7,000 chicks fledged

Tuz Gölü: ~ 13,300 pairs attempted to breed; no report on number of chicks produced

Southwest Asia & South Asia

Iran (*P. roseus*)

Breeding period: May-June

Uromiyeh Lake: No report

India (*P. minor* & *P. roseus*)

Breeding period: Erratic, depending on the rains, but mainly September-November

Both species attempt to breed regularly at two sites in the Wild Ass Sanctuary in the Little Rann of Kachchh – Zinzuwada salt pan and Purabcheria mud flats.

Zinzuwada Salt Pan (P. minor): On a visit to Zinzuwada on 14th October, the pan was completely dry and the colonies were abandoned, but 11,315 nests were recorded in three separate clusters 0.5 to 1.0 km apart. There were 7,808 Lesser Flamingo nests and 3,508 Greater Flamingo nests, judging by the nest size. On the nesting site, there were at least 5,900 (52.2%) intact eggs in the colony indicating high hatching failure. Officials of the state forest department reported that at least 2500-3000 chicks had hatched and moved with their parents. B. Parasharya (parasharya@satyam.net.in)

Purabcheria Salt Pan (P. minor): 1,100 nests and approximately 12,000 adult birds, most displaying, were recorded on 28 June, 2006. Nesting was unsuccessful due to egg pilferage by local fishermen. B. Parasharya ((parasharya@satyam.net.in)

Great Rann of Kachchh (P. roseus): The main Greater Flamingo breeding site in India is 'Flamingo City' in the Great Rann of Kachchh.

"Flamingo City", Great Rann of Kachchh: Nesting of Greater Flamingo on 'Flamingo City' is not yet confirmed but nesting is expected as the Rann is still inundated. (B. Parasharya)

East Africa & southern Africa

Tanzania (*P. minor & P. roseus*)

Breeding period: Erratic, depending on the rains, but mainly November-February

Lake Natron: The birds began breeding in November 2005 (O. Evans, *in litt*.) and were reportedly breeding in large numbers in January 2006 (M. Aeberhard *in litt*.). However, there are no data on how many pairs bred or how many chicks fledged (N. Baker)

Botswana (*P. minor & P. roseus*)

Breeding period: Erratic, depending on the rains, but mainly November-February

Sua Pan: With over twice the average annual rainfall during the breeding season, Sua Pan once again became a vast wetland, and both species took advantage of the excellent breeding conditions. Based on aerial photographs, an estimated 40,700 pairs of Lesser Flamingos and 12,200 pairs of Greater Flamingos occupied nests at the end of January 2006. Most nested at the main Lesser Flamingo colony, with other Greater Flamingo colonies positioned on small calcrete islands elsewhere.

In late March, a survey of the still very wet pan revealed six individual crèches, far from the main colony, totalling over 18,000 chicks, with smaller crèches in and around the colonies adding to the numbers. Many of the chicks had already fledged. In early April, counting was still in progress, but breeding continued and over 20,000 flamingos were still sitting on nests. A bumper year indeed and a joy to witness! (G. McCulloch, *in litt.*).

Namibia (*P. minor & P. roseus*)

Breeding period: Erratic, depending on the rains, but mainly November-February

Etosha Pan: Namibia also received heavier than normal rains during the traditional breeding season, but perhaps too much, as an aerial survey in mid-March revealed only about 2,500 flamingos on Etosha Pan (4,760 km^2), very little breeding, and much of the main breeding island covered with water. No flamingos were seen on the pan during an overflight in mid-April (W. Versfeld, *in litt.*).

The first signs of breeding were seen in mid-June, but since the pan had begun to dry out by that time, leaving the main breeding island no longer surrounded by water, the birds established three new breeding sites in areas of the pan with more water. During an aerial survey in mid-August, observers estimated approximately 15,000 flying birds of both species, as well as fledged young, and a small crèche of approximately 2,500 unfledged birds (W. Versfeld, *in litt*.)

EX-SITU BREEDING SUMMARY

Three flamingo species (Greater *P. roseus*, Caribbean *P. ruber* and Chilean *P. chilensis*) breed regularly in zoos and other captive facilities. The following table summarises captive flamingo populations and breeding success during 2005-06. (Rebecca.Lee@wwt.org.uk)

Species	No. of zoos	No. of individuals	No. hatched
Caribbean Flamingo (*Phoenicopterus ruber*)	152	4080	133
Greater Flamingo (*Phoenicopterus roseus*)	110	3345	110
Chilean Flamingo (*Phoenicopterus chilensis*)	157	4438	128
Lesser Flamingo (*Phoenicopterus minor*)	53	1016	4
Andean Flamingo (*Phoenicoparrus andinus*)	4	36	0
James's Flamingo (*Phoenicoparrus jamesi*)	2	4	0

Source: International Species Information System

IN SITU RINGING SUMMARY

Bolivia

From 21-24 March, 2006, 474 Andean and 86 James' flamingo chicks were banded at Laguna Colorada, Bolivia, as part of the regional banding program of the Grupo para la Conservación de Flamencos Altoandinos (GCFA). The banding was coordinated by the Centro de Estudios en Biología Teórica y Aplicada (BIOTA), with collaboration from WCS-Bolivia and the park guards of the Reserva Nacional de Fauna Andina Eduardo Avaroa. (Rocha and Rodriguez, Res. Reports)

Chile

From 17-21 April, 2006, 493 Andean Flamingo chicks were banded at Barros Negros, Salar de Atacama, Chile, also under the GCFA regional banding program. The banding was coordinated by the Corporación Nacional Forestal (CONAF). CONAF personnel and guides from Toconao, a village near the reserve installed the corral, and a training workshop was also held for participants. (Rocha and Rodriguez, Research Reports)

Bahamas & Caribbean

Mexico (*P. ruber*)

No flamingos were banded in Mexico during 2006 (R. Migoya)

Venezuela (*P. ruber*)

No flamingos were banded in Venezuela during 2006 (F. Espinoza)

Mediterranean & West Africa

Algeria (*P. roseus*)

214 chicks were ringed on 11 August at Garaet Ezzemoul (B. Samraoui)

France (*P. roseus*)

777 *P. roseus* chicks were ringed with PVC bands on 27 July at the Fangassier colony in the Camargue. (A. Béchet)

Germany

On 26 July, one *P. roseus* and four *P. chilensis* chicks in the Zwillbrocker Venn breeding colony were ringed. The ringing was done by a mixed German/Dutch team of 20 persons (J. Treep)

Italy (*P. roseus*)

On 12 July, 450 *P. roseus* chicks were ringed at the Comacchio salt pans. (N. Baccetti)

Sardinia (*P. roseus*)

On 29 July, 493 *P. roseus* chicks were ringed at Saline di Macchiareddu. (N. Baccetti)

Spain (*P. roseus*)

400 chicks were ringed on 2 July at Ebro Delta; 611 were ringed at Fuente de Piedra on 15 July (inf. M. Rendón-Martos, J.M. Ramírez, A.Garrido (C.M.A. Andalucia)

Turkey

On 31 July, 270 Greater Flamingos were ringed with PVC rings at Gediz Delta, Camalti Saltpans (A. Béchet and Özge Balkiz, *in litt.*).

Southwest & South Asia

No flamingo ringing reported from Southwest or South Asia in 2006.

East Africa & Southern Africa

No flamingo ringing reported from East Africa or southern Africa in 2006.

RESEARCH REPORTS

Banding program for threatened high-Andes flamingos

Rocha, O. O.[1] and Rodríguez, E. [2]
[1]Centro de Estudios en Biología Teórica y Aplicada – BIOTA, Bolivia (orocha@entelnet.bo)
[2] Corporación Nacional Forestal de Chile – CONAF (erodrigu@conaf.cl)

In 2001 the Grupo para la Conservación de Flamencos Altoandinos (GCFA) designed a regional banding program for the threatened high-Andes flamingo species. This program integrates the long-term efforts of the Corporación Nacional Forestal (CONAF) in Chile with new banding activities at Laguna Colorada, Bolivia, a key flamingo breeding site. The GCFA and local institutions receive support form the Wildlife Conservation Society and the BirdLife International/Río Tinto Partnership Fund.

CONAF banded flamingos in Chile from 1988 to 1997. During this period, 7,263 chicks were banded in 9 campaigns in the following proportions: 86% *Phoenicoparrus andinus*, 13.5% *Phoenicopterus chilensis* and 0.50% *Phoenicoparrus jame*si. In 2004, 1,056 *P. andinus* and 14 *P. chilensis* were banded. In Bolivia, 820 *P. jamesi* chicks were banded between 2002 and 2005 in 4 campaigns. The local institution carrying out these activities is the Centro de Estudios en Biología Teórica y Aplicada (BIOTA) in coordination with Servicio Nacional de Áreas Protegidas (SERNAP).

The current regional program standardized the band codes and established a centralized database to manage the banding and re-sighting data. The GCFA has designed and printed a poster providing information on flamingo species, the banding program, and how to report re-sightings. This poster has been distributed to communities, hostels, restaurants, and tourism operators throughout the region.

Banding results 2006
From 21-24 March, 2006, flamingo chick banding was carried out at Laguna Colorada, Bolivia, coordinated by BIOTA and with collaboration from WCS-Bolivia and the park guards of the Reserva Nacional de Fauna Andina Eduardo Avaroa. On 23 March, the field team conducted a flamingo census and scouted the area to determine the location of the installation of the banding corral. Team leaders conducted a training workshop for park guards and volunteers to explain the objectives, coordinate logistics and describe methods in detail. A total of 560 chicks were banded (474 Andean and 86 James' Flamingos). We obtained 40 blood samples for health evaluations. This is the fourth year this activity has been carried out and each year we improve procedures. We met our target number of chicks banded.

From 17-21 April, 2006, flamingo banding was carried out at Barros Negros, Salar de Atacama, Chile. The banding corral was installed on 18 April by CONAF staff and local guides from Toconao, a village near the reserve. A training workshop was also held for participants. Banding occurred on April 19th, and a total of 493 Andean Flamingo chicks were banded.

Results
To date 9,136 chicks have been banded and 263 re-sightings recorded, representing 2.8% of banded birds by the regional banding program. The percentages of sightings by country are shown in Table 1. The sites with the most sighting records are Rio Xanaes (62) and Pozuelos (8) in Argentina, lakes Poopo and Uru Uru (32) and Sakewa (20) in Bolivia, Salar de Atacama (20) and Quepiaco (9) in Chile and Paracas (43) in Perú.

Table 1. Percent of sightings by country

Country	Flamingo Re-sightings	%
Argentina	83	31.6
Bolivia	69	26.2
Chile	59	22.4
Perú	51	19.4
Brasil	1	0.4
Total	263	100.0

Based on re-sighting observations, we detect a tendency for flamingos banded towards the end of the summer (March and April) in the high-Andes and Salar de Atacama to move to lower altitude lakes where weather conditions are less severe to spend the winter, such as, Laguna Pozuelos, Argentina, Lakes Poopó y Uru Uru, lakes Sakewa and Sabaya. in Bolivia. They are also observed in lowland chaco-pampa wetlands such as Mar Chiquita, the Rio Xanaes estuary and Melincue in Argentina. These observations coincide with a satellite telemetry study of Andean flamingos.

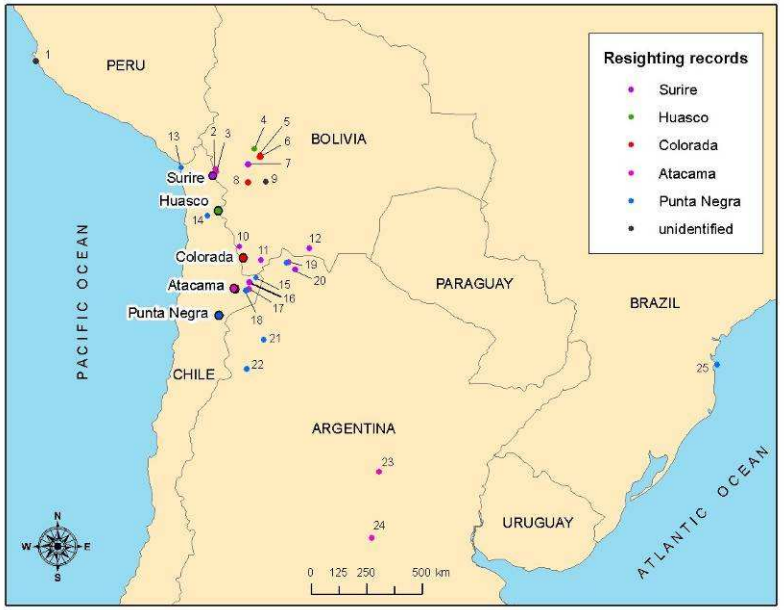

Fig. 1. References of resighting sites by country: **Peru:** 1. Paracas, **Bolivia:** 2. Macaya Lake, 3. Sakewa Lake, 4. Huayrapata Lake, 5. temporary pools SW Uru Uru city, 6. Uru Uru Lake, 7. Jankokala Lake, 8. Julián Lake,. 9. Poopo Lake, 10. Cachi Lake, 11. Mama Kumu Lake, 12. Grande Lake, **Chile:** 13. Arica, 14. Pica, 15. Salar de Tara, 16. Quepiacó, 17. Aguas Calientes II, 18. Lejía Lake, **Argentina:** 19. Pozuelos Lake, 20. Runtuyoc Lake, 21. Hombre Muerto, 22. Purulla Lake, 23. stuaries of Xanaes River, 24. Las Tunas Lake, **Brazil:** Santa Caterina.

Abundancia poblacional de flamencos altoandinos: resultados preliminares del último censo simultáneo

Population abundance of high-Andes Flamingos: preliminary results from the latest international simultaneous census, 2005

[1]Caziani, S.M., [2]Rocha Olivio, O., [4]Romano, M., [1]Tálamo, A., [1]Derlindati, E.J., [5]Ricalde, D., [3]Rodríguez Ramírez, E., [6]Sosa, H. y [7]Sureda, A.L.

[1] Consejo de Investigación, Universidad Nacional de Salta-CONICET, Buenos Aires 177, 4400, Salta, Argentina.
[2] Centro de Estudios en Biología Teórica y Aplicada - BIOTA, Casilla de Correo 4778, La Paz, Bolivia. E-mail: orocha@entelnet.bo
[3] CONAF II Región, Av. Argentina 2510, Antofagasta, Chile.
[4] Centro de Investigaciones en Biodiversidad y Ambiente ECOSUR, Pasaje Sunchales 329, 2000, Rosario, Argentina.
[5] Perú Verde. Manuel Bañón 461, San Isidro. Lima 27. Perú.
[6] Dirección de Recursos Naturales Renovables, Gobierno de Mendoza, Juan B. Justo 381, 5501, Godoy Cruz, Mendoza. Argentina
[7] Administración de Parques Nacionales, Delegación Regional Noroeste, Santa Fe 23, 4400, Salta, Argentina.

Resumen
De las seis especies de flamencos, las más raras y menos conocidas son el flamenco de James y el flamenco andino. Estas especies habitan principalmente humedales en los Altos Andes y Puna de Argentina, Bolivia Chile y Perú. Con el objetivo de actualizar la distribución global y abundancia de ambas especies, realizamos el quinto censo simultáneo de flamencos altoandinos en el verano de 2005. De 142 humedales relevados en el 89.7% encontramos flamencos. Las abundancias totales fueron 114 317 flamencos de James y 31 617 flamencos andinos. El 52% de los flamencos de James se concentraron en cinco lagos: Colorada, Grande, Khara Grande, Salar de Surire y Poopó.; y el 50% de los flamencos andinos se concentraron en: Negro Francisco, Salar de Surire, Vilama, Colorada y Salar de Atacama. Los patrones de distribución fueron similares a los de censos estivales previos, pero el flamenco de James casi duplicó las abundancias previas, en parte por los grandes números encontrados en Colorada, y en parte por la adición de 50 humedales nuevos relevados. El flamenco andino mantuvo números similares a los de los censos estivales previos.

Abstract
Of the world's six flamingo species, the rarest and least known are the James' Flamingo and the Andean Flamingo. These species inhabit only the lakes in the puna and high Andes of Argentina, Bolivia, Chile and Peru. To update information on global distribution and abundance of both species, we conducted a fifth simultaneous census during summer 2005. Of 142 wetlands surveyed, 89.7% had flamingos. Total counts were 114,317 James' Flamingos and 31,617 Andean Flamingos. James' Flamingos congregated at five lakes: Colorada, Grande, Khara Grande, Salar de Surire and Poopó. 50% of the Andean Flamingo population was on Negro Francisco, Salar de Surire, Vilama, Colorada and Salar de Atacama. The two species showed distribution patterns similar to those observed in previous summer censuses, but number of James's Flamingo was nearly double that found in earlier censuses, mostly explained by large numbers at Colorada, and by the addition of fifty new surveyed wetlands. The number of Andean Flamingos remained similar to estimates from previous summer censuses.

Introducción
Los flamencos de James y andino (*Phoenicoparrus jamesi y P. andinus*) son las especies más raras entre las seis especies de flamencos del mundo (Rose y Scott 1994), y están mayormente restringidas al altiplano, un ambiente sumamente frágil y de condiciones ambientales extremas,

sometido a diversas presiones de uso como la minería, el turismo sin regulación y sobrepastoreo.

Por tal motivo, durante los veranos de '97 y '98, y los inviernos de '99 y '00, el Grupo de Conservación Flamencos Altoandinos ha venido realizando censos exhaustivos enfocados en estas dos especies. Estos censos se desarrollaron simultáneamente en toda el área de su distribución potencial en Argentina, Bolivia, Chile, y Perú, con el objetivo de estimar el tamaño de sus poblaciones, explorar nuevos sitios, detectar colonias de nidificación, identificar áreas clave y elaborar propuestas integradas de conservación y manejo de los flamencos altoandinos y los humedales que habitan, en una escala regional (Caziani *et al*. in rev.). A partir de los resultados de estos censos se concluyó que: (1) El flamenco andino se encuentra en un estado de conservación más crítico que el flamenco de James, (2) las poblaciones de flamencos de James duplicaron en tamaño a las poblaciones de flamencos andinos, (3) la distribución del flamenco andino es más dispersa, incluyendo numerosos humedales fuera de la eco-región andina durante el invierno austral, y (4) las colonias de nidificación del flamenco andino se concentran en Chile, siendo el tamaño de las colonias observadas durante 1997 y 1998, mucho menor que las registradas durante los '80. Los patrones observados en la distribución y concentración de las abundancias de flamencos han resultado altamente consistentes en el período estudiado, sugiriendo que este tipo de monitoreo es útil y que la simultaneidad en las observaciones asegura una estimación insesgada de las abundancias poblacionales (Caziani et al. in rev.). En base a estos resultados, y considerando que las amenazas por actividades humanas, especialmente la minería y el turismo sin regulación, mostraron un aumento considerable en los Andes Centrales desde el año 2000, se planteó la necesidad de realizar un nuevo censo internacional simultáneo de flamencos altoandinos en enero de 2005, con el objetivo de actualizar la estimación global de sus poblaciones.

Métodos
Área de estudio
El área censada abarcó la distribución potencial de los flamencos de James y andino en el Altiplano de los Andes Centrales de Argentina, Bolivia, Chile y Perú (Fig. 1), en la estación reproductiva (23 al 30 de enero de 2005).

Estimación de las poblaciones de flamencos
Para estimar el tamaño de las poblaciones usamos una metodología de censo estandarizada a partir de los cuatro censos previos (Valqui *et al.* 2000, Caziani *et al.* en rev.). Para minimizar el error debido a movimientos de flamencos entre humedales, censamos simultáneamente en los cuatro países y en un período no mayor a una semana. Esto nos permitió asumir que los datos fueron independientes, por lo que la estimación de la abundancia global de las dos especies es el resultado de la suma de las abundancias de cada humedal. En cada humedal establecimos puntos de observación sobre la costa, desde donde censamos con telescopios, binoculares y contadores manuales cada especie por separado, y el total de flamencos. Para grupos de menos de 4000 individuos, contamos directamente todos los individuos; en grupos de más de 4000 individuos, contamos los flamencos en bloques de entre 10 a 100 individuos (Bibby *et al.* 1992). Cada conteo fue realizado al menos por dos personas, y usamos la media aritmética como abundancia estimada para el humedal censado. Complementariamente, como información adicional registramos también la abundancia de flamencos australes (*P. chilensis*).

Resultados
Censamos 142 humedales en Argentina, Bolivia, Chile y Perú, entre los S 14º47'00" y los S27º30'00", y en altitudes que fueron desde Mejía y Punta Bombón en la costa peruana (2 m.s.n.m.) hasta laguna Guacha en Bolivia (4795 m.s.n.m.). Detectamos flamencos en el 89.7% de los humedales. Cincuenta nuevos sitios se adicionaron con respecto a los censos previos.
Las abundancias totales para cada especie fueron: 114 317 flamencos de James, 31 617 flamencos andinos, 27 906 flamencos australes y 13 170 flamencos sin identificar la especie.

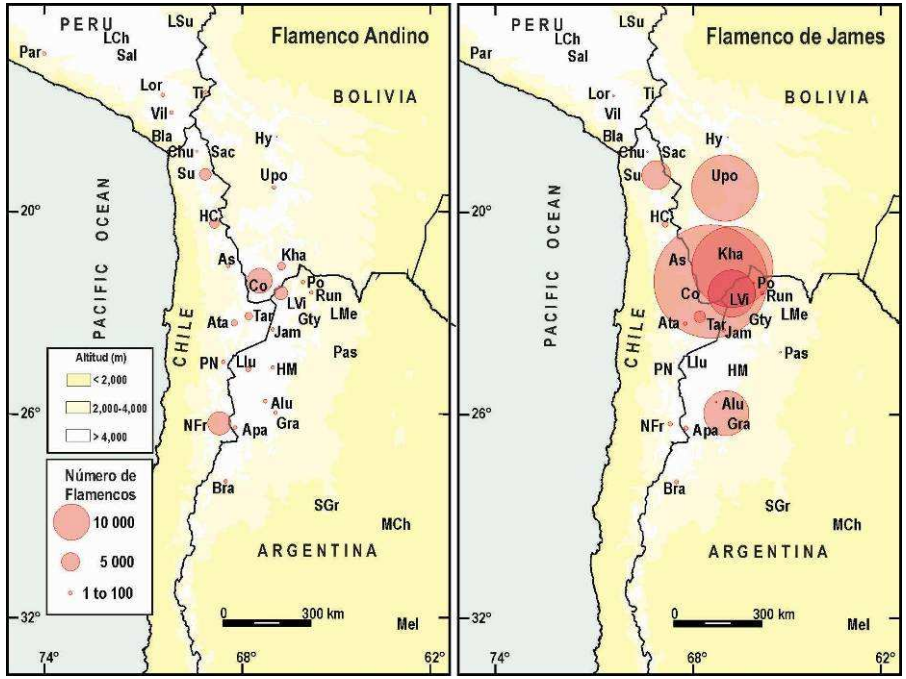

Figura 1. Abundancias totales de las dos especies de flamencos altoandinos. Se indican las Unidades de Censo (conjuntos de humedales agrupados por proximidad geográfica). Referencias: ARGENTINA: LVi (Vilama), Po (Pozuelos), Run (Runtuyoc), LMe (Lagunas Mellizas), Jam (Jama), Gty (Guayatayoc), Llu (Llullaillaco), HM (Hombre Muerto), Pas (Pastos Grandes), Alu (Alumbrera), Gra (Grande), Bra (Brava), MCh (Mar Chiquita), SGr (Salinas Grandes), Mel (Melincué); BOLIVIA: Hy (Huayrapata), Sac (Sacabaya), UPo (Poopó), Kha (Khastor), Co (Colorada); CHILE: Chu (Chungará), Su (Salar de Surire), HC (Huasco-Coposa), As (Salar de Ascotán), Tar (Tara), Ata (Salar de Atacama), PN (Punta Negra), NFr (Negro Francisco); PERU: Ti (Titicaca), Par (Parinacochas), LCh (Lagunillas Chico), LSu (Lago Suches, Puno), Sal (Salinas), Lo r (Loriscota), , Vil (Vilacota), Bla (Laguna Blanca).

Laguna Colorada, laguna Grande, laguna Khara Grande, el Salar de Surire y el lago Poopó concentraron el 52% de la abundancia de flamenco de James (Fig. 1). La laguna Negro Francisco, el Salar de Surire, Vilama, Laguna Colorada y el Salar de Atacama concentraron el 50% de los flamencos andinos (Fig. 1), mientras que para el flamenco austral sólo dos sitios, el lago Poopó y el Salar de Surire concentraron el 52% de la población en el área de simpatría con las otras dos especies.

Discusión

Las dos especies altoandinas mostraron patrones de distribución similares que en censos estivales anteriores. En cuanto a las abundancias, es destacable el aporte de los nuevos sitios censados al número total de flamencos, en especial de James, no así para el flamenco andino, que no muestra variaciones importantes con respecto a la adición de nuevos sitios (Caziani *et al.* en rev.). Esta respuesta podría deberse al comportamiento más gregario en el flamenco de James, especie que se agrega en grandes concentraciones, independientemente del tamaño del humedal (Caziani y Derlindati 2000, Caziani *et al.* 2001). El Flamenco andino tuvo un patrón de distribución más homogéneo, con grupos más pequeños distribuidos en gran cantidad de humedales.

Como sitios claves por la proporción de la población que soportan, destacan para el flamenco de James: Laguna Grande en Argentina, laguna Colorada, laguna Khara Grande y lago Poopó en Bolivia, y Salar de Surire en Chile. Para el flamenco andino destacan: lagunas de Vilama en Argentina, laguna Colorada en Bolivia y laguna Negro Francisco, Salar de Surire y Salar de Atacama en Chile (Fig.1).

En el área de simpatría con las otras dos especies, el flamenco austral mostró un patrón más heterogéneo que las especies andinas. Estuvo presente en numerosos humedales, pero las abundancias variaron enormemente entre años (Caziani *et al.* en rev.).

Los resultados del censo 2005 corroboran la necesidad de esfuerzos coordinados e integrados de conservación y manejo entre los cuatro países que comparten la distribución de estas dos especies. En tal sentido, el censo proveyó de insumos técnicos actualizados para la formulación del Proyecto de Red de Humedales Altoandinos y ecosistemas asociados, basada en la distribución de las dos especies de flamencos altoandinos (Marconi 2005). Este proyecto iniciado en octubre de 2005, prevé en una primera etapa de tres años, la conformación de una red básica de 14 humedales prioritarios, donde se desarrollarán actividades y proyectos piloto de manera coordinada en: investigación y monitoreo (fortalecimiento del programa de anillamiento, integración y ampliación del programa de seguimiento satelital); conservación y manejo transfronterizo (plan de gestión integrado de la red de humedales, protección coordinada de colonias de nidificación); concientización pública y coordinación interinstitucional.

Agradecimientos

Este trabajo es el resultado de la colaboración entusiasta de más de 80 biólogos, estudiantes y guardaparques de Argentina, Bolivia, Chile y Perú. El censo simultaneo fue subsidiado por The Wildlife Conservation Society, the Migratory Species Convention, y the Ramsar Convention. Las instituciones locales que apoyaron el estudio fueron: en Chile: CONAF, la Unión de Ornitólogos (UNORCH), Universidad Arturo Prat de Iquique, la compañía minera Escondida, Quiborax, Quebrada Blanca, Sociedad Chilena de Litio S.A., Cerro Colorado, El Abra, SQM Salar, y Doña Inés de Collahuasi; en Argentina: Administración de Parques Nacionales, Consejo de Investigación de la Universidad Nacional de Salta, y CONICET; en Bolivia: el Centro De Estudios en Biología Teorica y Aplicada (BIOTA), Guardaparques de la Reserva Nacional de Fauna Eduardo Avaroa, WCS-Bolivia; en Perú: Perú Verde. También queremos agradecer a Kristina Cockle, Patricia Marconi, y Carlos Trucco por los comentarios sobre el manuscrito. Dedicamos este trabajo a la memoria de nuestra amiga y colega, a quien queremos honrar con el puesto de primer autor, y quien dedicó gran parte de su vida al estudio y conservación de estas especies y sus ambientes, Sandra Caziani. Gracias Sandra.

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Winter abundance in Laguna Melincué, Argentina

Romano, M.[1,2], Barberis, I.[1,3], Pagano, F.[1,4] and Romig, J.[1]

[1] *Centro de Investigaciones en Biodiversidad y Ambiente (Ecosur). Pasaje Sunchales 329, 2000 Rosario, Santa Fe, Argentina.*
[2] *Grupo para la Conservación de los Flamencos Altoandinos (GCFA).*
[3] *Facultad de Ciencias Agrarias, Universidad Nacional de Rosario, Zavalla, Santa Fe, Argentina.*
[4] *Facultad de Ciencias Veterinarias, Universidad Nacional de Rosario, Casilda, Santa Fe, Argentina*.

Laguna Melincué in Santa Fe Province, Argentina is a saline lake of about 11,000 ha located in the center of the country's agricultural region. This lowland wetland is a key site for flamingos during winter when some of lakes in the high-Andes freeze over, particularly the Chilean Flamingo (*Phoenicopterus chilensis*) and the rare Andean Flamingo (*Phoenicopterus andinus*). For this reason, Laguna Melincué has been included as one of the 14 priority wetlands that will be a focal site for the Network for Conservation of Priority Areas for Flamingo Conservation. We are focusing on improving the knowledge about Andean Flamingo ecology and establishing the ecological baselines at this key lowland wetland site. We carried out two winter surveys from 20-22 August 2005 and 5-7 August 2006. Each year we recorded environmental variables and counted and identified all flamingos present along four transects parallel to the coastline using binoculars or spotting scopes and manual counters. Each count was done by at least two people, and the mean used as the estimated abundance. The transects were travelled by vehicle and on foot. In 2005, we recorded 3,241 *P. chilensis*, 4,840 *P. andinus*, and 400 *Phoenicopterus* sp. In 2006, we registered 4,629 *P. chilensis*, 5,719 *P. andinus*. These results highlight the importance of this lowland wetland for flamingo conservation, mainly for *P. andinus*, because in winter Laguna Melincué hosts more than 17% of the world population estimated in about 34,000 individuals (Caziani *et al.* in review).

* *This is a project of the Grupo para Conservación de Flamencos Altoandinos (GCFA). See report in this issue.*

Abundancia de tres especies de flamencos en le Lago Uru Uru, Oruro, Bolivia

Rocha Olivio, O., Vargas, M. y Palenque, K.
Centro de Estudios en Biología Teórica y Aplicada
Email: orocha@entelnet.bo

Resumen
Realizamos un seguimiento durante 20 meses continuos, de las abundancias de tres especies de flamencos (*Phoenicoparrus andinus*, *P. jamesi* y *Phoenicopterus chilensis*) en el lago Uru Uru ubicado en la Puna de Bolivia. Los resultados reflejan que no existe una marcada preferencia estacional y los flamencos de las tres especies se presentan irregularmente a lo largo de todo el año. Generalmente se presenta una dominancia de *P. chilensis* sobre las otras

dos especies, excepto durante mayo a julio 2006 donde existe una mayor abundancia de *P. andinus*. El lago Uru Uru en algunos meses puede albergar el 10% de la población global de *P. andinus*. La tercera especie *P. jamesi* es la menos abundante.

Abstract
We conducted monthly counts of three flamingo species (*Phoenicoparrus andinus*, *P. jamesi* y *Phoenicopterus chilensis*) in Lake Uru Uru of the Bolivian Puna. Our results show that all three species are present throughout the year and there is no seasonal preference of use. In general, *P. chilensis* is more abundant than the other two species, except from May to June 2006 when *P. andinus* was more abundant. Lake Uru Uru can at times hold 10% of the global population of *P. andinus*. *P. jamesi* is the least abundant at this lake.

Introduccion
En los humedales altoandinos de Altiplano de Bolivia habitan tres especies de flamencos, *Phoenicoparrus andinus*, *P. jamesi* y *Phoenicopterus chilensis*. En esta región del país existen dos centros de distribución importantes para estas especies, el suroeste de Potosí y el Altiplano central donde se encuentran los lagos Poopó y Uru Uru y donde hasta el momento se carecía de información detallada al respecto. Ambos lagos son el hábitat con una alta concentración de flamencos en la estación invernal (Rocha 2002), sin embargo existen registros extraordinarios de *P. andinus* en verano con estimaciones de 18.000 individuos en diciembre 1972 (Kahl 1975) y de 8.479 individuos en septiembre 2001 (Rocha *et al.* 2002). Estas especies se encuentran amenazadas principalmente por la destrucción o modificación de su hábitat, la caza furtiva y el comercio ilícito, por lo cual surge la necesidad de hacer un seguimiento de la abundancia de flamencos en este humedal. El lago Uru Uru presenta niveles altos de contaminación minera (Beveridge *et al*. 1985, Apaza *et al*. 1996) y recibe una gran cantidad de desechos sólidos y aguas residuales provenientes de la ciudad de Oruro (Liberman *et al.* 1991), lo cual es una amenaza potencial para las aves acuaticas que habitan estos lagos.

Area de estudio
El lago Uru Uru está ubicado al noreste del departamento de Oruro (18º02' S y 67° 05' W), se encuentran dentro de la ecoregión de la Puna Sureña árida a semiárida (Ribera 1992, Ibisch *et al*. 2003) a una altura promedio de 3.686 m.s.n.m.. La superficie media del lago es de 260 km^2 y se considera que es muy variable en función de su recarga en el período de lluvias (diciembre - marzo) (Rocha 2002). El lago se encuentra dentro de los límites del sitio Ramsar o Humedal de Importancia Internacional lagos Poopó y Uru Uru. El clima en general es frío y seco, con temperaturas medias anuales inferiores a los 10º C, se registra una precipitación promedio de 346 mm y entre 6 y 9 de meses áridos (Navarro 2002, Ibisch *et al*. 2003).

Methodos
Efectuamos censos mensuales de tres especies de flamencos durante el período enero 2005 hasta octubre 2006) Para las observaciones a distancia se utilizaron telescopios 15x - 60x apoyados por contadores manuales. Se utilizó el método del doble conteo repetitivo, que considera el cálculo simultáneo de dos o más censadores (Parada 1987, Rocha y Quiroga 1997). Georeferenciamos cada punto de observación con un GPS y usamos los mismos sitios en todos los conteos para mejor consistencia y hacer posible comparaciones posteriores.

Resultados
Hiciemos un seguimiento mensual de la abundancia de tres especies de flamencos, desde enero 2005 hasta octubre 2006 (20 meses). Los picos más altos de abundancia de flamencos totales están en los meses de diciembre y agosto del 2005 y julio 2006 y, los registros más bajos en enero, febrero y mayo del 2005, así como en febrero y abril del 2006. No existe una marcada preferencia estacional y los flamencos se presentan irregularmente a lo largo de todo el año. Generalmente se presenta una dominancia de *P. chilensis* sobre las otras dos especies, excepto en el período de mayo a julio 2006 donde existe una mayor abundancia de *P. andinus.* La tercera especie *P. jamesi* es la menos abundante (Figura 1). Se presentan dos registros significativos de *P. andinus* en mayo y julio 2006 con 3.323 y 3.212 individuos respectivamente.

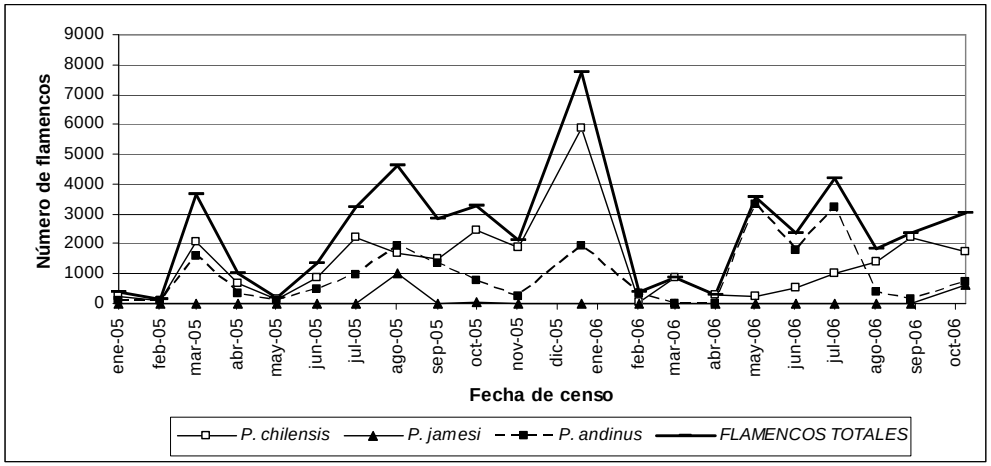

Figura 1. Censos mensuales de tres especies de flamencos en el Lago Uru Uru, Bolivia (enero 2005 – octubre 2006).

Discusion

El lago Uru Uru se constituye en un sitio de distribución norte importante para las tres especies de flamencos, con un considerable número de flamencos de forma regular y permanente a lo largo de todo el año. Se presenta una dominancia de *P. chilensis* sobre las otras dos especies de flamencos, sin embargo también *P. andinus* y *P. jamesi* utilizan el lago con frecuencia y con cierta preferencia de *P. andinus* en invierno.

En las tres especies de flamencos aparentemente no existe un patrón de abundancia estacional marcada como en las lagunas del suroeste de Potosí, donde los flamencos altoandinos se concentran en verano (octubre – marzo), que coincide con la época de reproducción y, abandonan esta zona en invierno donde el espejo de la mayoría de los cuerpos de agua se congela por las bajas temperaturas extremas (Rocha 2006). La utilización durante el invierno de los Lagos Poopó y Uru Uru puede reflejar las condiciones térmicas más benignas, que por su gran superficie y por su alto contenido de sal, inhibe el congelamiento del espejo de agua en esta época y favorece el asentamiento de los flamencos.

De acuerdo a los tres censos simultáneos internacionales de flamencos altoandinos, realizados en veranos (1997, 1998 y 2005), para *P. andinus* se estima una población global alrededor de 30.000 individuos (Valqui *et al*. 2000, Caziani *et al*. 2006), por lo tanto el lago Uru Uru en algunos meses del período de estudio albergo el 10% de la población total de esta especie.

Con un monitoreo a largo plazo de las poblaciones de flamencos incluyendo el Lago Poopó y otras variables como concentración de alimento potencial, con estudios limnológicos y características físico-químicas de las aguas, podremos entender mejor la dinámica de las fluctuaciones poblacionales de flamencos y sus interacciones con el hábitat en estos ecosistemas.

Los humedales de importancia invernal para los flamencos altoandinos como el Lago Poopó y Uru Uru a pesar de ser Sitio Ramsar, presentan un panorama complejo de conservación, y ningún control sobre las actividades en sus cuencas. Probablemente su estado actual es solo resultado de la capacidad de amortiguamiento que le otorga su gran tamaño (Caziani *et al*. no pub.). Actualmente se viene gestionando la declaratoria de los Lagos Poopó y Uru Uru como un área protegida departamental, lo cual podría asegurar la conservación de estos humedales.

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Breeding and banding of Greater Flamingo *Phoenicopterus roseus* in Algeria, August 2006

[1,3] Boulkhssaïm, M., [1,2] Houhamdi, M., [1,3] Saheb, M., [1,2] Samraoui, F & [1,2] Samraoui, B.
[1]*Laboratoire de Recherche des Zones Humides, University of Annaba, Algeria*
[2]*Département de Biologie, Université de Guelma, Algeria*
[3]*Centre Universitaire d'Oum El Bouaghi, Algeria*
E-mail : bsamraoui@yahoo.fr

Summary
Following four favourable wet years and the institution of protective measures to secure the safety of the breeding colony, the Greater Flamingo managed to breed at Garaet Ezzemoul, Algeria in 2006 for the second year in a row. A banding scheme, the first of its kind in North Africa, was launched and 212 chicks were banded on 11 August, 2006. Noteworthy were the help and enthusiasm of locals, so far perceived as the main threat to the breeding colony, who contributed decisively to the banding operation which was successful in raising public awareness. The use of mobile hides was instrumental in monitoring the breeding colony and recording over 6,000 band readings.

Introduction
The discovery in 2005 of a sizeable breeding colony of Greater Flamingo *Phoenicopterus roseus* in the Eastern Hauts Plateaux, Algeria (an estimated 6,000 pairs bred in 2005) offered a rare opportunity to study the species in an unmanaged setting but also presented us with multiple conservation problems as illegal hunting and egg pilfering had previously caused breeding to fail (Saheb et al., 2006).

Study Site
The colony was located on an islet of 0.9ha close to the northern shore of a vast seasonal salt lake, Garaet Ezzemoul (35° 53.137´N, 6° 30.200´E, a lt. 900m). The islet was used for practice bombing during the Second World War and so it has not been unusual to come across unexploded bombs scattered around the islet or to fall into one of the numerous bomb craters. This site, with a surface area of 6,000 ha, is part of a large wetland complex (Fig. 1) made up mostly of shallow salt lakes which in favourable years becomes one of the most important wintering and stopover sites for thousands of waterbirds (Saheb, 2003; Boulekhssaïm *et al*., In press 2006). The salt lake complex of Oum El Bouaghi is also an important breeding area for many species like the Greater Flamingo *Phoenicopterus roseus* (Samraoui *et al*. In press 2006), the Avocet *Recurvirostra avosetta*, the Black-winged Stilt *Himantopus himantopus* (Saheb *et al*., 2004), the Common Shelduck *Tadorna tadorna* (Boulekhssaïm *et al*., 2004; In press 2006) and the Coot *Fulica atra* (Samraoui & Samraoui, in press).

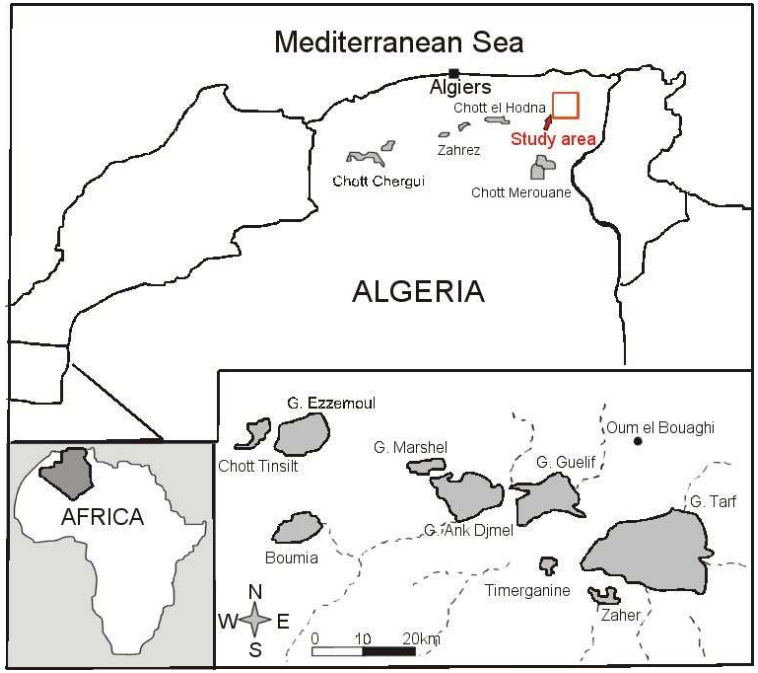

Fig. 1. Wetland complex in the Eastern Hauts Plateaux of Algeria containing the Garaet Ezzemoul study site.

The reproduction in 2005 and 2006
In 2005, an estimated 6,000 pairs bred and with over 5,000 fledged chicks, the colony achieved a breeding success of 92% (Samraoui *et al.* In press 2006). In 2006, an estimated 4,750 pairs bred producing an estimated 3,750 fledged chicks and achieving a breeding success of 79%. In both years, egg-laying started in May, much later than in Europe (Johnson, 1983; Rendón Martos *et al*., 1991). Incubation of eggs and chicks lasted till mid-July with many late-breeding birds reusing vacated nests.

The use of mobile hides
In order to monitor the breeding colony, we needed to approach it as closely as possible; no vantage point overseeing the islet was available. As the Greater Flamingo is very sensitive to human disturbance, we decided to build mobile hides and initiated the approach only after hatching began. Different types of floating hides were constructed and tried in 2005 and 2006 before we settled on a metallic framework. This somewhat rigid hide, though slightly cumbersome is spacious enough to house three to four people and is set up on a series of plastic jerry cans which were used for flotation. These hides, if their movement is slow, do not elicit any fear response from the colony which can be approached at a close range.

Outside G. Ezzemoul, these mobile hides were unsuccessful in getting close to foraging Greater Flamingo at G. Ank Djmel, the only other site where these attempts were made. Slender-billed Gull *Larus genei* and Avocet *R.. avosetta* would alight close by but flocks of Greater Flamingo maintained a safe distance of over three hundred meters.

We started using these hides in 2005 and nearly 6,000 band readings were recorded in 2006 (Table 1). Strong winds, which are ever present in the afternoon, prevented us from making readings in the evening when adults visit the crèche to feed chicks. Breeding adults at G. Ezzemoul originated in Spain, Continental Italy, Sardigna (Italy) and France. Of course, some may have originated from North Africa but these birds would go unnoticed as no banding

scheme was carried out in the past. An account of the origin and dispersal of Greater Flamingo in North Africa is in process (Boulkhssaïm *et al.* in prep.).

The Banding Scheme

The banding operation was carried out on 11th August and resulted in 212 chicks banded with a PVC ring bearing the following code: AX|XX where X represents an alphanumeric character. Receding water left G. Ezzemoul with a thick layer of salt, which combined with mud, proved to be a tough challenge even to very experienced ringers. At dawn, eighty beaters divided into teams of five, set out to surround the crèche, made up of an estimated 3,750 chicks, and helped to drive the flock into the corral. About four hundred chicks were carefully coaxed to enter the corral, with the rest being allowed to escape. Volunteers came from all walks of life, but were mostly from the local community. They vowed to help protect the breeding colony; a heartening promise after many years of egg collecting.

Table 1: Counts of band records in Algeria made by members of the Laboratoire de Recherche des Zones Humides (2002-2006)

Year	Number of band readings
2002	3
2003	92
2004	148
2005	237
2006	5,910
Total	**6,390**

The banding allowed us to monitor the dispersal of local birds. Over sixty records have already been made: by the end of August some banded chicks had made it to the neighbouring salt lake Chott Tinsilt. In September, some banded juveniles moved to Timerganine near Oum El Bouaghi and to Bazer Sakra near Sétif. By October, some have already flown as far as Ouargla in the Sahara.

Conservation

For the last two years, protection of the breeding colony was provided by guards patrolling the site all day long to prevent human disturbance. Although the threats of egg removal have lessened, illegal hunting is still going on despite steps taken by local authorities to limit it. Hydrological changes brought by irrigation schemes using small reservoirs damming wadi that feed the salt lakes are now considered the major threat. Education programs, highlighting the diversity and importance of wetlands, aimed at school children will be launched soon. News of the breeding of the Greater Flamingo was well received by the public and the media (TV as well as national and regional newspapers) covered the event at length. Last but not least, the Direction des Forêts and the Wilaya of Oum El Bouaghi have made a pledge to designate G. Ezzemoul as a Ramsar site.

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Caribbean Flamingo breeding at Cienaga de Los Olivitos Wildlife Refuge and Fishing Reserve, western Venezuela

Espinoza, F.[1] and Perozo, H.[2]

[1] *Ministerio de Ambiente, Oficina Nacional de Diversidad Biológica, Estación Biológica de Rancho Grande, Maracay, Venezuela. E-mail:pinoza_f@hotmail.com*
[2] *Ministerio de Ambiente. Dirección Estadal Zulia. Maracaibo, Venezuela.*

Abstract

The Caribbean Flamingo (*Phoenicopterus ruber*) breeds annually at the Los Olivitos Wildlife Refuge and Fishing Reserve in western Venezuela. Between January and September 2006, we regularly monitored the number and breeding behavior of the flamingos at this site. The mean number of flamingos in the refuge during the January-April dry season was 6,867 (range: 5,000-8,600), and during the May-September wet season was 14,085 (range: 12.000-17,000). Courtship displays were first observed on 8 March. On 16 May, approximately 3,600 flamingos

were incubating. On 3 June, the number of occupied nests had increased to 5,200. On 16 June, the first chicks were seen. We estimated that they were about two weeks old, based on their plumage. At the middle of August, approximately 5,100 chicks were observed in crèches. By the first week of September, all of the nests were empty and crèches totaling approximately 5,600 chicks surrounded the breeding site. The number of chicks produced in 2006 outnumbered all previous breeding numbers reported at this site.

Resumen

El Flamenco del Caribe (*Phoenicopterus ruber*) se reproduce anualmente en el Refugio de Fauna Silvestre y Reserva de Pesca Ciénaga de Los Olivitos, ubicado en el occidente de Venezuela. Entre enero y septiembre de 2006, se realizo el seguimiento del número y comportamiento reproductivo de los flamencos en esta localidad. El promedio de flamencos contados en el refugio durante la época seca de enero-abril fue 6.867 (rango: 5,000-8,600), y en la época de lluvias de mayo-septiembre fue 14,085 (rango: 12,000-17,000). El cortejo fue observado por primera vez el 8 de marzo. El 16 de mayo, aproximadamente 3,600 flamencos se encontraban incubando. El 3 de junio, el número de nidos ocupados había incrementado a 5,200. El 16 de junio, se observaron los primeros pollos. De acuerdo al color del plumaje, se estimo que estos no tendrían más de 2 semanas de nacidos. A mediados de agosto, se observaron varias guarderías con un total aproximado de 5,100 pollos. A finales de la primera semana de Septiembre, todos los nidos estaban vacíos y las guarderías conformadas por aproximadamente 5,600 pollos se encontraban en los alrededores del sitio de reproducción. El total de pollos producidos en 2006, supera todos los números reportadas previamente para esta localidad.

Introduction

The Caribbean Flamingo (*Phoenicopterus ruber*) was first reported nesting in Venezuela in 1952 on La Orchila Island (Phelps and Phelps 1959), but the nests were abandoned due to human disturbance. Except for scattered reports of incidental breeding attempts, there was no reliable evidence of flamingo breeding in Venezuela for several decades. During this period, any flamingos occurring along the Venezuelan coast came from Bonaire Island (Netherlands Antilles), where breeding was known since 1944 (Rooth 1965). Research interest in the flamingos along the coast of Venezuela increased in 1980s and 1990s (Casler and Lira 1983, Lentino 1984, Este 1988, Guzman 1986, Espinoza 1994, Espinoza *et al.* 2000, Pirela 1994, Casler *et al.* 1994). Among other important findings, it was demonstrated that the flamingo population had increased almost two fold (37,000) in relation previous decades. The reports by Casler and Lira (1983) and Lentino (1984) lead to the creation of several Key Protected Areas, such as the Los Olivitos wetland, which was declared a Wildlife Refuge and Fishing Reserve in 1986.

The first recorded breeding attempt of the Caribbean Flamingo on mainland Venezuela occurred between February and July 1987 at Los Olivitos (Casler *et al*. 1994). Breeding occurred at the same site in 1988, but a high storm tide flooded the nest site and all of the chicks were drowned. The following year, the flamingos nested successfully at a new breeding site three kilometres north of the refuge. For the next 10 years, the flamingos failed to breed successfully on mainland Venezuela for a variety of reasons. In 1995, they built a new nesting site 2 km northeast of Caño Nuevo (1.400 nests) and eggs were laid, but they were abandoned (Pirela 2000), possibly because of Military Artillery Practice nearby. Finally, in 1999 they reused the successful site from 1989 and bred there successfully until 2002 (Espinoza 2003), fledging an estimated 1,970 chicks during the 1999 breeding season, 2,230 chicks during the 1999-2000 season, 2,240 in the 2000-01 season (Espinoza 2003) and 2,800 chicks during the 2001-02 season (Perozo, unpub. data). At the end of 2002, they moved the colony 1.5 km northeast to its current location, where they have also bred continuously and successfully, fledging approximately 4,160 chicks during the 2004-05 season and 4,400 chicks during the 2005-06 breeding season. In Venezuela, Caribbean Flamingos breed successfully during either the dry season (November-March) or the rainy season (April-October). They bred predominantly during the dry season from 1999-2002, in 2004-05 and in 2005-06, and during the wet season in 1987, 1988 and 2006.

Study Area

Los Olivitos Wildlife Refuge and Fishing Reserve (the refuge), is located on the eastern shore of El Tablazo Bay (10°50'N 71°23'W) in the state of Zu lia, western Venezuela (Fig.1). The refuge is an estuarine wetland that covers an area about 24,000 ha. There are approximately 10,000 ha of shallow open water, 4,800 ha of mangroves and 1,800 ha of sandy beaches to the north. The hydrology is associated with three relatively narrow channels (Cano Oribor, Cano Nuevo, and Cano Viejo) through which brackish water enters the refuge from El Tablazo Bay. Fresh water enters the refuge via two small rivers from the east. Water depth varies from 50 cm to 100 cm in the northern half of the refuge, and from 3 cm to 50 cm in the southern half (Casler *et al*. 1994). Tidal changes in sea level range from 5 cm to 80 cm. Rainfall averages 500 mm/year, with a low peak in May and a high one in October. Average annual temperature is 27° C and average evaporation 2.900 mm/day (Produsal 2006). Sediment composition range: 10-79% clay, 7-84% silt, and 2-78% sand (Este 1988). The refuge is bounded on the northeast by a shrimp farm and on the southeast by the solar salt extraction works of Produsal (Productora de Sal, C.A., a subsidiary of Cargill de Venezuela), a man-made aquatic habitat covering 2,360 ha.

Description of the breeding site

The breeding site is located in the Los Corianos sector of the refuge (10°52'05"N/ 71°23'55"W), two kilometres east of the mouth of Cano Viejo, three kilometres from the mangrove forest to the southwest, three kilometres from nearest salt concentrator pond and 5.6 kilometres from the southern boundary between the refuge and the Produsal salt works (Fig.1). This site was built by flamingos in late 2002 and currently consists of approximately 4,400 nests within a perimeter of about 800 m, situated in terrain that seems higher than the breeding site used from 1999-2001.

Methods

From January to September 2006, a total of 17 visits were made to the refuge to count the flamingos and monitor breeding activity in the Los Corianos sector (Table 1), and in the salt works concentrator ponds. We used two 15-60x spotting scopes and 8x40 binoculars to count flamingos that were distributed from the mouth of Caño Viejo and the breeding site at Los Corianos sector, to the edge of mangroves at the southwest and the boundary between the

Fig. 1. Google Earth ™ map of Caribbean Flamingo breeding site (N) within the Cienaga de Los Olivitos Wildlife Refuge and Fishing Reserve, western Venezuela

refuge and the salt works. At the salt works, we counted flamingos from two observation stations (E) located on the dikes that separate concentrator ponds 1 and 2 (Fig.1), and from which the refuge and both concentrator ponds could be clearly seen. When flocks of flamingos were at aconsiderable distance, we counted them in groups of 500 and 1,000. We observed all behavior, but concentrated on flamingos in courtship display. We also noted plumage colour of juveniles. At the breeding site, the location and distance of observation points varied from 250 m to 600 m, depending on the time of day, tidal conditions and stage of breeding. We counted flamingos in courtship displays, within the nesting site and on nest mounds. We counted the chicks at the

Table 1. Monitoring of Caribbean Flamingo numbers and breeding activity at Los Olivitos Wildlife Refuge, Venezuela, Jan-Sep 2006.

Visit date	Est. no. in refuge	Est. no. displaying	Est. no. nesting	Est. no. chicks
28 Jan	5.000		0	-
15 Feb			0	-
08 Mar	7.000	800	0	-
09 Mar		1.500		
08 Apr	8.600	3.000	0	
18 May	12.000	2.700	3.800	
21 May	12.600	2.400	4.400	
27 May	13.300	1.900	4.800	
31May	13.800	600	5.200	
03 Jun	14.400	400	5.800	
16 Jun	11.800	200	4.800	63
04 Jul	17.800*			
11Jul	12.700	100	2.000	3.100
13 Jul	13.100	40	1.300	4.480
29 Jul	14.400	--	120	4.900
15 Aug	15.700	120	19	5.100
01 Sep	16.500	400	0	5.600
06 Sep	15.000*			
07 Sep			0	3.500

nests and in crèches. In order to establish an approximation of hatching dates, chick plumage (down) colour and body size were recorded, based on Shannon (2000). Photos of the breeding colony were taken (250-500mm zoom) to enable an estimation of nest and bird numbers.

Results

No breeding occurred during the first quarter of 2006 (Table 1). Most of the flamingos counted during this normally dry period were either feeding or resting where water was still available, close to the mangrove forest, around the edge of the refuge and at the salt works. Courtship displays were first observed on 8 March, involving approximately 350 adults on a man-made artificial nesting island, located in concentrator pond 1. This island was built in 1995 to induce breeding, but has never hosted a breeding colony, and this was the first time that courtship behavior had been recorded there (R. Taylhardat, pers. comm.). 1,500 birds were observed in courtship displays on 9 March.

On 8 April, the normal breeding site was still empty, but approximately 3.000 flamingos were observed in courtship display about 600 m away, still within the refuge. With the start of the seasonal rains in May, the number of flamingos in the refuge increased from the dry season mean of about 6,800 to 12,000. On May 18, approximately 3,500 flamingos were observed at the breeding site, about 75% of which were incubating eggs and/or repairing old nests. A few groups close to the breeding site exhibited very aggressive behavior.

Chicks were first observed on 16 June. We estimated that the youngest chicks, those closest to the nests, were at approximately one week old, while the older chicks, seen walking

around nest, were about two weeks old. In the last week of July, about 4,500 chicks were at the breeding site, almost all in crèches. On 15 August, approximately 5,100 chicks of different ages were distributed in crèches around the breeding site, while some hundreds of meters away the oldest chicks were flapping their wings and performing short flies. At this time, there were only 19 flamingos sitting on nest.

On 1st September, the nest mounds were completely empty and about 5,600 chicks were occupying the breeding site. A week later (6 September) approximately 2,000 chicks had fledged, as only about 3,500 remained at the breeding site, while approximately 1,700 juveniles were located in several different groups near the mangroves and close to the boundary between the salt works and the refuge (Fig. 1).

Discussion

Caribbean Flamingo breeding success at Los Olivitos in Venezuela has been steadily increasing since the disastrous flooding of nests in 1988. During 2006, the flamingos produced the highest number of chicks (5,600) ever recorded. The 2006 breeding event was also the first to occur during the wet season between April and September since 1987-88.

We did not census flamingos in the northern sector of the refuge, where Pirela (2000) reported that 55% of the flamingo population in the refuge concentrates. Nevertheless, the census totals in 2006 were higher than any previously recorded (Lentino 1984, Lentino y Goodwin 1991, Guzman 1986, Espinoza 1994, Casler *et al*. 1994, Casler y Este 2000, Espinoza *et al.* 2000, Pirela 2000). While making observations at the salt works, we did not monitor flamingo use of concentrator ponds, but flamingos were present there during all visits. On two occasions, we counted more than 9.000 flamingos distributed in the concentrator ponds, out numbering flamingos in the refuge. Flamingo presence in the concentrator ponds was substantially greater than that observed by Casler *et al.* (2000), who in 30 counts over a period of 17 months saw flamingos only on seven occasions and counted no more than 8,000 individuals in total. Nevertheless, these authors predicted the future importance of the salt works concentrator ponds as an alternative feeding habitat for flamingos once water sanity stabilized.

Patterns of intermittent breeding and shifting of breeding locations are common in flamingos around the world (Brown 1975). The frequent shifting of the flamingo breeding colony site at Los Olivitos, could be associated with anthropogenic pressures such as human population growth (resulting in increased disturbance from egg-collecting and poaching) and/or expansion of economic activities (affecting the hydrology and water quality). On the other hand, shifting of the breeding site could also be a consequence of an expanding breeding population that no longer needs to leave the refuge from March to June in large numbers to feed in other wetlands (Pirela 2000), because of the increased food availability provided by the stabilized salt concentrator ponds in Los Olivitos.

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Septic arthritis and disseminated infections caused by *Mycobacterium avium* in Lesser Flamingos, Lake Bogoria, Kenya

Oaks, J.L.[1], Walsh, T.[1], Bradway, D.[1], Davis, M.[1] and Harper, D.M.[2]
[1] *Washington State University, Pullman, WA 99164-7040 USA*
[2] *University of Leicester, UK*
Corresponding author: Lindsay Oaks (loaks@vetmed.wsu.edu)

Mycobacterial infections have been reported as a cause of outbreak and sporadic mortality in Lesser Flamingos (*Phoenicopterus minor*) in the Kenyan Rift Valley (Kock *et al.* 1999; Cooper & Karstad 1975; Sileo *et al.* 1979). A research project investigating lake ecology (Harper *et al.* 2003), and Lesser Flamingo ecology and distribution has been underway at Lake Bogoria since 2000, funded by the Earthwatch Institute and, since 2003, by the UK government's Darwin Initiative (Harper 2005).

In July 2005, there was a comparatively small population of about 5,000-7,000 Lesser Flamingos and about 500-1,000 Greater Flamingos (*Phoenicopterus roseus*) at the lake. The flamingo population overall appeared to be healthy with abundant *Arthrospira* to eat and ready access to fresh water with limited competition for drinking and bathing. Surveys for dead and sick flamingos, including those that had been scavenged by either African Fish Eagles (*Haliaeetus vocifer*) or Marabou Storks (*Leptoptilos crumeniferus*), were conducted daily along the lake shore. Dead, sick and injured flamingos were collected opportunistically for post-mortem examinations.

Mortality rates appeared to be quite low. We encountered a total of five dead or sick flamingos during the 16-day survey. All of these birds were thin with an average body mass of 1,202 grams (range 1,000-1,280) and had gross post-mortem lesions characteristic of disseminated infection by *Mycobacterium avium* (avian tuberculosis). These lesions included enlarged spleens, and nodules in the spleen, liver, lung, air sacs, heart, gastrointestinal tract, skin and musculoskeletal system. The diagnosis was subsequently confirmed by histopathology demonstrating granulomatous inflammation with intralesional acid-fast bacteria. The bacteria were identified as *M. avium* by culture, polymerase chain reaction specific for *M. avium* (Rodrigues *et al.* 2002) and 16s rDNA sequencing (Drake *et al.* 2002). Pulsed-field gel electrophoresis (Slutsky *et al.* 1994) patterns were indistinguishable for all five isolates and different from unrelated isolates, suggesting either a common environmental source or transmission between flamingos. Finding this disease at low levels in an otherwise healthy

population suggests that *M. avium* infections may be endemic in Lesser Flamingo populations. These findings also suggest that underlying immunosuppressive factors may be required for larger-scale epidemics. These factors could include overcrowding, nutritional stress, and acquired immunosuppressive factors such as viral disease or possibly toxins from *Arthrospira* or other cyanobacteria.

Another interesting finding at Lake Bogoria was what we initially believed to be a very high rate of skeletal injuries, mainly to the legs, wrists, and elbows. In one survey of all of the approximately 5,000 flamingos on the lake, we counted 50 individuals with wing and/or leg injuries for a point prevalence of about 1%. We captured 13 of these flamingos for examination. The body condition ranged from thin to good, with an average body mass of 1,220 grams (range 920-1,400). Post-mortem examination revealed that these birds had no external or internal abnormalities other than grossly enlarged and fused joint(s) with severely restricted range of motion. These lesions appeared to originate in the joint and were composed of fibrous and necrotic tissue. Histopathology revealed that these lesions were granulomatous inflammation with intralesional acid-fast bacteria that involved the joint and periarticular bone. Although joint infections have been noted in previous reports of *M. avium* infection in Lesser Flamingos (Kock *et al.* 1999; Cooper & Karstad 1975), it was unclear if there was selective joint involvement as noted here. The relationship between articular and disseminated infections is not known, and if these represent separate disease syndromes or if articular infection is a precursor to disseminated infection.

Interestingly, there was no evidence of either disseminated or articular *M. avium* infections in the Greater Flamingos.

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Exposure to selected agents in three flamingo species from the high Andes wetlands

Uhart, M.[1], Arengo, F.[2], Nallar, R.[3], Caziani, S.[4], Karesh, W.[5] and Marull, C.[1]
[1] *Wildlife Conservation Society, Puerto Madryn (9120), Chubut, Argentina*
[2] *American Museum of Natural History, New York, USA*
[3] *Wildlife Conservation Society, Bolivia*
[4] *Universidad Nacional de Salta, Argentina*
[5] *Wildlife Conservation Society, Bronx 10460, New York, USA*
Corresponding author: Felicity Arengo (farengo@amnh.org)

Abstract of an oral report to the Wildlife Disease Association Annual Meeting, Storrs, Connecticut, USA. August 2006.

Three species of flamingo use the high-Andes wetlands, the Chilean (*Phoenicopterus chilensis*-CF), the Andean (*P. andinus*-AF) and James' (*P. jamesi*-JF) flamingos. These wetlands and their associated flora and fauna are threatened by increasing human activities, such as mining operations and underground water pumping. These changes of the environment could favor the emergence of pathogens, which could affect the health of flamingos. Flamingos are nomadic species with the potential to disperse pathogenic microorganisms, as well as favor horizontal transmission of disease agents when they congregate with other birds at migration stops. Samples from 25 adult flamingos (7 CF, 10 AF, 5 JF) and 188 chicks (28 CF, 43 AF, 117 JF) were collected between 1997 and 2006 at several wetlands in Chile and Bolivia. Serological analyses were carried out for *Aspergillus* sp.(n=50), *Clamydophila* sp.(n=50) , *Salmonella* sp.(n=120), avian adenovirus (n=50), avian encephalomyelitis (n=50), avian influenza virus (n=129), avian reovirus (n=95), infectious bursal disease (n=50), avian paramyxovirus type 1 (n=125), type 2 (n=49) and type 3 (n=49), flavivirus (n=22), duck viral enteritis (n=30), infectious bronquitis (n=104), egg disease syndrome (n=75), *Mycoplasma gallisepticum* (n=71), *M. synoviae* (n=73), infectious bursal disease (n=75), avian rhinotracheitis (n=75), avian leukosis virus (n=79), circovirus avian disease (n=79) and infectious laryngotracheitis virus (n=125). Antibodies to thirteen of these 22 infectious agents were found in the animals tested.

OTHER NEWS

Nairobi action plan workshop for the Lesser Flamingo

On 25-29 September 2006, 33 Lesser Flamingo and action planning experts from the range states of the Lesser Flamingo (*Phoenicopterus minor*) met in Nairobi, Kenya and started the process of drafting an international Single-Species Action Plan for the Lesser Flamingo under the auspices of CMS and AEWA. The workshop was organised by the Flamingo Specialist Group of the IUCN Species Survival Commission and Wetlands International, with the assistance of the BirdLife Africa Partnership Secretariat, the hosts in Nairobi. It was also attended by governmental representatives from the two countries with the largest Lesser Flamingo populations – Kenya and Tanzania – as well as Botswana.

The workshop was co-sponsored by Wildfowl and Wetlands Trust (WWT) and the AEWA Secretariat through a voluntary contribution provided by the Swedish Environmental Protection Agency. Other sponsors included the International Flamingo Foundation, Disney's Animal Programs, Taiwan Council of Agriculture (Bureau of Forestry), Pensthorpe Conservation Trust, Friends of Banham Zoo, Hillside Bird Oasis and Flamingo Land.

The workshop was conducted by Drs. Szabolcs Nagy of Wetlands International, Baz Hughes of Wildfowl & Wetlands Trust (WWT), and Sergey Dereliev of the UNEP/AEWA Secretariat. Dr Geoffrey Howard, Regional Programme Coordinator in the IUCN Eastern Africa Regional Office opened the workshop with guidance from past Lesser Flamingo action planning experience and suggestions for the future. This was followed by three presentations on workshop expectations and a biological assessment of the Lesser Flamingo by Szabolcs Nagy, Paul Ndang'ang'a, Africa Species Coordinator for the BirdLife Africa Partnership Secretariat, and Brooks Childress, respectively.

Lesser Flamingo status and distribution data for 21 range states from India to Senegal, and from Djibouti to Namibia were presented, and there were four additional presentations concerning the likely causes of the recent Lesser Flamingo die-offs in East Africa, a new technique for conducting aerial census counts and the building of an artificial breeding island for Lesser Flamingos in South Africa (see separate report this issue). Copies of all workshop presentations are available on

Habitat degradation at key breeding and feeding sites through inappropriate hydrological regimes, disruption of breeding colonies and the mass die-offs occurring in East Africa (see separate report this section) were identified as the most serious threats to the future survival of the species. The FSG and WWT will coordinate the development and implementation of the action plan, with the first draft being available for review and comment by the range states early in 2007. Submission for approval to the next Meeting of the AEWA Standing Committee in late 2007 and to the CMS Scientific Council meeting in early 2008 are planned. (B. Childress)

High-Andes flamingo conservation action plan workshop

In addition to the AEWA/CMS single-species action plan for the near-threatened Lesser Flamingo, the FSG, in cooperation with the Grupo para Conservación de Flamencos Altoandinos (GCFA) will lead the development and execution of a conservation action plan for the threatened Andean and James' flamingos, under the auspices of the international Convention on the Conservation of Migratory Species (CMS).

These two species are sympatric on the saline wetlands of the high Andes in Argentina, Bolivia, Chile and Peru. The Andean Flamingo, the rarest flamingo in the world is classified as vulnerable to extinction in the international IUCN Red List of Endangered Species, while the James' Flamingo is classified as being near-threatened, meaning that it is close to qualifying as vulnerable as well.

This effort will be lead by the FSG Western Hemisphere Chair, Dr Felicity Arengo, Assistant Director of the Center for Biodiversity and Conservation at the American Museum of Natural History. The first step will be an action planning workshop, bringing together range state experts on the biology and ecology of these two species, as well as key government delegates and other stakeholders. This workshop is currently planned to be held in June 2007 in Melincué, Argentina, an important lowland site for Andean flamingos. (B. Childress)

BirdLife International - Rio Tinto partnership to focus on flamingo conservation in the high Andes

In October 2005, the Grupo para Conservación de Flamencos Altoandinos (GCFA) and Aves Argentinas (AvA) worked with the BirdLife International-Rio Tinto partnership (BL-RT) to develop a project based on designating a network of priority wetlands for flamingo conservation. This project is in line with the Regional Strategy for the Conservation and Sustainable Use of High Andean Wetlands being promoted by the Ramsar Convention senior advisor for the Americas. BL-RT aims to enhance the conservation of birds and their habitats globally, in the context of sustainable development, with a particular interest in areas of RioTinto's mining operations.

The first phase of the project, supported for one year, consisted of strengthening our knowledge about Andean Flamingo ecology, mainly population dynamics, behavior, movements, and habitat use; and make this information available to decision-makers and the general public.

With this support, the GCFA strengthened flamingo breeding colony monitoring and protection, and the regional Andean and James' Flamingo chick banding program. This support also allowed continuation of the Andean Flamingo movement and habitat-use research using satellite telemetry, as well as the flamingo health studies.

The GCFA and AvA also produced an informational brochure on flamingo and wetland ecology for mass distribution. During this first phase, the GCFA was able to develop criteria to identify the 14 priority wetlands that will be the pilot focal sites for the wetland network in the next 3 years. These are: Salinas y Aguada Blanca in Peru; Poopó-Uru Uru, Norlípez wetlands and Eduardo Avaroa in Bolivia; Surire, Atacama, Punta Negra, and Negro Francisco in Chile, and Pozuelos, Vilama, Parinas, Laguna Brava, Mar Chiquita-Bañados del Río Dulce, and Melincué in Argentina.

The next phase of the project which is currently under review by BL-RT will allow continuation of long-term basic research and monitoring activities but will focus on strengthening these priority sites through networking and cross-border initiatives, and strengthening the institutions involved in and affecting their management and conservation.

New Caribbean Flamingo conservation network launched

With encouragement from the Flamingo Specialist Group, a new organisation, the Caribbean Flamingo Network, is being formed to enhance the conservation of the Caribbean Flamingo. The objective of this alliance, which will be similar to the Greater Flamingo Network in the Mediterranean and Western Africa, is to unite the investigators working with the Caribbean Flamingo (*Phoenicopterus ruber*), to identify research priorities and to work towards their implementation. The objective would be to have a research program that approaches the problems on a regional scale.

Dr. Nancy Clum, Assistant Curator of Ornithology in the Wildlife Conservation Society (and flamingo researcher in the Bahamas) has agreed to lead the initiative, with Dr. Felicity Arengo, FSG Western Hemisphere Chair acting as advisor. Although the emphasis of the group will be *in situ* work, we recognize the value of being able to study the animals in captivity, and we will invite the participation of people working with *ex-situ* populations.

The first annual meeting of the Caribbean flamingo Network will be held November 27-29th, 2007, in Yucatan, Mexico. The goal of this meeting will be to gather researchers and other interested parties to identify and implement regional research priorities for *in situ* work on this species. Nancy Clum (nclum@wcs.org)

Con el estímulo del Grupo del Especialistas del Flamenco, una nueva organización, la Red del Flamenco del Caribe, se está formando para realzar la conservación del Flamenco del Caribe. El propósito de esta alianza, parecido al de las redes del Mediterráneo y de África Occidental para el flamenco mayor, es de reunir a los investigadores trabajando con el flamenco del Caribe (*Phoenicopterus ruber*) para identificar prioridades de investigación y trabajar hacia su implemetación. El objetivo sería de tener un programa de investigación que aborde la problemática a escala regional.

Dra. Nancy Clum, Assistant Curator of Ornithology en la Wildlife Conservation Society (e investigadora de flamencos de las Bahamas) ha convenido lidere la iniciativa, con Dra. Felicity Arengo, Coordinadora de las Americas del Grupo de Especialistas como asesora. Si bien el énfasis del grupo sería de trabajo *in situ* (en el terreno), reconocemos el valor de poder estudiar a los animales en cautiverio, por lo invitamos la participación de personas trabajando con poblaciones *ex situ*.

La primera reunión de la red de flamenco del Caribe se llevará a cabo del 27-29 de noviembre del 2007 en Yucatán, México. El objetivo de la reunión es trabajar con investigadores de la región para identificar e implementar prioridades regionales de investigación en el campo para la especie. N. Clum (nclum@wcs.org)

Africa's first artificial flamingo breeding island

Kamfers Dam, the large perennial wetland located just north of Kimberley, South Africa, home to the largest permanent population of flamingos in southern Africa, now has a large artificial island. This is the first such island in Africa and perhaps the third in the world, with similar structures on Bonaire Island in the Netherlands Antilles, and on the Rhone River delta in the Camargue, France.

It is anticipated that Kamfers Dam's island will greatly contribute to the conservation of southern Africa's flamingos, as the populations of both the Lesser and Greater Flamingo are declining in this region. Although the Lesser Flamingo population in Africa is more numerous, it is threatened by various factors, especially anthropogenic changes to the species' breeding habitat. It only breeds at three localities in Africa: Sua Pan (Botswana), Etosha Pan (Namibia) and Lake Natron (Tanzania).

Mark Anderson

Both species of flamingos have attempted to breed at Kamfers Dam, but never proceeded beyond egg-laying. There are currently three nesting areas, with approximately 2500 nests, located at the south-eastern end of the Dam. The reason for breeding failure has been attributed to a rapidly receding water level during early summer which leaves the nests high and dry and exposed to disturbance and predation by dogs and people.

The idea of building an island at Kamfers Dam was first conceived in 1995, but financial constraints resulted in this project taking 11 years to be realised. The construction of the island was funded by Ekapa Mining, a Kimberley-based company, with Envirosec seeing to the environmental impact assessment. The design of the island was based on the successful island in the Camargue.

A 200 metre causeway had to be constructed to the island site, with this access road being removed once the construction had been completed. The island is about 250 x 25 m, S-shaped and the long-axis faces north, into the prevailing wind, thus limiting erosion caused by wind and the resultant wave action. Pebbles were packed on the windward side of the island to further limit erosion. The shape also results in there being two sheltered bays, which were gently sloped to allow the flamingos to get onto and off of the island. The most important building material was calcrete, sourced from a nearby disused quarry, but the island was topped with a 200 mm layer of clay and sand. A total of more than 25,000 tons of material was used to construct the island!

Four large ponds were built in the centre of the island and, fed from a submerged water pump, these ponds will provide the flamingos with wet mud for the construction of their nests. Kimberley's Boy Scouts and other volunteers assisted with the construction of 1000 nest turrets, hopefully the stimulus that will see the flamingos breeding in the near future. The island took less than two weeks to build, with Ekapa working 24 hours a day on this important project.

Kamfers Dam is an important ecotourism destination, with the magnificent spectacle of thousands of pink and white birds, against a backdrop of an urban skyline, providing a memorable sight. The conservation of the Dam's flamingos is important, not only for the tourism and economic benefits to the city, but also in terms of conserving the southern African population of, in particular, the Lesser Flamingo.

Mark Anderson (manderson@half.ncape.gov.za)

Lesser Flamingo die-offs continue in East Africa

Periodically, at least since 1961 (Brown 1973), the Lesser Flamingo population on the alkaline-saline lakes of East Africa has been afflicted by large-scale die-offs, estimated to affect tens of thousands of individual birds during a single episode. These die-offs, which do not affect the sympatric Greater Flamingos, have occurred with increasing frequency principally at lakes Bogoria, Nakuru and Elmenteita in Kenya, and lakes Manyara and Big Momella in Tanzania. There appear to have been several different causes. Depending on the location and timing, the die-offs have been variously attributed to pesticides (Greichus *et al.* 1978), avian TB and septicaemia (Sileo *et al.* 1979, Koch *et al.* 1999), heavy metal pollution (Kairu 1996, Nelson *et al.* 1998), and toxic cyanobacteria (Ballot *et al.* 2004, Krienitz *et al.* 2005, Lugomela *et al.* 2006). (Also see abstracts of recently-published scientific articles on the die-offs in this issue.)

In early July of this year, reports began coming in of another major die-off occurring at Lake Nakuru in Kenya affecting thousands of Lesser Flamingos (D. Bygott and O. Nasirwa *in litt*.). David Bygott reported that the density of corpses along the western shore of the lake (downwind from the prevailing winds) was approximately two per linear meter, one on the shore and one in the water. Kenya Wildlife Service researchers collected samples for testing, and buried approximately 35,000 corpses (A. Kariuki, in litt.). Kariuki, Senior Scientist at Lake Nakuru National Park, reported that another approximately 5,000 corpses were too decomposed to bury. The KWS Veterinary Department identified the bacterium, *Pseudomonas aeruginosa*, as the cause of the deaths after examining specimens from internal organs of dead birds (A. Kariuki, *in litt*.) (B. Childress)

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Important Lesser Flamingo site documented in South Africa

Based on coordinated counts from April 1999 by FSG members Mark Anderson (South Africa), Graham McCulloch (Botswana) and Rob Simmons (Namibia), it has been believed that the resident population of Lesser Flamingos in southern Africa is between 55,000 and 65,000 (Wetlands International, in press). This population is believed to increase during good breeding years; 80,000 breeding pairs of Lesser Flamingos were counted in 2000 (a record); 85,444 individual Lesser Flamingos were counted at Sua Pan, the primary southern African breeding site for this species, in March 2005 (G. McCulloch, *in litt.*). It was thought that breeding numbers at Sua Pan may be increased by birds from Angola and Mozambique in good breeding years (G. McCulloch, *in litt.*). There have even been suggestions that some of the breeding birds may have come into the region from East Africa (Simmons 2000).

Lesser Flamingo breeding in southern Africa is erratic, depending on the timing of the rains, but normally occurs between November and February. When not breeding, the Lesser Flamingos disperse from their two main breeding sites (Sua Pan in the Mkgadikgadi Wetlands in Botswana and Etosha Pan in Namibia) to smaller wetlands from Angola to Mozambique (McCulloch *et al*. 2003). In May 2005, Brian Colahan, Principal Nature Conservation Scientist: Ornithology, Free State Tourism, Environment & Economic Affairs began making regular visits to some of the Goldfields wetlands in central Free State, South Africa. He has reported that the number of Lesser Flamingos on these wetlands increased steadily during the following months, reaching a maximum of approximately 80,000 in August 2005 before declining gradually to about 100 birds in January 2006 (B. Colahan, *in litt*.). Breeding conditions were particularly good in Sua Pan, Botswana during 2005-06, and presumably the birds had gone there to breed.

In 2006, the number of Lesser Flamingos on the Goldfields wetlands again built up gradually each month, reaching a maximum of approximately 53,000 in August 2006, before starting to decline again (25,000 were counted in September, and less than 5,000 in October, B. Colahan *in litt*.). Bearing in mind that this is only one wetland complex, these counts would suggest that the resident population of Lesser Flamingos in southern Africa may well be much larger than previously thought, and that the large numbers of breeding birds observed at Sua Pan and Etosha Pan do not represent an influx of birds from other regions. (B. Childress)

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Vagrant Lesser Flamingos in Europe, the Mediterranean and Middle East

During the past year, sightings of Lesser Flamingos in Europe, the Mediterranean and the Middle East have become much more frequent than in the past. On 25 January, FSG member Kevin Hyland photographed two Lesser Flamingos among a flock of Greater Flamingos in Dubai. Ido Tsurim, Department of Life Sciences, Ben-Gurion University of the Negev, Israel reported a single Lesser Flamingo at Eilat on 10 April, Emin Yogurtcuoglu reported a Lesser Flamingo in breeding plumage in the Eregli Marshes in Turkey on 12 April and FSG member Manuel Rendón-Martos reported seven Lesser Flamingos in the Fuente de Piedra Lagoon in southern Spain on the same date.

In August, FSG member Nicola Baccetti reported that two Lesser Flamingos seen regularly in the Adriatic during the previous year had been joined by an immature Lesser Flamingo at the Greater Flamingo breeding site at Commachio.

FSG member Joop Treep reports "In the past 15 years there have been several reports of Lesser Flamingos in the Netherlands. During the summer of 1990 groups of 3 to 5 birds (probably the same birds each time) were spotted in several places along the coast, from the southwest of the Netherlands up to Denmark. Since then there have been reports of single birds or pair, mostly from the Grevelingenmeer, a saltwater basin in the Delta of the rivers Rhine, Meuse and Scheldt in the southwest. Two Lesser Flamingos in that basin survived a severe winter in 1995/96. Another place, where they appear almost annually in autumn, is the coast of Friesland in the Waddensea (in the north of the country) where they feed on the shallows.
"In January 2006, two Lesser Flamingos created some commotion, with pictures in newspapers, when one bird appeared in the harbour of Holwerd, a small town in the north of Friesland from where the ferry to the waddenisland Ameland leaves, and a second bird on a puddle on the Island Ameland. The bird in Holwerd was not ringed, the bird on Ameland had a red ring with the inscription CG on the tibia and a second smaller ring on the tarsus. In August 2003 a Lesser Flamingo with the same marks was seen in the southwest of the Netherlands. Research has been done to find out about these rings, but without success."

Lesser Flamingo breeding success at WWT Slimbridge

The Lesser Flamingo (*Phoenicopterus minor*) is a popular species for inclusion in zoo collections but breeds poorly in captivity. According to International Species Information System (ISIS) data, over 50 zoos keep Lesser Flamingos, but only one has reported breeding success in the last year. Improving the breeding success of captive Lesser Flamingos over the long term will require detailed study of the conditions required for breeding and increased co-operation between institutions keeping the species.

Whether or not it is possible through improved breeding success for a viable population of captive Lesser Flamingos to be maintained over the long term needs to be evaluated. Toward this goal, it is necessary that zoos share information about the breeding successes and failures of their Lesser Flamingo flocks.

Lesser Flamingos have been part of the Wildfowl & Wetlands Trust (WWT) captive collection for over 30 years. The flock laid eggs once in the 1980s and again five years ago but

none of the eggs hatched successfully. In June 2006, five eggs were laid - one of which was fertile. The egg was artificially incubated for 24 days (parent birds were given a dummy egg) before being returned to its original nest site where the parent birds continued incubation. The chick hatched one and a half days later on 19 July and continues to thrive in the Lesser Flamingo enclosure. The exact reasons for the breeding success this year are unclear but two factors are thought to have played a role. Firstly, the Lesser Flamingo flock was moved to a smaller enclosure with uninterrupted access to their house where indoor nest sites were provided; and secondly, a captive Comb Duck (*Sarkidiornis melanotos*) escaped into the enclosure in the spring causing the birds to band together defensively into a tight group. Both of these factors increased the density of the flock and perhaps encouraged display and breeding behaviour. (Rebecca.Lee@wwt.org.uk)

James Lees, WWT

Tracking Greater Flamingo movements in SW Asia

Greater Flamingos (Phoenicopterus roseus) are known to arrive in the United Arab Emirates from nearby breeding colonies in Iran and, perhaps, also colonies in Kazakhstan and Turkey before heading for Oman, Yemen and, maybe, eastern Africa. There is also considerable local and regional movement among the resident flamingos that visit wetlands in Abu Dhabi, Umm Al Quwain, Qatar and Kuwait.

Between 25th and 29th November 2005, five Greater Flamingos (two adults, two immature birds and one juvenile) were captured and ringed with high-visibility Darvic rings at Al Wathba Reserve in Abu Dhabi by Environment Agency - Abu Dhabi. Four of the five birds were also tagged with solar-powered satellite transmitters. The purpose of the research is to understand where the Al Wathba flamingos come from and where they go to feed, in order to help with the management of the Al Wathba flamingo population and help ensure successful breeding.

Based on the success of the 2005 effort, on 27th February 2006, nine Greater Flamingos were captured at Ras Al Khor Wildlife Sanctuary in Dubai, jointly by Environment Agency - Abu Dhabi and the Dubai Municipality, in partnership with EWS and Dubai's Wildlife Protection Office all of which were tagged with plastic Darvic rings and four of which were fitted with satellite

transmitters. Two of the tagged flamingos have been tracked to wetlands in Iran and back to Ras Al Khor.

Another has been to Khor Al Beidah in Umm Al Quwain and one to Al Wathba in Abu Dhabi. As their movements continue to be tracked, the importance of having a network of wetlands as feeding and resting grounds for flamingos and other waterfowl has become abundantly clear. S. Javed (sjaved@ead.ae)

Salim Javed

OTHER ARTICLES AND REPORTS

Florida's Forgotten Flock

Bob Showler
Florida Bay District Naturalist
Everglades National Park
98630 Overseas Hwy #9
Key Largo, FL 33037 U.S.A.
Bob_Showler@nps.gov

The sun rose hot and bright over Florida Bay. It was early August, sometime during the 1850's, and the birds, more than a thousand of them, were stirring. The image of their gangly pink forms, backlit by tangerine sky, was surreal.

Several miles to the south a small boat was becoming visible. Its sail was up, and it was moving toward the birds. They took no notice, though. Many of them began feeding in the shallows near the bay's north shore. Their long necks drooped down and their odd beaks dipped into the water. Soon hundreds of birds were swinging their necks from side to side, a choreography in pink.

But as the boat neared, the birds took heed. They raised their heads and started to honk; the ensuing chorus was an incessant, pervasive babbling. Obviously they'd been through this routine before, and they didn't like it. Most of the birds moved nervously away, and eventually they took flight. But several dozen were molting and flightless.

The boat's two occupants dropped sail and began paddling strongly until they were upon the flamingos. One of the men jumped into the shallows. Taking vigorous, high strides, and throwing muddy water everywhere, he raced toward the birds. He literally embraced two of them in one effort, and hurled them into the boat. Soon dozens of flamingos were flopping in the boat's bottom, as the second man pounced on top of them and roped them together in one writhing, babbling, pink clump. More flamingos were caught, until the boat was piled high with birds, their once elegant plumage smeared and sticky with their own blood.

Before sunset, the boat and its occupants were back at Indian Key, along the main string of Florida Keys. There the hunters sold the dead and still living flamingos—not for their feathers—but for their meat.

In 1857 U.S. Coast Surveyor and naturalist Gustavus Wurdemann accompanied a flamingo hunter into Florida Bay, the vast stretch of shallow water between the South Florida mainland and the Florida Keys. The description above is based on his written account of that hunt.

Until the turn of the 20th century large numbers of Caribbean Flamingos (*Phoenicopterus ruber*) existed in north-central Florida Bay, mainly in the vicinity of Snake and Garfield Bights. Various observers, including ornithologists, reported flocks of around 1000, and one observer, D.P. Ingraham, described seeing some 2500 birds in a single gathering. Nearly 150 years later, flamingos in Florida are equated with the state lottery, lawn decorations, and pink swizzle sticks used to stir piña coladas and rum runners. To most, flamingos are nothing more than quirky, glitzy symbols of the tourist industry. Little do people know that southern Florida once hosted impressive flocks of strutting, honking, *truly wild* flamingos. The world in which they thrived—mangrove-fringed backwaters, salt-crusted lagoons, remote bays and bights—still exists in Florida Bay, within the boundaries of Everglades National Park. It's a world apart from the nearest gift shop or tiki bar.

Even most modern-day bird watchers, who visit southern Florida from around the world, have vague notions of the flamingo's story. Bird field guides state that any flamingos sighted are probable escapees from Florida tourist attractions or zoos. Perhaps, they go on to say, wild flamingos may occasionally stray to Florida from their existing breeding grounds in the Caribbean. But space rarely allows mention of the big flocks that once occurred in Florida Bay.

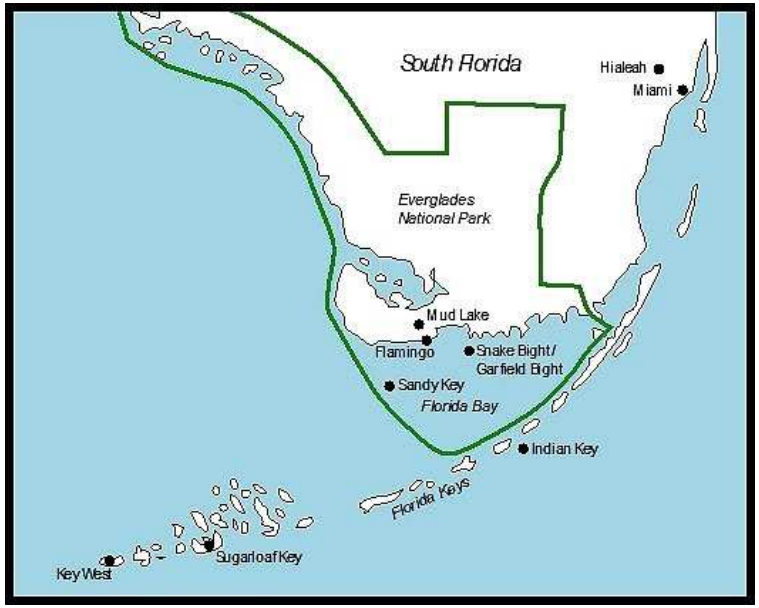

Fig 1. Map of southern Florida showing areas of former flamingo occurance

During the early 1800s noted American ornithologist John James Audubon embarked on a lifelong quest to document the birds of North America. This quest brought him to the Florida Keys in 1832 to observe and paint birds, many of them found nowhere else in the country. On May 7, while sailing near Indian Key, he saw his first flock of wild flamingos, a profound moment in his life. He later wrote: "Ah! Reader, could you but know the emotions that then agitated my breast! I thought I had now reached the height of all my expectations, for my voyage to the Floridas was undertaken in a great measure for the purpose of studying these lovely birds in their own beautiful islands."

During the 1800s flamingos didn't just occur in southern Florida. Individual birds and even large flocks were reported from many places, including Pensacola, Tampa Bay, Indian River, Volusia County, and as far north as Georgia and South Carolina. The *biggest* flocks, though, were always in northern Florida Bay…until the hunters found them. After 1903 the Caribbean Flamingo was nearly extinct in Florida Bay, and had disappeared, save for the occasional straggler, form the rest of its U.S. range.

Not everybody was willing to forget about flamingos, though. Breeding colonies still remained in the Bahamas and the Caribbean. One of those colonies wasn't far away, on the northern Bahamian Island of Andros. Frank Chapman, of the American Museum of Natural History and an eminent ornithologist, visited the Andros flamingos in 1902 and 1904. Of his observations he wrote: "The very earth seemed to erupt with birds, as flaming masses streamed heavenward." He, like Audubon, was duly impressed, but he was also dismayed with the disappearance of flamingos, due to heavy hunting pressure and egg collecting, throughout their range.

It didn't take long for Chapman and others to make their concerns known. During the very first meeting of the National Association of Audubon Societies (later to become the National Audubon Society), held in New York City on January 29, 1905, a resolution was passed appealing for the preservation of Bahamian flamingos. The result was the Wild Birds Protection Act, passed by the Bahamian government in the same year, and which came to include complete legal protection of flamingos. One can't help but wonder why *American* ornithologists were focusing so much attention on *Bahamian* flamingos, especially Andros Island flamingos, in

1905. Chapman and others believed Andros birds moved to Florida Bay when they weren't nesting.

Throughout the first half of the 20th century, "protection" of the Andros birds meant much more on paper than in reality. Constantly impoverished island residents continued to illegally hunt the birds and to harvest their eggs. The death knell for the Andros population, however, seemed to come during World War II, when fighter pilots relentlessly harassed the surviving breeding colonies, driving the shy birds away for good.

The disappearance of Florida's flamingos appeared to be a conservation topic *du jour* during the early 1900s. Some fifty years later flamingo biologist Robert Porter Allen would write: "By the turn of the century considerable apprehension was being expressed in various quarters over the destruction of flamingos in Florida." Today, in citing its conservation history, the National Audubon Society lists the Caribbean Flamingo as one of its ten "signature species," right up there with the Whooping Crane and the California Condor.

In 1931, flamingos were experiencing a rebirth…of sorts in Florida. Joseph Widener, owner of the fledgling Hialeah Racetrack (near Miami), had an idea. Why not propagate a large population of flamingos at the racetrack to boost his attraction? That year twelve flamingos, imported from Cuba, were released on the grounds (D. Testa, pers. comm.). They all promptly flew away. Another batch was brought in, but this time they were pinioned. They constituted the foundation of the flock which has made Hialeah famous for over 70 years. On July 6, 1937, the first successful hatching of a captive flamingo egg occurred at Hialeah. A few years later, 60 eggs were hatched. By the 1970s the population had peaked at around 800 birds. Today, even though the racetrack is closed, around 375 flamingos remain (J. Perdomo, pers. comm.). Hialeah became known as the first place in Florida where flamingos had ever reproduced. Or was it?

In 1938, another champion for the flamingo cause, ornithologist Alexander Sprunt, Jr., met with Judge E.R. Howe, a long-time resident of Key Largo. In 1901, the judge worked as a surveyor for the Florida East Coast Railway on the Lower Keys. While on Sugarloaf Key he made his way through the mangroves on the bay side, and he came upon 40 to 50 flamingos sitting on what he described as "whitish stumps." Sprunt felt convinced that Lowe had witnessed flamingos sitting on their characteristic crater-shaped nests, constructed from Sugarloaf's nearly white marl. He was so convinced that he published a report on these birds in the respected ornithological journal, *The Auk*.

One bit of physical evidence exists as well. The Western Foundation of Vertebrate Zoology in Los Angeles, noted for its collection of birds' eggs from around the Western Hemisphere, possesses an intriguing specimen: a Caribbean Flamingo egg. The attached label reads: "American Flamingo; *Phoenicopterus ruber*; Florida Keys, Fla.; 18 April, 1886." Is it possible that flamingos weren't just post-nesting visitors, but year-round, breeding Florida residents?

The latter half of the 20th century is the period during which Florida's flamingo story becomes murky. In 1949 the practice of wing-clipping the Hialeah flock ended, and ever since, even though they generally remained at the racetrack to breed and take advantage of an endless, human-provided food supply, those birds could fly free. Simultaneously, flamingos throughout the Caribbean began making a comeback. In the early 1950s the only substantial population of Caribbean Flamingos known to exist, numbering around 18,000 adults, nested on the southern Bahamian island of Great Inagua. Robert Porter Allen estimated the entire Caribbean population at around 21,000 adults. Today, just 50 years later, over 300,000 Caribbean Flamingos live in the region, with substantial breeding populations (nesting in good years, at least) in Cuba, the Yucatan Peninsula, Bonaire, Venezuela, and Great Inagua.

Andros Island hasn't fared so well, but all is not hopeless. During a 2004 aerial survey of the island, between 1000 and 2000 flamingos were counted. That's a far cry from the tens of thousands estimated to have nested historically, but it appears that flamingos are revisiting their former haunts. While no nesting has been observed, the right habitat survives, especially in the southern interior of the sparsely-populated island.

And, through the latter half of the 20th century, small numbers of flamingos have been regularly sighted at their old feeding grounds in Florida Bay. During the mid-1990s a flock of about 35 was seen at Sandy Key, on the boundary of Florida Bay and the Gulf of Mexico. Even more recently, in July, 2004, a flock of 57 was documented in Mud Lake, just a couple of miles

inland from Florida Bay. This all leads to a question…where are the small flamingo flocks now visiting Florida Bay coming from? During the 1980s and 1990s, Dennis Testa, former curator of the Hialeah flock, claimed that every October and November some 20-30 of his birds left the racetrack for parts unknown. This often coincided with the appearance of flamingos in Florida Bay. The evidence seemed strong that any "wild" birds in South Florida were likely coming from Hialeah…until October 20, 2002, when park rangers in Everglades National Park observed and photographed a banded flamingo, part of a flock of 15 birds, in Florida Bay. It's origin: not Hialeah, and not Andros Island…but the Rio Lagartos Biosphere Reserve in Yucatan, Mexico!

Perhaps today's Florida Bay birds are coming from many places, including tourist attractions *and* wild, nomadic Caribbean and Bahamian populations. Regardless, the debate on current flamingo origins shouldn't allow us to forget that over a century ago these birds existed naturally in Florida—in substantial numbers—and may have even bred in the state.

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RECENT SCIENTIFIC ARTICLES AND REPORTS, GENERAL

Anonymous 2005. Sideways glance. Natural History 114: 26.

Animals that catch live, fast-moving prey tend to have forward-facing eyes, while animals that rely on a more sedentary diet have eyes on each side of the head, maximizing their ability to spot lurking dangers. However Africa's filter-feeding lesser flamingo has eyes that face forward. This is because lesser flamingos must feed their young for the first ten to twelve weeks of their lives, and this task requires delivery of "crop milk" from parent to chick, directly into the chick's open mouth, and this is possible only with forward facing eyes.

Balkız Ö., Özesmi U., Pradel R., Germain C., Sıkı M., Amat J. A., Rendón-Martos M., Baccetti N., & Béchet A., In press. Range of the Greater Flamingo *Phoenicopterus roseus* metapopulation in the Mediterranean: new insights from Turkey. Journal of Ornithology.

Metapopulation conservation should rely on a flyway approach aiming to assess the spatial range of metapopulations by estimating the level of exchanges among local populations. In the Western Mediterranean, Greater Flamingos have been shown to constitute a metapopulation with natal and breeding dispersal among colonies. In this paper, we examine whether this metapopulation reaches Turkey using a band-resighting study. Our results constitute the first evidence of natal and breeding dispersal from the Western Mediterranean to Turkey, and suggest that the Gediz Delta, one of the two colony sites in Turkey, can play a significant role in the recruitment of flamingos from the Western Mediterranean. In 2003 and 2004, breeders of Western Mediterranean origin in the Gediz Delta accounted for more than 1.2 and 1.9% of the estimated breeding population, respectively. Our observations also indicate that the Western Mediterranean and Southwest Asia could constitute distinct compartments which overlap in Turkey. Future studies on the genetic differentiation between populations are necessary to conclude the existence of separate compartments. Finally, the resightings of flamingos banded in Turkey show that post-fledging dispersal from Turkey reaches both the Eastern and Western Mediterranean wetlands. Future data on the natal and breeding dispersal of flamingos born in Turkey could clarify further the connection between Turkey and the Western Mediterranean metapopulation.

Boukhriss, J., Selmi, S., Béchet, A. & Nouira, S. In press. Vigilance in Greater Flamingos wintering in southern Tunisia: Age-dependant flock size effect. Ethology.

The decrease in individual vigilance with flock size is a widely recognized pattern in group-living species. However such a relationship may be affected by other factors, such as age and flock composition. For instance, because young animals generally lack experience and have higher nutritional needs than adults, they can be expected not only to be less vigilant than adults but also to decrease their vigilance level in a greater extent when flock size increases than adults do. We investigated this issue using data on Greater Flamingos wintering in the gulf of Gabès, in southern Tunisia. Flamingos tended to congregate in small single-age flocks for feeding, but as flock size increased, flocks became mixed. Globally, we found that when flock size increased, young flamingos significantly decreased their vigilance time, while adult did not, suggesting an age-dependant flock size effect on vigilance. However, when flock composition (single-age versus mixed) was taken into account, a more complex pattern was found. Within single-age and small flocks, no difference was found between young flamingos and adult ones regarding their vigilance level and their response to increasing flock size. However, within mixed and large flocks, adult flamingos were more vigilant than young ones, while variation in flock size did not result in a significant change in vigilance. These results would suggest that young birds relied on the presence of adults, and hence more experienced individuals in detecting dangers, to reduce their vigilance and to increase their foraging time in order to satisfy their

higher nutritional requirements. They could also be interpreted as a possible consequence of increasing competition with flock size which constrained more nutritionally stressed young flamingos to increase their foraging time to the detriment of vigilance.

Childress, B., Harper, D., Hughes, B. and Ferris, C. 2006. Adaptive benefits of differential post-fledging development patterns in the Lesser Flamingo (*Phoenicopterus minor*). Ostrich 77 (1&2): 84-89.

Measurements of five morphological components (mass, skull length, culmen, flattened wing and tarsus) and blood samples were taken from 154 fledged wild Lesser Flamingos *Phoenicopterus minor* captured during 2001 and 2002 at Lake Bogoria, Kenya (0°11'–20'N, 036°06'E). The sample included adults (>3 years old), immature birds (2–3 years old) and first-year juvenile birds of both sexes. The sex of each bird was determined by PCR amplification of the CHD-Z and CHD-W genes, using DNA extracted from blood samples. Within each gender, there were significant differences in mass and tarsus length amongst the three age groups, indicating that the skeletal size and mass of Lesser Flamingos continue to increase between fledging and attainment of adult plumage at three to four years of age. The different morphological components increased in size at different rates, although the same components appeared to increase at similar rates in both males and females. Skull and culmen lengths had reached adult size in juvenile birds, while juvenile wing length, tarsus length and mass were approximately 95%, 85% and 75% of adult size, respectively. The adaptive significance of these findings is discussed.

Childress, B., Hughes, B., Harper, D., Van den Bossche, W., Berthold, P. and Querner, U. In press 2006a. Satellite tracking documents East African flyway and key site network of the Lesser Flamingo (*Phoenicopterus minor*). In: Boere, G.C; C.A. Galbraith; D.A. Scott; D.A. Stroud and L.G. Underhill, editors (2006). "Waterbirds Around the World". Proceedings of a global conference on waterbird flyways, Edinburgh, April 2004. [Publisher], Edinburgh. Pp. XXX.

The itinerant Lesser Flamingo *Phoenicopterus minor* is dependent on a network of specialized sites for its survival. To study the movements of individual birds and define this network in East Africa, four adult male Lesser Flamingos were tagged with satellite transmitters (PTTs) at Lake Bogoria, Kenya, in October 2002. During the first 15 months, there was no significant difference in the length of their inter-lake flights. However, there were significant differences in the number of flights and the number of days spent at each stopover. One bird flew 2 964 km, making 20 visits to eight different lakes (mean stay 21.8 days), while another made 18 visits to six different lakes (mean stay 24.1 days), flying 3 012 km. A third bird moved among lakes 70 times, visiting 11 different lakes (mean stay 6.4 days) and flew 7 870 km. The fourth bird's PTT stopped transmitting after 38 days. There were no flights outside East Africa. The flyway for the Lesser Flamingo in East Africa consisted of a 940 km north-south range between Lake Logipi, Kenya, and Bahi Swamp, Tanzania. The network of sites used by the study birds consisted of eight alkaline lakes in Kenya and Tanzania and an ephemeral freshwater wetland in central Tanzania. The conservation status of these nine sites varies from well-protected to completely unprotected.

Childress, B., Hughes, B., Harper, D., Van den Bossche, W., Berthold, P. & Querner, U. In press 2006b. East African flyway and key site network of the Lesser Flamingo (*Phoenicopterus minor*) documented through satellite tracking. Proceedings of Pan African Ornithological Congress XI, Djerba, Tunisia, 20-25 November 2004. Ostrich Supplement 16: xx-xx.

In October 2002, four adult Lesser Flamingos were tagged at Lake Bogoria, Kenya: two with solar-powered PTTs and two with battery-powered PTTs, one of which stopped transmitting after 38 days. In July 2003, an additional four birds were tagged with solar-powered PTTs. During the first two years (November 2003 - October 2004), flight patterns of the tagged birds were independent. Interlake flight distances ranged from 16 km to 441 km (mean:

111.5 km, N = 243); 68.3% being less than 100 km, and 96% less than 300 km. There was no significant difference among the birds in the median length of their interlake flights. The number of days spent at each stopover ranged from 0 (less that 1d) to 153d (mean: 14.4d, N = 250). There was a significant difference among the birds in the number of days spent at each stopover. This difference was due to one very active bird that made 133 interlake flights during the period, visiting 12 different sites, spending a mean 5.2 d at each and travelling 12 600 km. There was no significant difference among the other six birds. The seven birds' flights were confined to a 940 km north-south range within the Rift Valley between Lake Logipi in northern Kenya and Bahi Swamp in central Tanzania. Their key site network consisted of eight alkaline lakes (Logipi, Bogoria, Elmenteita, Nakuru, Natron, Empakai Crater Lake, Manyara and Eyasi), and Bahi Swamp, an ephemeral wetland in central Tanzania. The conservation status of these nine sites varies from well-protected to completely unprotected. None of the birds appears to have bred during either the 2002-03 or the 2003-04 breeding seasons (October to January), although other Lesser Flamingos bred at Lake Natron during both seasons, Lake Natron being the only East African site where the Lesser Flamingo has bred successfully during the past 40 years.

Diawara Y, Arnaud A, Araujo A, Béchet A., In press. Nouvelles données sur la reproduction et l'hivernage des flamants roses en Mauritanie et confirmation d'échanges avec les colonies méditerranéennes. Malimbus.

The coastal wetlands of Mauritania consist of vast areas of flooded plains and mudflats under the influence of the tide and are habitats of an exceptional avifaunistic richness. The Banc d'Arguin and the fresh and salt-water marshes of the delta of the Senegal river are especially known to be the principal wintering sites of many waterbirds from the Western Palearctic. These sub-Saharan coastal wetlands are also the breeding sites of many waterbirds of afro-tropical and Mediterranean distribution. The Greater Flamingo (*Phoenicopterus roseus*) is one of these species, often abundant on the Mauritanian coast. The link between the Greater flamingos breeding in Mauritania and those breeding at Mediterranean colonies is however not established. In order to better characterize the current status and trends of the species, we monitored the Greater Flamingos in the coastal wetlands in Mauritania in 2003-04. Here, we present the first results of this study put in perspective with the data relative to this species collected for the 48 last years in Mauritania. In particular, the observation of 2 birds born and ringed in the Mediterranean, feeding chicks on the Banc d'Arguin makes it possible to establish the final proof of existing exchanges between the Mediterranean colonies and the Mauritanian one. We discuss the implications of these results for the limits of the metapopulation of this species.

Guitart, R., Clavero, R., Mateo, R. and Manez, M. 2005. Levels of persistent organochlorine residues in eggs of greater flamingos from the guadalquivir marshes (Donana), Spain. Journal of Environmental Science and Health, Part B - Pesticides, Food Contaminants and Agricultural Wastes 40: 753-760.

Organochlorine pesticides (OCPs) and polychlorinated biphenyls (PCBs) residue levels were determined in 53 unhatched eggs from greater roseus flamingos (*Phoenicopterus ruber*). Eggs were collected in 1996 from the National Park of Donana (Guadalquivir marshes, Southwest Spain), immediately after one breeding colony abandoned the nesting site due to predator attacks. The main metabolite of p,p'-DDT, p,p'-DDE, was the OCP residue found at higher concentrations, with a geometric mean of 721 ng/g wet weight. Residues of other pesticides, including some hexachlorocyclohexane isomers, hexachlorobenzene, aldrin, heptachlor, and heptachlor-epoxide, were detected at much lower concentrations. The sum of PCBs was 528 ng/g, with PCB congeners #187 and #153 being the most prominent in eggs. The pattern observed in these compounds of industrial origin corresponded more to Aroclor 1260 than to any other commercial mixture. Levels of organochlorine residues indicate a medium degree of exposure, and they are not considered of any concern for the flamingo population. In particular, neither p,p'-DDE nor PCB levels were found to be correlated with the eggshell thickness.

Javed, S., Khan, S.B., Mansouri, R and Hosani, E.A. 2006. Satellite tracking of Greater Flamingos *Phoenicopterus roseus* from the United Arab Emirates. *Tribulus* 16:16-17.

In one of the first-ever instances of the capture and satellite tracking of greater flamingos Phoenicopterus roseus in the Arabian Peninsula, several birds were captured in late 2005 and fitted with satellite transmitters at Al Wathba Wetland Reserve in Abu Dhabi, a protected area managed by the Environment Agency - Abu Dhabi, EAD. The capture and tagging of the flamingos was done as part of the Seabird Satellite Tracking Project implemented by EAD's Terrestrial Environment Research Centre, TERC. One of the key objectives of the study is to understand the movement of flamingos between different coastal and inland wetlands within the Emirates and also to document their migration. The bulk of the UAE's flamingo population is believed to originate from breeding colonies further north, possible Iran, Turkey and Central Asian countries. Birds are present at favoured sites, including Al Wathba, throughout the year, although numbers increase between autumn and spring because of migrants and winter visitors.

Mascitti, V. and Castañera, M.B. 2006. Foraging depth of flamingos in single-species and mixed-species flocks at Laguna de Pozuelos, Argentina. Waterbirds 29: 328-334.

Habitat use by Chilean Flamingos (*Phoenicopterus chilensis*), Andean Flamingos (*Phoenicoparrus andnus*) and James Flamingo (*Phoenicoparrus jamesi*) in single-species and mixed-species flocks were studied at Laguna de Pozuelos, Argentina, by comparing the foraging pattern of each species in the presence and absence of the others. Spatial segregation among species within a flock was found. James Flamingo used the edge and the shallow foraging depth both in single-species and mixed-species flocks. Chilean Flamingos did not use the edge or the shallow depth either in single-species or mixed-species flocks, and used moderate and deep foraging depths. Andean Flamingo exhibited the most flexible foraging pattern, grouping either with Chilean Flamingo or with James Flamingo depending on which of these species predominated in the flock. Spatial difference in the feeding behavior among the three flamingo species may be principally attributed to the habitat of prey organisms. Chilean Flamingo feeds on planktonic organisms present mainly in the upper portion of the water column, and therefore this species can access a wider range of food items if foraging at deeper depths both in single-species or mixed-species flocks. The foraging pattern of James Flamingo was indicated by its main prey, benthic and aerophilic diatoms, largely found in shallow waters near the edge of the lake. Andean Flamingo feed on benthic diatoms common in the water-sediment interface of shallow and deep waters, thus favoring its grouping behaviour with James or Chilean Flamingos in mixed-species flocks.

Norambuena, M.C. and Parada, M. 2005. Serum biochemistry in Andean flamingos (*Phoenicoparrus andinus*): Natural versus artificial diet. Journal of Zoo and Wildlife Medicine 36: 434-439.

A study of 10 clinical pathology values in four groups of Andean flamingo chicks (*Phoenicoparrus andinus*) was conducted to evaluate an artificial feeding program in Chile. Three groups were fed controlled diets (groups 2000, 2001, and 2002) with quantitative differences in their nutritional content. A fourth group of free-living Andean flamingo chicks was used as normal controls. Nutritional management techniques used in 2002 resulted in hematologic values with similar levels of total protein, globulins, albumin, cholesterol, urea, phosphorus, aspartate aminotransferase (AST), alanine aminotransferase (ALT), creatinine, and calcium to those obtained in free-living chicks. In addition, final weight, physical condition, and plumage in flamingo chicks of group 2002 were considered satisfactory to face local climatic conditions and nomadic activity. These results may be useful as reference values and help to improve conservation management and veterinary care of this species.

Saheb, M., Boulkhssaïm, M., Ouldjaoui, A., Hamdi, M. and Samraoui, B. 2006. Sur la nidification du Flamant Rose *Phoenicopterus roseus* en 2003 et 2004 en Algérie. Alauda 74 (2): 368-371.

La reproduction du Flamant rose *Phoenicopterus roseus* en Algérie, bien que parfois soupsonnée, n'a jamais été auparavant prouvée. Un inventaire systématique des lacs salés des Hauts Plateaux et de la vallée de Oued Rhigh, qui recèlent des sites potentiels de reproduction, a permis de localiser un site, Garaet Ezzemoul, où le Flamant rose a essayé de se reprodruire sans succès durant les deux années de 2003 et de 2004. Nous aborderons les raisons de l'échec de la reproduction du Flamant rose en Algérie et des moyens adéquats à prendre pour assurer sa réussite.

The reproduction of the Greater Flamingo *Phoenicopterus roseus* in Algeria, though long suspected, has never been proven before. During a systematic survey of the salt lakes of the Haut Plateaux and the eastern Sahara which are potential breeding sites, we were able to locate a breeding site, Garaet Ezzemoul, where the Greater Flamingo attempted unsuccessfully to breed for the past two years. We discuss the reasons for the previous breeding failure in Algeria of this flagship species and appropriate means to ensure its safe nesting.

Sangster, G. 2005. A name for the flamingo-grebe clade. Ibis 147: 612-615.

Zollinger, T.J., Backues, K.A. and Burgos-Rodriguez, A.G. 2005. Correction of angular limb deformity in two subspecies of flamingo (*Phoenicopterus ruber*) utilizing a transphyseal bridging technique. Journal of Zoo and Wildlife Medicine 36: 689-697.

Three hand-raised American flamingo (Phoenicopterus ruber ruber) chicks and one hand-raised Chilean flamingo (Phoenicopterus ruber chilensis) developed valgus angular limb deformities of the proximal tarsometatarsal bone. All flamingos Underwent surgical correction to unequally retard the growth plate using transphyseal bridging. Positive profile pins were placed in the proximal epiphysis and distal to the growth plate in the metaphysis on the convex side of the affected tarsometatarsus. Various banding techniques were used in each flamingo to create tension. Three of the four flamingos responded in 7-14 days with correction or slight overcorrection of the valgus limb deformity. The fourth flamingo's leg deformity did not improve for reasons thought to be related to improper implant placement. Growth plate retardation by transphyseal bridging proved successful in correcting valgus limb deformity of the proximal tarsometatarsus. This technique may be considered as an option for correction of angular limb deformities of the proximal tarsometatarsus in flamingos less than 90-120 days of age.

RECENT SCIENTIFIC ARTICLES AND REPORTS, LESSER FLAMINGO MORTALITY IN EAST AFRICA

Ballot, A., Krienitz, L., Kotut, K., Wiegand, C., Metcalf, J.S., Codd, G.A. & Pflugmacher, S. 2004. Cyanobacteria and cyanobacterial toxins in three alkaline Rift Valley lakes of Kenya – Lakes Bogoria, Nakuru and Elmenteita. Journal of Plankton Research 26: 925-935.

The abstract of this paper was published in *Flamingo* 13 (2005) on pages 38-39.

Ballot, A., Krienitz, L., Kotut, K., Wiegand, C. & Pflugmacher, S. 2005. Cyanobacteria and cyanobacterial toxins in the alkaline crater lakes Sonachi and Simbi, Kenya. Harmful Algae 4: 139-150.

The phytoplankton communities and the production of cyanobacterial toxins were investigated in two alkaline Kenyan crater lakes, Lake Sonachi and Lake Simbi. Lake Sonachi was mainly dominated by the cyanobacterium *Arthrospira fusiformis*, Lake Simbi by *Arthrospira fusiformis* and *Anabaenopsis abijatae*. The phytoplankton biomasses measured were high, reaching up to 3159 mg L^{-1} in L. Sonachi and up to 348 mg L^{-1} in L. Simbi. Using HPLC techniques, in L. Sonachi one structural variant of the hepatotoxin microcystin (microcystin-RR) was found in L. Sonachi and four variants (microcystin- LR, -RR, -LA and -YR) were identified in L. Simbi. The neurotoxin anatoxin-a was found in both lakes. To our knowledge this is the first evidence of cyanobacterial toxins in L. Sonachi and L. Simbi. Total microcystin concentrations varied from 1.6 to 12.0 µg microcystin-LR equivalents g^{-1} dry weight (DW) in L. Sonachi and from 19.7 to 39.0 µg microcystin-LR equivalents g^{-1} DW in L. Simbi. Anatoxin-a concentrations ranged from 0.5 to 2.0 µg g^{-1} DW in L. Sonachi and from 0 to 1.4 µg g^{-1} DW. in L. Simbi. Microcystin-YR and anatoxin-a were produced by a monocyanobacterial strain of *Arthrospira fusiformis*, isolated from L. Sonachi. The concentrations found were 2.2 µg microcystin g^{-1} DW and 0.3 µg anatoxin-a g^{-1} DW. This is the first study showing *Arthrospira fusiformis* as a producer of microcystins and anatoxin-a. Since *Arthrospira fusiformis* occurs in mass developments in both lakes, a health risk for wildlife can be expected.

Codd, G.A., Metcalf, J.S., Morrison, L.F., Krienitz, L., Ballot, A., Pflugmacher, S., Wiegand, C. & Kotut, K. 2003. A cyano-anomaly? Cyanobacterial toxins as contributors to Lesser Flamingo mass deaths. Harmful Algae News. The Intergovernmental Oceanographic Commission of UNESCO 24: 1-2.

Mass die-offs of Lesser Flamingos do not appear to have been recorded during earlier decades of intensive study at the East African saline-alkaline lakes, suggesting that the mass mortalities of the 1990s are relatively modern phenomena. The extend to which increasing modern pressures from visitor numbers upon the breeding colonies, and pollution input from industry and agriculture interact with microbial threats to bird health, is a complex problem. The production of cyanobacterial toxins in the lakes and their presence in birds, dying after displaying typical signs of intoxication, indicate that their primary food can present benefits and costs. The characteristics of the toxigenic cyanobacteria in the lakes, and their regulation, require investigation to further understand the multiple influences upon health and population dynamics of the Lesser Flamingo.

Krienitz, L., Ballot, A., Kotut, K., Wiegand, C., Pütz, S., Metcalf, J.S., Codd, G.A. & Pflugmacher, S. 2003. Contribution of hot spring cyanobacteria to the mysterious deaths of Lesser Flamingos at Lake Bogoria, Kenya. FEMS Microbiology Ecology 43. 141-148.

Cyanobacterial mats at hot springs on the shore of the alkaline Lake Bogoria, Kenya, were investigated regarding species community and cyanobacterial toxin content. The hepatotoxins microcystin -LR, -RR, -LF and -YR, and the neurotoxin anatoxin-a were present. The mats were dominated by *Phormidium terebriformis*, *Oscillatoria willei*, *Spirulina subsalsa* and *Synechococcus bigranulatus*. The concentration of microcystins in mat samples ranged from 221 to 845 µg microcystin-LR equivalents g^{-1} DW of mat. Anatoxin-a concentrations ranged from 10 to 18 µg g^{-1} DW of mat. A contribution of the cyanobacterial toxins from the hot spring-mats to the mass mortalities of Lesser Flamingos is suggested by: *a*, the presence of hot spring cyanobacterial cells and cell fragments, and high concentrations of the cyanobacterial hepato- and neurotoxins in flamingo stomach contents and faecal pellets; *b*, observations of neurological signs of bird poisoning, consisitent with anatoxin-a intaoxication, at the lake. Cyanobacterial toxins in stomach contents, intestine and fecal pellets were 0.196 µg g^{-1} FW for the microcystins and 4.34 µg g^{-1} FW for anatoxin-a. Intoxication with cyanobacterial toxins could occur by ingestion of detached cyanobacterial cells from the mats, as the flamingos need to drink fresh- or brackish water, and to wash their feathers daily, which they do in the vicinity of the hot springs, where salinity is lower than in the main waterbody of the lake.

Krienitz, L., Ballot, A., Casper, P., Codd, G.A., Kotut, K., Metcalf, J.S., Morrison, L.F., Pflugmacher, S., Wiegand, C. 2005. Contribution of toxic cyanobacteria to the massive deaths of Lesser Flamingos at saline-alkaline lakes of Kenya. Verhandlungen der Internationalen Vereinigung für Limnologie 29: 783-786.

The hepatotoxic microcystins and the neurotoxic anatoxin-a are acutely poisonous substances, which can kill waterfowl. The investigations on dead Lesser Flamingos from Kenyan lakes revealed microcystins and anatoxin-a in different body tissues in such concentrations that a major contribution to the bird deaths can be expected. The intake of the cyanotoxins by the flamingos is largely via feeding. By means of its filter-equipped bill, an adult Lesser Flamingo consumes about 72 g dry weight of cyanobacterial food daily (Vareschi 1978). We found three possible sources in the cyanobacterial food of the flamingos: (i) toxic strains of *Arthrospira fusiformis*; (ii) invading potentially toxic populations of *Anabaena* and *Anabaenopsis* in the natural phytoplankton communities; and (iii) cyanobacterial mats in hot springs, dominated by potentially toxic Oscillatoriales and *Synechococcus.*

Krienitz, L., Ballot, A., Casper, P., Kotut, K., Wiegand, C., Pflugmacher, S. 2005. Cyanobacteria in hot springs of East Africa and their potential toxicity. Algological Studies 117: 297-306.

Cyanobacterial mats at the saline-alkaline Rift Valley lakes Bogoria and Manyara were dominated by *Phormidium* cf*. terebriformis*, *Oscillatoria willei*, *Spirulina subsalsa* and *Synechococcus bigranulatus*. In the hot springs at Lake Magadi *Phormidium* spec. was the most prevalent . Mats from the hot springs at the shoreline of Lake Natron were dominated by *Cyanobacterium minervae*. In the Hell's Gate hot spring *Pseudanabaena* subgen. *Ilyonema galeata* was prevalent. The hepatotoxins microcystin -LR, -RR, -LF and -YR, and the neurotoxin anatoxin-a were present in the hot spring cyanobacterial community of Bogoria. In 2001, the concentration of microcystins, ranged from 221 to 835 µg microcystin-LR equivalents g^{-1} DW of mat. Anatoxin-a concentrations ranged from 10 to 18 µg g^{-1} DW of mat. These concentrations range in a scale of potential intoxication of Lesser Flamingos. In 2002-2003, the toxin concentrations in the hot springs at Lake Bogoria were remarkably lower (microcystins below 10 µg g^{-1} DW, anatoxins below 1 µg g^{-1} DW). In the samples from Magadi, Hell's Gate and Manyara, anatoxin-a was not detectable and the microcystins did not exceed a concentration of 1 µg g^{-1} DW. In the Natron sample neither microcystins nor anatoxin-a were detectable. The causes of the high fluctuation of cyanobacterial toxins in hot springs of East Africa remain unknown and need to be further investigated. The endemic, cyanobacteria-feeding fish *Oreochromis grahami* caught 2001 in the Magadi hot springs contained 0.41 - 0.79 µg g^{-1} FW microcystin-RR. This is a first hint of potential intoxication of fish populations in hot springs by cyanobacteria.

Kotut, K., Ballot, A., Krienitz, L. 2006. Toxic cyanobacteria and its toxins in standing waters of Kenya: implications for water resource use. Journal of Water & Health 4: 233-245.

Phytoplankton biodiversity studies in Kenya's standing waters were carried out between 2001 and 2003. Toxin -producing cyanobacteria were recorded in twelve water bodies. *Microcystis* and *Anabaena* were the most common species in freshwaters, while *Anabaenopsis* was common in alkaline saline lakes. Seven lakes with cyanobacterial blooms and a hot spring had detectable levels of microcystins and anatoxin-a. Cell bound microcystin (-LR equivalents) concentrations ranged from 1.6–19800 µg g^{-1} DW, while anatoxin-a varied from below the limit of detection to 1260 µg g^{-1} DW. In alkaline-saline lakes, microcystins and anatoxin-a were also present in stomach contents and liver samples of dead flamingos. Monoculture strains of *A. fusiformis* from Lakes Sonachi and Bogoria had detectable levels of microcystins, while anatoxin-a was present in strains isolated from Lakes Sonachi, Bogoria and Nakuru. Two freshwater sites, Nyanza Gulf (L. Victoria) and Lake Baringo recorded cyanotoxin concentrations exceeding the World Health Organisation's current Guideline Value of 1.0 µg L^{-1} microcystin-LR for drinking water. The

results confirm that cyanotoxins could have played a role in the mortality of flamingos in Lakes Bogoria and Nakuru. The implications of these findings on water resource use, measures to be taken to reduce the risk of exposure, and eutrophication control steps to reduce cyanobacterial bloom formation are considered in this paper.

Lugomela, C., Pratap, H.B. and Mgaya, Y.D. 2005. Cyanobacteria blooms—A possible cause of mass mortality of Lesser Flamingos in Lake Manyara and Lake Big Momela, Tanzania. Harmful Algae 5: 534-541.

Limnological studies were conducted in three alkaline lakes (Lake Big Momela, Manyara and Embagai) with the aim of investigating the cause of mass mortality of the Lesser Flamingos in Lake Manyara and Lake Big Momela during July–August 2004. High concentrations, up to 150 million filaments per liter of the potentially toxic planktonic cyanobacterium Arthrospira fusiformis were found in surface scum of Lake Big Momela where Lesser Flamingos were dying at a rate of between 15 and 50 individuals per day during the study period. Gut content analyses indicated that A. fusiformis was the main food item in moribund flamingos. Mouse bioassay suggested that the crude microalgal extract dominated by A. fusiformis was toxic with all mice close to death becoming lethargic, with loss of balance, uncoordinated movements, intermittent tremors, dyspnoea with gasping followed by respiratory arrest. This observation gives circumstantial evidence that A. fusiformis at such high concentrations was toxic to the Lesser Flamingo in Lake Big Momela.

Metcalf, J.S., Morrison, L.F., Krienitz, L., Ballot, A., Krause, E., Kotut, K., Pütz, S., Wiegand, C., Pflugmacher, S. & Codd, G.A. 2006. Analysis of the cyanotoxins anatoxin-a and microcystins in Lesser Flamingo feathers. Toxicology and Environmental Chemistry 88: 159-167.

Analysis of feathers taken from carcasses of the Lesser Flamingo (*Phoeniconaias minor*) which had been exposed to the cyanobacterial toxins anatoxin-a and microcystins showed that feathers from birds from Lake Bogoria had between 0.02 and 30.0 µg microcystin-LR equivalents per gram of feather but no microcystin variants in feathers from Lake Nakuru according to HPLC and ELISA analysis of extracts. Anatoxin-a analyses of Lesser Flamingo feathers, although more frequently negative than for microcystins, were found to contain up to 0.8 µg anatoxin-a g^{-1} of feather. When multiple feathers were analysed for microcystins and anatoxin-a, wing feathers were found to contain the highest concentrations of these cyanotoxins and the order of concentration and frequency of detection was wing>breast>head. Furthermore, microscopic analysis of the feathers showed an absence of cyanobacterial cells upon the feather surface. In order to understand the adsorption of toxins to feathers, further experiments using control feathers indicated that feathers exposed to microcystin-LR and anatoxin-a solutions of 10 and 100 µg l^{-1} showed no significant uptake of these toxins from solution. ELISA and protein phophatase inhibition assay analysis of the feathers exposed to the microcystin-LR solutions showed low positive microcystin-LR equivalents of <0.002 to 0.11 µg g^{-1}. These findings indicate that the analysis of flamingo feathers may provide a convenient and non-invasive method to investigate the possible exposure of these birds to cyanobacterial toxins via ingestion.

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Flamingo publishes articles on the world's six species of flamingo. We welcome reports on the status, movements, breeding and biology of species in the wild or in captivity on a regional or local scale, short papers with original data, progress reports of *in-situ* or *ex-situ* conservation projects, ringing reports, news items, etc. Articles may be submitted in English, French or Spanish, should be no longer than 2,000 words, and should include summaries in English as well as in the language used for the article. There are c. 500 words per printed page. The word limit includes *all references*, and should also take into account any *tables* or *figures* in the text. A figure reproduced as a half-page in the final newsletter equates to approximately 250 words, a full page table to c. 500 words, etc. Manuscripts longer than the word limit may be returned for shortening prior to being published.

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***Flamingo* Editors**

Articles in English: Dr. Brooks Childress (brooks.childress@wwt.org.uk)
Articles in French: Dr. Arnaud Béchet (bechet@tourduvalat.org)
Articles in Spanish: Dr. Felicity Arengo (arengo@amnh.org)

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Editeurs de *Flamingo*

Articles en Anglais: Dr. Brooks Childress (brooks.childress@wwt.org.uk)
Articles en Français: Dr. Arnaud Béchet (bechet@tourduvalat.org)
Articles in Espagnol: Dr Felicity Arengo (arengo@amnh.org)

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Artículos en Inglés: Dr. Brooks Childress (brooks.childress@wwt.org.uk)
Artículos en Español: Dr. Felicity Arengo (arengo@amnh.org)

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