



# International Single Species Action Plan for the Conservation of the Lesser Flamingo *Phoenicopterus minor*



*Alan Hickenbottom*

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Convention on the Conservation of  
Migratory Species of Wild Animals (CMS)

Agreement on the Conservation of  
African-Eurasian Migratory Waterbirds (AEWA)

**International Single Species Action Plan  
for the Conservation of the  
Lesser Flamingo**

*Phoenicopterus minor*



*Graham McCulloch*

*Prepared with financial support from Swedish Environmental Protection Agency, Wildfowl & Wetlands Trust, International Flamingo Foundation, Disney Animal Programs, Taiwan Council of Agriculture, Wetlands International, Pensthorpe Conservation Trust, Hillside Bird Oasis, The Friends of Banham Zoo, Flamingo Land*

**Compiled by: Brooks Childress<sup>1</sup>, Szabolcs Nagy<sup>2</sup> and Baz Hughes<sup>1</sup>**

<sup>1</sup> Wildfowl & Wetlands Trust, Slimbridge, Glos. GL2 7BT, UK. Email: [research@wwt.org.uk](mailto:research@wwt.org.uk)

<sup>2</sup> Wetlands International, P.O. Box 471, 6700 AL Wageningen, The Netherlands. Email: [Szabolcs.Nagy@wetlands.org](mailto:Szabolcs.Nagy@wetlands.org)

**With input from:** AEWA/CMS International Lesser Flamingo Action Planning Workshop, Nairobi, Kenya, 25-29 September 2006

**With contributions from:** Yilma Abebe, Mark Anderson, Neil Baker, Arnaud Béchet, Achilles Byaruhanga, Thade Clamsen, Peter Cranswick, Sergey Dereliev, Yelli Diawara, Tim Dodman, David Harper, Geoffrey Howard, Baharat Jethva, Jasson John, Mzamilu Kaita, Najam Khurshid, Cathy King, Kiplagat Kotut, Graham McCulloch, Lota Melamari, Zenzele Mpofu, Taej Mundkur, Wambugu Mwangi, Oliver Nasirwa, P. Kariuki Ndag'ang'a, Fred Omengo, Alfred Owino, B. Parasharya, Houssein Rayaleh, Rob Simmons, Aiyasami Salem Sreenivasan, Anika Tere, Bertrand Trolliet, Miriam Zacharia

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**Geographical scope:** With the exception of India and Pakistan, the range of the Lesser Flamingo is fully included within the AEWA geographic scope. This action plan covers the entire African, South Asian and SW Asian Lesser Flamingo breeding and non-breeding range. It requires implementation in the following countries regularly supporting >1% of the regional populations of the Lesser Flamingo: Botswana, Ethiopia, Guinea, India, Kenya, Mauritania, Namibia, South Africa, United Republic of Tanzania and Uganda.

**Reviews:** This International Single Species Action Plan should be reviewed and updated every ten years (first review 2017). An emergency review will be undertaken if there is a sudden major change liable to affect the population.

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## Preface

This International Single Species Action Plan for the Conservation of the Lesser Flamingo (*Phoenicopterus minor*) was commissioned to the IUCN-SSC/Wetlands International Flamingo Specialist Group (FSG) and Wildfowl & Wetlands Trust (WWT). It has been compiled by Brooks Childress, Chair of the FSG and Research Associate at WWT, Baz Hughes, Head of Species Conservation at WWT and Szabolcs Nagy, Senior Biodiversity Officer at Wetlands International. The drafts of the plan went through rigorous consultations and in the final approved version are reflected comments received from a number of experts, governmental officials from the range states and the AEWA Technical Committee. Financial support for the preparation of this Action Plan was provided by the Swedish Environmental Protection Agency, Wildfowl & Wetlands Trust, International Flamingo Foundation, Disney Animal Programs, Taiwan Council of Agriculture, Wetlands International, Pensthorpe Conservation Trust (UK), Hillside Bird Oasis (UK), The Friends of Banham Zoo (UK) and Flamingo Land (UK). The Action Plan follows the format for Single Species Action Plans approved by the AEWA 2<sup>nd</sup> Meeting of Parties in September 2002.

## Executive Summary

Although the most numerous of the world's flamingos, the Lesser Flamingo is classified “Near Threatened” in the 2006 IUCN Red List of Threatened Species, indicating that it is considered likely to qualify for a threatened category in the near future. The species is also listed in Columns A and B of the Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA) Action Plan, Appendix II of the Bonn Convention (CMS) and Appendix II of the CITES convention. Implicit in these agreements is the need for the production of a conservation action plan.

The Lesser Flamingo is a non-migratory itinerant species adapted to respond to changes in local environmental conditions by moving among wetlands, and thus depends on a network of suitable sites. Four separate populations are recognised for conservation purposes, although it is assumed that some interchanges probably occur between them. The largest population, estimated to be between 1.5 and 2.5 million individuals, occurs on the alkaline-saline lakes of the Great Rift Valley in East Africa, where single flocks of several hundred thousand birds regularly provide one of the world's most impressive wildlife spectacles. Smaller populations occur in the Rann of Kachchh in north-western India, estimated to be approximately 390,000 birds, in southern Africa, estimated to be between 55,000 and 65,000 birds and in West Africa, estimated to be between 15,000 and 25,000 birds. Declines have been suggested for much of Africa, but are difficult to clarify due to widescale movement within the continent.

The Lesser Flamingo occurs regularly in 29 countries from West Africa, across sub-Saharan Africa and along the SW Asian coast to South Asia, and occurs as a vagrant in 25 additional countries. However, its global population is concentrated in 10 primary range states and confirmed regular breeding is confined to just five sites in four of these countries: Makgadikgadi Pans in Botswana, Etosha Pan in Namibia, Lake Natron in Tanzania and Zinzuwadia and Purabcheria salt pans in India. Possible breeding on a new artificial breeding island at Kamfers Dam in South Africa and at Aftout es Sâheli in Mauritania has yet to be confirmed. Of these confirmed breeding sites, only Etosha Pan and the two sites in India are officially protected. Because of its specialized diet of microscopic alkaline cyanobacteria (‘blue-green algae’) or salt water algae, the Lesser Flamingo is primarily dependent on a habitat of shallow saline/alkaline lakes, pans, wetlands and coastal areas, and >95% of its non-breeding population is concentrated on just 22 sites in the 10 primary range states.

The major threats to the survival of the Lesser Flamingo are the loss and/or the degradation of its specialised habitat at these key sites through altered hydrology and water quality, wetland pollution, extraction of salt and soda ash, and the disruption of its few breeding colonies by human activities. Other threats include disruption of nesting colonies by predators, poisoning, disease, harvesting of eggs and live birds, human disturbance at non-breeding sites, predation, and competition for food and breeding sites. The activities identified in the plan focus on measures that address these threats and fill current knowledge gaps. These measures include protecting the Lesser Flamingo and its habitats, appropriate management of key sites and increasing public awareness of the need for protecting the Lesser Flamingo and its habitats.

This action plan is based on the AEWA International Single Species Action Plan format prepared by BirdLife International and provides a framework for the conservation of the Lesser Flamingo in all of its primary range states. The plan, which will need implementation in 10 countries, has been developed using internationally agreed standards for identifying appropriate actions, and has been prepared to facilitate the monitoring and evaluation of the subsequent implementation, linking threats, actions and measurable activities. Because the Lesser Flamingo is an itinerant species dependent on a network of sites in several different countries, successful implementation of the plan will require effective international coordination of organisation and action. The long-term goal of this plan is to upgrade the Lesser Flamingo from a “near-threatened” species to a species of “least concern” in the IUCN Red List of Threatened Species. In the short term, the aim is to maintain the species' current population and range, while the medium-term goal is to promote an increase in population size and range. Each country within the primary range of the Lesser Flamingo should be committed to the implementation of this plan, including the development of a national Lesser Flamingo action plan and the establishment of a national Lesser Flamingo working group to facilitate implementation.

# 1. Biological Assessment

**Table 1. Biological Attributes**

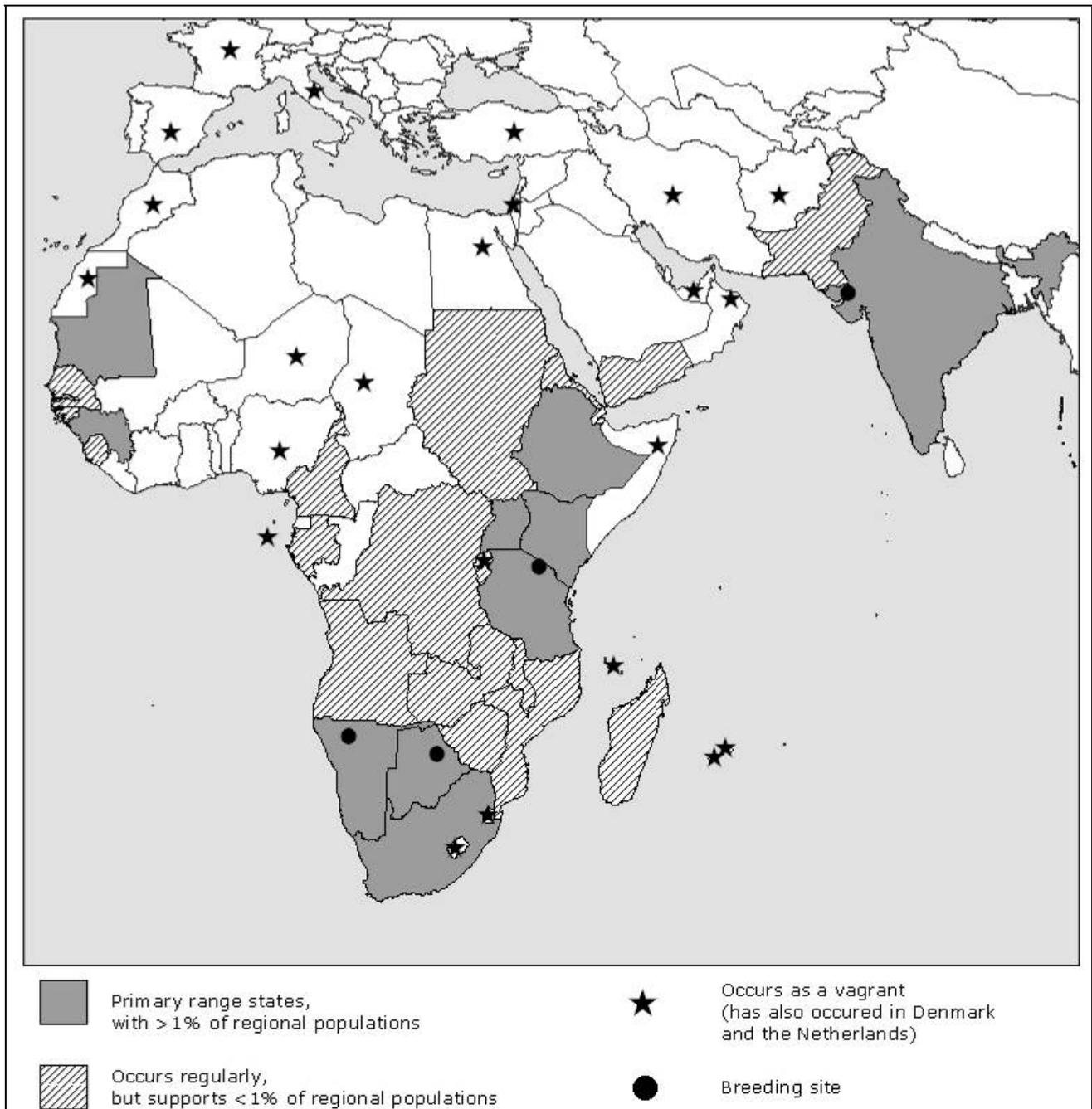
<b>General information</b>	The Lesser Flamingo is an itinerant species adapted to respond to changes in local environmental conditions by moving, and thus depends on a network of suitable sites. Although the most numerous of the world's flamingos, it is classified “Near Threatened”, nearly qualifying as threatened under criteria A3c: A population size reduction of $\geq 30\%$ , projected or suspected to be met within the next 10 years or three generations, whichever is the longer (up to a maximum of 100 years), based on a decline in area of occupancy, extent of occurrence and/or quality of habitat. The species is also listed in Columns A and B of the Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA) Action Plan, Appendix II of the Bonn Convention (CMS) and Appendix II of the CITES convention.
<b>Systematic Classification &amp; Taxonomy</b>	<p>Phylum: <i>Chordata</i>            Class: <i>Aves</i>            Order: <i>Ciconiiformes</i>            Family: <i>Phoenicopteridae</i>            Genus: <i>Phoenicopus</i> (Linnaeus, 1758)            Species: <i>Phoenicopus minor</i> (Geoffroy, 1798)</p> <p>The taxonomic relationships of flamingos have been difficult to establish. Historically, they have been thought to be most closely related to Anseriformes, Charadriiformes or Ciconiiformes by different researchers. Recent DNA analyses have shown that flamingos are most closely related to the Podicipedidae and are divided into two clades based on their genetic similarities: one containing <i>P. ruber</i>, <i>P. roseus</i> and <i>P. chilensis</i>, with the other containing <i>P. minor</i>, <i>P. andinus</i> and <i>P. jamesi</i>.</p>
<b>Population development</b>	Four separate populations are recognised for conservation purposes, although it is assumed that some interchanges probably occur between the populations. The largest population, estimated to be between 1.5 and 2.5 million individuals, occurs on the alkaline-saline lakes of the Great Rift Valley in East Africa. Smaller populations occur in the Rann of Kachchh in north-western India, estimated to be approximately 390,000 birds, in southern Africa, estimated to be between 55,000 and 65,000 birds, and in West Africa, estimated to be between 15,000 and 25,000 birds. Declines have been suggested for much of Africa, but are difficult to clarify due to widescale movement within the continent. Increasing numbers of vagrant Lesser Flamingos are sighted each year in the Middle East and the Mediterranean region.
<b>Geographical distribution</b>	The Lesser Flamingo is regularly seen in 29 countries from West Africa, across sub-Saharan Africa and along the SW Asian coast to South Asia, and occurs as a vagrant in 26 additional countries. However, its global population is concentrated in just 10 primary range states and confirmed regular breeding is confined to only five sites in four of these countries.

**Table 1a. Geographical distribution of the Lesser Flamingo.** Country names follow the official short names in English used by the International Organisation for Standardisation. Primary range states regularly hold >1% of the breeding or non-breeding Lesser Flamingos regularly found in the geographical region of which the country is part (i.e. West Africa, East Africa, southern Africa and South Asia). Sources: Distribution: Joint Nature Conservation Committee (JNCC, UK) Reports, No. 381, 8th Edition. Breeding: Range country data.

<b>Primary range states</b> (Countries regularly containing >1% of regional populations)			<b>Other range states</b> (Regularly seen, but <1% of regional pops.)	<b>Countries where Lesser Flamingo Is Vagrant</b>
<b>Country</b>	<b>Breeding</b>	<b>Non breeding</b>	<b>Non breeding</b>	<b>Non breeding</b>
Botswana	X	X	Angola	Afghanistan
Ethiopia		X	Burundi	Chad
Guinea		X	Cameroon	Comoros
India	X	X	Congo, The Democratic Republic of the (br?)	Denmark
Kenya		X	Djibouti	Egypt
Mauritania	?	X	Eritrea	France-(métropole)
Namibia	X	X	Gabon	France-(Réunion)
South Africa		X	Gambia	Iran, Islamic Republic of
Tanzania, United Republic of	X	X	Guinea-Bissau	Israel
Uganda		X	Madagascar	Italy
			Malawi	Lesotho
			Mozambique	Mauritius
			Pakistan	Morocco
			Senegal	Niger
			Sierra Leone	Nigeria
			Sudan	Oman
			Yemen	Rwanda
			Zambia	Saudi Arabia
			Zimbabwe	São Tomé and Príncipe
				Somalia
				Spain
				Swaziland
				The Netherlands
				Turkey
				United Arab Emirates
				Western Sahara

**Distribution throughout the annual cycle**

Breeding periods are erratic, depending on the timing of seasonal rains, but most breeding occurs between September and November in South Asia, and between November and February in eastern and southern Africa. Breeding in West Africa has not been confirmed. During breeding periods, if there has been sufficient rainfall and breeding conditions are suitable, Lesser Flamingos congregate at five well-known and regular breeding sites, frequently in large mixed breeding colonies with Greater Flamingos. When not breeding, the Lesser Flamingo occurs in virtually all sub-Saharan countries and from the Arabian Peninsula to India. It is a non-migratory itinerant species with flocks constantly on the move between feeding sites, sites that are often in different countries and several hundred kilometres apart. These movements occur mostly at night.



**Figure 1. Lesser Flamingo distribution map.** Primary range states (dark grey) regularly hold >1% of the breeding or non-breeding Lesser Flamingos regularly found in the geographical region of which the country is part (i.e. West Africa, East Africa, southern Africa and South Asia). Lesser Flamingos occur regularly in light grey striped states, but these states support <1% of the regional populations. Lesser Flamingos occur as vagrants in states with stars. Sources: Distribution: Joint Nature Conservation Committee (JNCC, UK) Reports, No. 381, 8th Edition. Breeding: Range country data.

**Productivity & survival**

Individual Lesser Flamingos do not breed annually, and their clutch size is one. Between 1953 and 1962, estimated mean breeding success in five major breeding attempts observed at lakes Natron and Magadi in East Africa was 41-43% (range: < 5% to 70%) of eggs laid. Most of the mortality occurred during the first three weeks from predation, nest desertion and getting entrapped in the mud surrounding the nesting area. Lesser Flamingos live at least 40 years and have an estimated generation length of 22-24 years. There is insufficient data to estimate annual mortality/survival.

<b>Life history</b>	<b>Breeding:</b> Believed to reach sexual maturity at 3-4 years of age. Breeds following seasonal rains that provide the flooding necessary to isolate remote breeding sites from terrestrial predators and the soft muddy material for nest building. Nests built from mud substrate; mean incubation: 28 days; fledging: ~70 days. Lesser Flamingos do not breed readily in captivity.	<b>Feeding:</b> Feed on species of microscopic cyanobacteria and benthic diatoms found only in alkaline lakes, salt pans and saline lagoons and estuaries. Feed primarily by swimming and filtering the algae and diatoms with a specialised bill that contains up to 10,000 microscopic lamellae.	<b>Outside breeding season:</b> In East Africa and India, they congregate in huge flocks on major feeding lakes. In southern Africa, they disperse among small wetlands.
<b>Habitat requirements</b>	Lesser Flamingos depend primarily on shallow saline/alkaline lakes, pans, wetlands and coastal areas.		
	<p><b>Breeding habitat requirements:</b></p> <ul style="list-style-type: none"> <li>• Inaccessible to terrestrial disturbance from humans or animal predators</li> <li>• Subject to seasonal flooding that is sufficiently shallow (and calm) to enable the construction of the traditional conical mud nests without them being washed away, but sufficiently deep and long-lasting to prohibit terrestrial predators from reaching the nesting colony.</li> <li>• Within easy flying distance (i.e. 120-180 km) of a good feeding site for the parents.</li> </ul>	<p><b>Feeding habitat requirements:</b></p> <ul style="list-style-type: none"> <li>• Water chemistry that enables growth of cyanobacteria and diatoms.</li> <li>• Wet mud supporting surface growth of diatoms</li> <li>• Several hours each day when the surface of the water is sufficiently calm to enable the flamingos to feed. If the surface of the water is not calm, they are unable to feed and are confined to the limited areas of wet mud.</li> </ul>	

## 2. Available key knowledge

The total non-breeding population was estimated by the workshop participants to range from approximately 865,000 to 2,640,000 (Annex 1), with a mean of 1,752,500. Data quality is mostly good. The large estimate range is the result of frequent large-scale movements of birds among sites and range states, resulting in low minimum counts and high maximum counts for individual sites.

Habitat use and food requirements are generally well known in countries with larger population concentrations (Annex 2). The species depends primarily on shallow saline/alkaline lakes, pans, wetlands and coastal areas. In all regions, the birds breed on large shallow saline lakes and pans in areas that are inaccessible to terrestrial predators. Lesser Flamingos in East Africa and southern Africa feed primarily on microscopic cyanobacteria and benthic diatoms. Diets in West Africa and South and southwest Asia are not well known but in South Asia include diatoms from the surface of tidal mud in Sewree Bay near Mumbai for part of each year.

The species is known to breed in only five sites, two in southern Africa (Makgadikgadi Pans in Botswana and Etosha Pan in Namibia), one in East Africa (Lake Natron) and two in India (Zinzuwadia and Purabcheria salt pans). Breeding on a new artificial island at Kamfers Dam in South Africa and at Aftout es Sâheli in Mauritania has yet to be confirmed. Of these breeding sites, only Etosha Pan and the two sites in India are officially protected (Annexes 2 and 6).

### 3. Threats

The major threats to the survival of the Lesser Flamingo are the loss and/or the degradation of its specialised habitat through altered hydrology and water quality, wetland pollution, extraction of salt and soda ash, and the disruption of its few breeding colonies by human activities. Other threats include disruption of nesting colonies by predators, poisoning, disease, harvesting of eggs and live birds, human disturbance at non-breeding sites, predation, and competition for food and breeding sites. Descriptions of the threats are in Annex 3a, while threat importance rankings at the species and country levels are in Annex 3b.

### 4. Treaties, legislation and policies relevant for management

The Lesser Flamingo is classified “Near Threatened” in the 2006 IUCN Red List of Threatened Species, indicating that it is considered likely to qualify for a threatened category in the near future. The following section briefly reviews the obligations of the range states (Annex 4) arising from the major international conventions and agreements. The species is also affected by various regional treaties, and national conservation legislation and policies.

#### 4.1. International conventions and agreements

**4.1.1. Convention on the Conservation of Migratory Species of Wild Animals (CMS).** The Lesser Flamingo is listed in Appendix II of the Convention on the Conservation of Migratory Species (CMS). This appendix refers to migratory species that have an unfavourable conservation status or would benefit significantly from international co-operation organised by tailored agreements. The Convention encourages the Range States to conclude global or regional Agreements for the conservation and management of individual species or, more often, of a group of species listed on Appendix II.

**4.1.2. The Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA).** AEWA is a regional agreement under the Bonn Convention. The Lesser Flamingo is listed in Annex II of this agreement, as well as Columns A and B of the AEWA 2006-2008 Action Plan. Parties that are Range States of a migratory waterbird species listed in Column A shall endeavour:

- a) to conserve and, where feasible and appropriate, restore those habitats of the species which are of importance in removing the species from danger of extinction;
- b) to prevent, remove, compensate for, or minimize, as appropriate, the adverse effects of activities or obstacles that seriously impede or prevent the migration of the species; and
- c) to the extent feasible and appropriate, to prevent, reduce or control factors that are endangering or are likely to further endanger the species, including strictly controlling the introduction of, or controlling or eliminating, already introduced exotic species.

**4.1.3. Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES).** The Lesser Flamingo is listed in Appendix II of the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES). Appendix II refers to species that are not necessarily now threatened with extinction but that may become so unless trade is closely controlled. Trade in Lesser Flamingo specimens requires the prior grant and presentation of an export permit. An export permit shall only be granted when the following conditions have been met: (a) a Scientific Authority of the State of export has advised that such export will not be detrimental to the survival of that species; (b) the Management Authority of the State of export is satisfied that the specimen was not obtained in contravention of the laws of that State for the protection of fauna and flora; and (c) a Management Authority of the State of export is satisfied that any living specimen will be so prepared and shipped as to minimize the risk of injury, damage to health or cruel treatment.

**4.1.4. Ramsar Convention on Wetlands.** The Convention on Wetlands, signed in Ramsar, Iran, in 1971, is an intergovernmental treaty that provides the framework for the conservation and wise use of wetlands and their resources through local, regional and national actions and international cooperation,

as a contribution towards achieving sustainable development throughout the world. It recognises the fundamental ecological functions of wetlands as regulators of water regimes and as habitats supporting a characteristic flora and fauna.

The Convention requires that each Contracting Party designate at least one suitable wetland within its territory for inclusion in a List of Wetlands of International Importance maintained by the Ramsar bureau. Wetlands should be selected for the List on account of their international significance in terms of ecology, botany, zoology, limnology or hydrology, particularly as habitat for waterfowl.

The Convention establishes guidelines for the formulation and implementation of national wetland management and conservation policies, including establishing inventories of wetlands, determining priorities for each site, requiring impact studies for all projects that may affect wetlands, regulating the use of wild flora and fauna to avoid over-exploitation, and drafting legislation that encourages wetland conservation, taking into account international responsibilities for the conservation, management and wise use of migratory stocks of waterfowl.

#### **4.2. National institutions, laws and policies affecting bird conservation**

The institutional, legislative and policy framework that relates to bird conservation in each of the range states is typically large, complex and often unclear. Even a summary of these frameworks for the 19 range states is beyond the scope of this action plan, and is more appropriately included in national Lesser Flamingo action plans. For example, in Kenya in 1999, no fewer than 38 different government ministries, departments and parastatal organisations were involved in biodiversity-related conservation work. At just the ministry level these included: The Office of the President, Ministry of Tourism and Wildlife, Ministry of Natural Resources, Ministry of Environmental Conservation, Ministry of Home Affairs, Culture and National Heritage, Ministry of Local Government, Ministry of Planning and National Development, Ministry of Agriculture, Ministry of Water Development and Ministry of Research, Science and Technology. Mandates for various facets of environmental conservation and management change as ministries are created and abolished, and the limits of institutional responsibility are often unclear.

#### **4.3 National Lesser Flamingo protection and conservation status**

The Lesser Flamingo is a protected species and it is illegal to deliberately kill them, destroy their nests or harvest their eggs in all of the primary range states for which we have been able to collect such data (Annex 5a). In most cases, this protection derives from national legislation, although in South Africa it is included in provincial legislation. The penalties for these acts vary among the countries from a slap on the wrist by park wardens to the potential for heavy fines and jail sentences (Annex 5a). Only in Tanzania is the trade in live Lesser Flamingos allowed.

In all countries, the attitude of the public and conservation authorities toward the Lesser Flamingo is positive, although it is not well known among the public in those countries where it occurs in isolated inhospitable places far from civilisation (Annex 5b). Conservation authorities in all primary range states consider the Lesser Flamingo a species of special concern that needs to be protected, and several countries have established Ramsar sites or protected areas specifically for the Lesser Flamingo. In those countries where the species gathers in flocks of hundreds of thousands, providing one of the most spectacular wildlife spectacles in the world, the conservation authorities are also conscious of the special tourist generating potential of the species.

### **5. Framework for Action**

The aim of this action plan is to improve the conservation status of the Lesser Flamingo from a “Near Threatened” species to a species of “Least Concern” globally and in each of its four regional populations – South Asia, East Africa, southern Africa and West Africa – by stabilising the size and distribution of the regional populations at current levels by 2020.

This aim will be achieved by:

1. Ensuring that all key breeding and feeding sites are maintained in good ecological condition by:

- Identifying the management needs of Lesser Flamingo habitat at key sites and implementing necessary management actions,
- Maintaining, and restoring where necessary, favourable hydrological conditions and water quality,
- Designating all key sites as protected areas, Ramsar sites and IBAs.

2. Ensuring that breeding colonies are not disturbed by:

- Preventing disturbance (especially by low flying aircraft) through legislation, planning, zoning, and through enforcement of these rules as appropriate,
- Raising awareness about the conservation needs of the species at national and local level,
- Helping local communities in India and Mauritania to develop alternative livelihood practices to reduce disturbance.

3. Reducing the effects on Lesser Flamingo regional populations of poisoning, particularly from cyanobacterial toxins, botulinus toxins, agricultural chemicals, industrial and domestic wastes, and infectious diseases, particularly avian influenza, avian cholera, salmonellosis and pseudomoniasis by:

- Establishing an integrated flamingo health surveillance programme to assess the effect of mass die-offs on the Lesser Flamingo population in East Africa,
- Ensuring that pollution guidelines and legislation are developed and enforced,
- Ensuring that pollution guidelines and legislation at all key sites reflect the sensitivity of the species, particularly to industrial chemicals and heavy metals,
- Raising awareness among decision makers and industry about the risk of pollution to Lesser Flamingo.

4. Ensuring that harvesting, particularly egg harvesting in India and the trade in live specimens in other range states has no effect on the regional Lesser Flamingo populations by:

- Maintaining the ban on Lesser Flamingo trade where it is already in place,
- Regulating and enforcing stringent licensing mechanisms at the national level. The licensing process should be based on an assessment of the effect of trade, in combination with other factors, on the regional populations.

5. Ensuring that collisions with man-made structures, particularly power lines, telephone lines, fences, light masts and guide wires are minimised.

6. Ensuring that human disturbance, particularly disturbance from boating, fishing, hunting other species, tourists, planes/helicopters, birdwatchers, photographers and military patrol/exercises, at non-breeding sites is minimised.

The expected results and means of verification are shown in Table 2, while the activities by country are in Table 3, and the priorities by key site are shown in Annexes 8a – 8c.

**Table 2. Expected results and means of verification**

	<b>The Action Plan</b>	<b>Indicators of success</b>	<b>Sources of verification</b>	<b>Assumptions</b>
<b>Aim</b>	Remove the Lesser Flamingo from the IUCN Red List of Threatened Animals globally and in each of its four regional populations by 2020	Red List categorisation as a species of Least Concern	Application of the IUCN Red List criteria	
<b>Objective</b>	Stabilise the size and distribution of regional and global non-breeding populations at current levels by 2012	Population and distribution has been stabilised at 2008 levels by 2012	Coordinated annual African/Asian Waterbird Census surveys and tri-annual aerial surveys	1. An accurate method of counting Lesser Flamingos from the air can be developed for 2008 2. Tri-annual international counts can be co-ordinated and financed
<b>Results to be achieved by:</b>	1. Ensuring that all key breeding and feeding sites are maintained in good ecological condition	Water levels, salinity and prey (microbacteria and diatom) levels at key sites are maintained at levels that are ideal for Lesser Flamingos	Annual independent ecological surveys  National government reports to the European Commission, the Bonn, Bern, Biodiversity and Ramsar Conventions, and AEWA  International and national Lesser Flamingo working group reports  Periodic independent assessments carried out by national BirdLife partners as part of their IBA Monitoring Programme.	These indicators can be controlled, or influenced, by national conservation authorities
	2. Ensuring that breeding colonies are not disturbed by human activity	Five-year mean level of breeding success ( $\geq 50\%$ )	Bi-weekly aerial surveys of breeding sites during the breeding season	These aerial surveys will not cause disturbance to the breeding birds
	3. Reducing the effects on Lesser Flamingo regional populations of toxicologic and/or infectious diseases	Mass die-offs in the East African regional population eliminated	International and national Lesser Flamingo working group reports	These events can be controlled, or influenced, by national conservation authorities
	4. Ensuring that harvesting of eggs and trade in live specimens has no effect on the regional Lesser Flamingo populations	Population viability analysis (PVA) confirms that harvest is within the safe limits of exploitation	PVA, and desk and field surveys estimating annual take	1. National legislation on egg harvesting is passed and enforced. 2. CITES recommendations on Lesser Flamingo trade are properly implemented

	<b>The Action Plan</b>	<b>Indicators of success</b>	<b>Sources of verification</b>	<b>Assumptions</b>
	5. Minimising collisions with man-made structures	Number of reported LF mortalities due to collision with man-made structures declined to 25 % of the 2008 level.	Reports by national Lesser Flamingo working groups	
	6. Minimising human disturbance at non-breeding sites	No reports of human disturbance at non-breeding sites	Reports by national Lesser Flamingo working groups	
	7. Filling knowledge gaps	No substantial knowledge gaps by 2008	Monitoring reports and research reports in scientific publications	

**Table 3. Activities by country**

<b>Results</b>	<b>National activities</b>	<b>Priority</b>	<b>Time scale</b>	<b>Responsible organisations</b>
<b>Ensure that all key breeding and feeding sites are maintained in good ecological condition</b>	Designate key sites as protected areas and Ramsar sites, and ensure they are maintained in favourable ecological status	Critical	Short	National conservation authorities
	Identify baseline conditions of habitat suitability for Lesser Flamingos	High	Medium	Governmental and non-government conservation organisations
	Conduct environmental impact assessments and audits of existing operations at all key sites	Medium	Medium	National conservation authorities
	Identify management needs of Lesser Flamingo habitat at key sites and implement necessary management actions	Medium	Medium	National conservation authorities
	Develop and implement integrated (catchments/coastal zone) management plans for the key sites	Medium	Medium	National conservation authorities
	Maintain, or restore where necessary, favourable hydrological conditions and water quality for the species	Medium	Long	National conservation authorities
	Enhance the habitat at suitable sites (e.g. creation of breeding islands, rehabilitate/create wetlands) where necessary	Low	Long	National conservation authorities
<b>Ensure that breeding colonies are not disturbed</b>	Prevent human disturbance (especially low flying aircraft) through legislation, planning, zoning and through enforcement of these rules as appropriate	Critical	Short	National conservation and local government authorities
	Raise awareness about the conservation needs of the species at national and local level	Medium	Medium	National conservation and local government authorities
	Help local communities in India and Mauritania to develop alternative livelihood practices to reduce disturbance	Medium	Long	National conservation authorities

Reduce the effects on regional populations of poisoning and/or diseases	Establish an integrated flamingo health surveillance programme to assess the effect of mass die-offs on Lesser Flamingo populations	Medium	Ongoing	Governmental and non-government conservation organisations
	Raise awareness amongst decision makers and industry about the risk of pollution to the Lesser Flamingo	Medium	Medium	National conservation authorities
	Ensure that pollution guidelines/legislation at key sites reflect the sensitivity of the species	Medium	Medium	National conservation and local government authorities
	Ensure that pollution guidelines/legislation are developed and enforced, especially with reference to industrial chemicals and heavy metals	Medium	Immediate	National conservation and local government authorities
Ensure that specimen and egg harvesting have no negative effect on regional Lesser Flamingo populations	Maintain ban on trade in Lesser Flamingo specimens, body parts and eggs where it is already in place	High	Ongoing	National conservation authorities
	Regulate and enforce a stringent trade licensing mechanism at the national level, based on an assessment of the effect of trade on regional Lesser Flamingo populations, in combination with other factors.	High	Ongoing	National conservation authorities
Ensure that collisions with man-made structures are minimised	Avoid crossing important Lesser Flamingo habitats and flyways when routing new power lines, telephone lines, fences, light masts and guide wires	Medium	Short	National environmental and conservation authorities.
Minimise human disturbance at non-breeding sites	Prevent human disturbance (especially low flying aircraft) through legislation, planning, zoning and through enforcement of these rules as appropriate	High	Short	National conservation and local government authorities
	Raise awareness about the conservation needs of the species at national and local level	Medium	Medium	National conservation and local government authorities
	Help local communities in India and Mauritania to develop alternative livelihood practices to reduce disturbance	Medium	Long	National conservation and local government authorities

Fill population numbers and distribution knowledge gaps	Determine population sizes and trends by developing a monitoring strategy and protocols (numbers, distribution, key sites), conducting regular coordinated aerial population surveys at non-breeding sites, at least tri-annually, monitoring breeding populations and breeding success annually at all primary breeding sites, and identifying potentially unknown breeding and non-breeding sites	High	Ongoing	Government and non-government conservation organisations, scientific institutions
	Determine population delineation and movements by conducting satellite tracking and ringing studies to determine movements of individuals between lakes, interchange and possible gene flow between populations, site usage, and relations with food availability and quality	High	Ongoing	Government and non-government conservation organisations, scientific institutions
	Establish a health surveillance strategy and conduct an integrated flamingo health surveillance programme to assess the effect of mass die-offs on Lesser Flamingo populations	Medium	Ongoing	Government and non-government conservation organisations, scientific institutions
Fill demographic knowledge gaps	Systematically collect data on breeding success and recruitment, including factors influencing fluctuations in breeding populations, frequency of breeding by individuals, age of first breeding, reasons for breeding failure, the role of practice nest building, survival rates, population structure, plumage development, moult strategy (timing and location), relationship between nuptial display and start of breeding	Medium	Medium	Government and non-government conservation organisations, scientific institutions
Fill habitat requirement knowledge gaps	Systematically collect data on breeding habitat requirements, including the role of rainfall in determining breeding success	High	Medium	Government and non-government conservation organisations, scientific institutions
	Systematically collect data on feeding habitat requirements, including daily food requirements, food quality at key sites, carrying capacity of key sites, differences in freshwater requirements between East Africa and southern Africa	High	Medium	Government and non-government conservation organisations, scientific institutions
	Understanding catchment processes	Medium	Medium	Government and non-government conservation organisations, scientific institutions
Fill disease and poison threats knowledge gaps	Systematically collect data on the role of diseases and poisons in population regulation, including the effects of infectious and non-infectious diseases	High	Ongoing	Government and non-government conservation organisations, scientific institutions
	Model long-term effects of climate change and diseases	High	Ongoing	Government and non-government conservation organisations, scientific institutions
	Evaluate the relative importance of different threats	Medium	Short	Government and non-government conservation organisations, scientific institutions

Fill genetics knowledge gaps	Systematically collect data on the genetic relatedness within regional populations and genetic exchange between regional populations in order to detect genetic bottlenecks which might be dangerous for this species	Medium	Medium	Scientific institutions
Fill Lesser Flamingo value knowledge gaps	Understand the cultural importance of Lesser Flamingos from South Africa to India	Medium	Ongoing	Government and non-government conservation organisations, scientific institutions
	Calculate the economic value of Lesser Flamingos to nations and local communities	Medium	Ongoing	Government and non-government conservation organisations, scientific institutions
Fill operational knowledge gaps	Assemble a Lesser Flamingo bibliography	Medium	Ongoing	Government and non-government conservation organisations, scientific institutions
	Assemble a database of funding sources	Medium	Ongoing	Government and non-government conservation organisations, scientific institutions

**Key to priority ratings:**

**Critical:** a Result that is needed to prevent a large decline in the population, which could lead to extinction.

**High:** a Result that is needed to prevent a decline of more than 20% of the population in 20 years or less.

**Medium:** a Result that is needed to prevent a decline of less than 20% of the population in 20 years or less.

**Low:** a Result that is needed to prevent local population declines or which is likely to have only a small impact on the population across the range.

**Key to time scale criteria:**

**Short:** completed within the next 1-3 years

**Medium:** completed within the next 1-5 years

**Long:** completed within the next 1-10 years

## 6. Bibliography

### 6.1. General references

**BirdLife International 2000.** Threatened Birds of the World. p.634. Lynx Edicions and BirdLife International. Barcelona and Cambridge, UK.

**BirdLife International 2006.** Species fact sheet: *Phoenicopterus minor*. <http://www.birdlife.org>

**Del Hoyo, J. Elliott, A. and Sargatal, J. (eds) 1992.** Handbook of the Birds of the World. Vol 1. pp. 525-526. Lynx Edicions, Barcelona.

**Brown, L. 1973.** The mystery of the Flamingo. East African Publishing House, Nairobi, Kenya.

**Brown, L.H., Urban, E.K. and Newman, K. 1982.** The Birds of Africa, Vol. I. pp. 216-219. Academic Press, London.

**Ogilvie, M. and Ogilvie, C. 1989.** Flamingos. Alan Sutton, Gloucester, UK.

**IUCN 2006.** 2006 IUCN Red List of Threatened Species. [www.iucnredlist.org](http://www.iucnredlist.org)

**Simmons R.E. 2005.** Lesser Flamingo. In: Hockey, P.A.R., Dean, W.R.J. and Ryan, P.G. (eds). Roberts Birds of Southern Africa, 7th ed., pp 606-607. John Voelcker Bird Book Fund, Black Eagle Publishing, Cape Town.

### 6.2. Taxonomy

**Fain, M.G. & Houde, P. 2004.** Parallel radiations in the primary clades of birds. *Evolution* 58: 2558–2573.

**Geoffroy, E.L. 1798.** Société Philomathique de Paris, Bulletin 1(2).

**Linnaeus, C. 1758.** Systema Naturae, Ed. X.

**Mayr, G. 2004.** Morphological evidence for sister group relationship between flamingos (Aves Phoenicopteridae) and grebes (Podicipedidae). *Zoological Journal of the Linnean Society* 140: 157-169.

**Sibley, C.G., Ahlquist, J.E. and Monroe, B.L. 1988.** Classification of the living birds of the world based on DNA-DNA hybridization studies. *Auk* 105: 409-424.

**van Tuinen, M., Butvill, D.B., Kirsch, J.A.W. & Hedges, S.B. 2001.** Convergence and divergence in the evolution of aquatic birds. *Proceedings of the Royal Society of London B* 268: 1345–1350.

**Wink, M. and Studer-Thiersch, A. In prep.** New results on flamingo genetics: taxonomy and hybridisation. Presented at EAZA Ciconiiformes TAG meeting, May 2005, Heidelberg, Germany.

### 6.3. Population size, distribution and movements

**Ali, S. 1945.** More on the flamingos in Kutch. *J. Bombay Nat. History Soc.* 45: 586-592.

**Ali, S. 1954.** The birds of Gujarat. *J. Bombay Nat. History Soc.* 52(3): 374-458.

**Ali, S. 1960.** Flamingo city re-visited: nesting of the Rosy Pelican (*Pelicanus onocrotalus* Linnaeus) in the Rann of Kutch. *J. Bombay Nat. History Soc.* 57(2): 412-415.

- Al-Saghier, O. and Porter, R.F. 1996.** The bird conservation importance of the Aden Wetlands, Republic of Yemen. Unpublished report on behalf of BirdLife International and the Ornithological Society of the Middle East.
- Borello, W.D, Mundy, J.M. and Liversedge, T.N. 1998.** Movements of Greater and Lesser Flamingo in southern Africa. *The Torgos* 28: 201-218.
- Childress, B. 2004.** Remarkable Lesser Flamingo recovery. *Lanioturdus* 37: 3-4.
- Childress, B. 2005.** Flamingo population estimates for Africa and southern Asia. In: Childress, B., Béchet, A., Arengo, F. & Jarrett, N. (eds.) 2005. *Flamingo*, Bulletin of the IUCN-SSC/Wetlands International Flamingo Specialist Group, No. 13, December 2005. Wildfowl & Wetlands Trust, Slimbridge, UK.
- Childress, B., Harper, D., Hughes, B., Van den Bossche, W., Berthold, P. & Querner, U. 2004.** Satellite tracking of Lesser Flamingo movements in the Rift Valley, East Africa – Pilot Study Report. *Ostrich* 75: 57-65.
- Childress, B., Hughes, B., Harper, D., Van den Bossche, W., Berthold, P. and Querner, U. In press 2007.** 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 (2007). “Waterbirds Around the World”. Proceedings of a global conference on waterbird flyways, Edinburgh, April 2004. [Publisher], Edinburgh. Pp. XXX.
- Childress, B., Hughes, B., Harper, D., Van den Bossche, W., Berthold P. and Querner, U. In press 2007.** East African flyway and key site network of the Lesser Flamingo (*Phoenicopterus minor*) documented through satellite tracking. In: Proceedings of the Pan African Ornithological Congress XI, 20-25 November, 2004, Djerba, Tunisia. *Ostrich Supplement* 16: xx-xx.
- Diagana, C.H.and Dodman, T. In press.** Numbers & distribution of waterbirds in Africa / Results of the African Waterbirds Census - Effectifs & distribution des oiseaux d'eau en Afrique / Résultats des Dénombrements d'Oiseaux d'Eau en Afrique, 2002, 2003 & 2004 Dakar.
- Dodman, T. 2002.** Waterbird Population Estimates in Africa. Unpublished report to Wetlands International.
- Dodman, T. & Diagana, C.H. 2003.** African Waterbird Census / Les Dénombrements d'Oiseaux d'Eau en Afrique 1999, 2000 & 2001. Wetlands International Global Series No. 16, Wageningen, The Netherlands.
- EWNHS. 2000.** African Waterfowl Census Report. Ethiopian Wildlife & Natural History Society, Addis Ababa, Ethiopia
- EWNHS. 2003.** African Waterfowl Census Report. Ethiopian Wildlife & Natural History Society, Addis Ababa, Ethiopia
- Jadhav, A. & Parasharya, B.M. 2004.** Counts of Flamingo at some sites in Gujarat State, India. *Waterbirds* 27: 141-146.
- Magin, C. (1999).** Rapport d'une deuxième mission au Lac Abhe du 21 au 22 janvier 1999. Rapport non-publié, Direction de l'Environnement, Ministère de l'Environnement, du Tourisme et de l'Artisanat, Djibouti
- Martin, M. & Razafindrajaio F. 2006.** First Pink Pelican *Pelecanus rufescens* sightings in Madagascar since 1960. *Bull ABC Vol* 13 No 1.
- McCulloch, G., Aebischer, A. and Irvine, K. 2003.** Satellite tracking of Flamingo in southern Africa: the importance of small wetlands for management and conservation. *Oryx* 37: 480-483.
- McCulloch, Graham P. and Borello, Wendy 2000.** The importance of the Makgadikgadi Salt Pans in

Botswana for flamingos. In: Baldassarre, G. A., Arengo, F. and Bildstein (eds) Special Publication 1: Conservation biology of Flamingo. *Waterbirds* 23: 64-68.

- Mlingwa, C. & Baker, N. In press 2007.** Lesser Flamingo *Phoenicopterus minor* counts in Tanzania soda lakes: implications for conservation. In: Boere, G.C; C.A. Galbraith; D.A. Scott; D.A. Stroud and L.G. Underhill, editors (2007). "Waterbirds Around the World". Proceedings of a global conference on waterbird flyways, Edinburgh, April 2004. [Publisher], Edinburgh. Pp. XXX.
- Mundkur, T. 1997.** The Lesser Flamingo - A summary of its current distribution and conservation in Asia. In: Howard, G. (ed.) Conservation of the Lesser Flamingo in Eastern Africa and Beyond. Proceedings of a workshop at Lake Bogoria, Kenya, 26-29 August, 1997. IUCN Eastern Africa Regional Programme, 120 pp.
- Mundkur, T., Pravej, R., Khachar, S. and Naik, R.M. 1989.** Hitherto unreported nest site of Lesser Flamingo *Phoeniconaias minor* in the Little Rann of Kutch, Gujarat. *Journal of the Bombay Natural History Society* 86: 281-285.
- Nasirwa, Oliver 1994.** Waterbird Counts, July 1994: Kenya Wetlands Working Group in Leon Bennun, Joseph Oyugi and John Fanshawe (Eds). *Kenya Birds* 3 (2). Department of Ornithology, National Museums of Kenya and BirdLife Kenya, Nairobi, Kenya.
- Nasirwa, Oliver 2000.** Conservation status of flamingos in Kenya. In: Baldassarre, G. A., Arengo, F. and Bildstein (eds) Special Publication 1: Conservation biology of Flamingo. *Waterbirds* 23: 47-51.
- Nasirwa, O., Muchai Muchane, Kariuki Nding'ang'a, Alfred Owino & Martin Mwema 2004.** Waterbird Monitoring Programme in Kenya, July 2003 and January 2004 Census. National Museums of Kenya, Centre for Biodiversity Reports: Ornithology No. 55.
- Owino, A. 2002.** Monitoring of waterbirds in Kenya, July 2001 and January 2002. Research Reports of the Centre for Biodiversity, National Museums of Kenya. Ornithology 45.
- Owino A.O., Kariuki Nding'ang'a, & Martin Mwema. 2005.** Waterbird Monitoring Programme in Kenya, July 2004 and January 2005 Census. National Museums of Kenya, Centre for Biodiversity Reports: Ornithology No. 60.
- Parasharya, B.M & Tere, A. 2005.** Population estimates of flamingos in India, 1945 - 2003. In: Childress, B., Béchet, A., Arengo, F. & Jarrett, N. (eds.) 2005. *Flamingo*, Bulletin of the IUCN-SSC/Wetlands International Flamingo Specialist Group, No. 13, December 2005. Wildfowl & Wetlands Trust, Slimbridge, UK.
- Qureshi, T. 2001.** Nurri Lagoon Information Sheet. Ramsar Convention Bureau, Gland, Switzerland ([www.wetlands.org/rsis/](http://www.wetlands.org/rsis/)).
- Rabarisoa, R., Rakotonomenjanahary, O. & Ramanampamonjy, J. In press 2007.** Waterbirds of Baie de Baly, Madagascar. In: Boere, G.C; C.A. Galbraith; D.A. Scott; D.A. Stroud and L.G. Underhill, editors (2007). "Waterbirds Around the World". Proceedings of a global conference on waterbird flyways, Edinburgh, April 2004. [Publisher], Edinburgh. Pp. XXX.
- Rabarisoa, R., Rakotonomenjanahary, O., Ramanampamonjy, J. Raveloson B. & Randrianarisoa M. 2000-2006.** Suivi environnemental de la baie de Baly, Soalala. Rapport pour l'Office National de l'Environnement Madagascar (ONE).
- Rabenandrasana M., Virginie, M.C., Randrianarisoa M., Sam T. S. & Zefania, S.** Les zones humides ZICO de Mahavavy kinkony, un site pilote dans la mise en place d'un site de conservation dans la région du moyen Ouest de Madagascar. *Pros PAOC* 10.

- Rayaleh, H.A. 2004.** Dénombrement des oiseaux d'eau d'Afrique à Djibouti, AFWC -Wetlands International, Djibouti Nature, Rapport de Djibouti 2004.
- Rayaleh, H.A. 2005.** Dénombrement des oiseaux d'eau d'Afrique à Djibouti, AFWC -Wetlands International, Djibouti Nature, Rapport de Djibouti 2005.
- Rayaleh, H.A. In prep.** Dénombrement des oiseaux d'eau d'Afrique à Djibouti, AFWC -Wetlands International, Djibouti Nature, Rapport de Djibouti 2006.
- République de Djibouti (2000).** Monographie nationale de la diversité biologique/Ministère de l'Habitat, de l'Urbanisme, de l'Environnement et de l'Aménagement du Territoire / Direction de l'Aménagement du Territoire et de l'Environnement.
- Rose, P.M. and Scott, D.A. 1997.** Waterfowl population estimates, 44. Second edition. Wageningen, The Netherlands: Wetlands International.
- Ryan, P.G. and Sinclair, I. 2006.** Mussulo - an important shorebird wintering site in Angola. Wader Working Group Bulletin 109: 120
- Simmons, R.E. 1996.** Population declines, viable breeding areas and management options for flamingos in southern Africa. *Conservation Biology* 10: 504-514.
- Simmons, R. 2000.** Declines and movements of Lesser Flamingo in Africa. In: Baldassarre, G. A., Arengo, F. and Bildstein (eds) Special Publication 1: Conservation biology of Flamingo. *Waterbirds* 23: 40-46.
- Syvertsen, P.O. 1995.** Wintering Waterbirds on Ethiopian Rift Valley Lakes. *Walia* 16:3-13.
- Tere, A., and B. M. Parasharya, 2005.** Post breeding distribution of flamingos and their population estimation. *Flamingo Newsletter of the Bird Conservation Society, Gujarat* 3 (4):2-5.
- Trolliet, B., & Fouquet, M. 2001.** La population ouest-africaine du Flamant nain *Phoeniconaias minor* : effectifs, répartition et isolement. *Malimbus* : 23 : 87-92.
- Trolliet, B., Fouquet, M., & Keita, N. (in press).** Statut du Flamant nain en Afrique de l'Ouest. Proceedings of the Pan African Ornithological Congress, Djerba, Tunisia, November 2004.
- Tuite, C.H. 1979.** Population size, distribution and biomass density of the Lesser Flamingo in the eastern Rift Valley, 1974-76. *Journal of Applied Ecology* 16: 765-775.
- Tuite, Christopher H. 2000.** The distribution and density of Lesser Flamingos in East Africa in relation to food availability and productivity. In: Baldassarre, G. A., Arengo, F. and Bildstein (eds) Special Publication 1: Conservation biology of Flamingo. *Waterbirds* 23: 52-63.
- UNEP-WCMC 2005.** *Checklist of birds listed in the CITES Appendices and in EC Regulation 338/97.* 8th Edition. JNCC Reports, No. 381.
- Wetlands International. In press, 2006.** Waterbird Population Estimates - Fourth Edition. Wetlands International, Wageningen, The Netherlands.

#### **6.4. Breeding behaviour and biology**

- Ali, S. 1974.** Breeding of the Lesser Flamingo, *Phoeniconaias minor* (Geofroy) in Kutch. *Journal of the Bombay Natural History Society* 71: 141-144.
- Anon. 1994.** Flamingo nesting in a Gujarat city. *Hornbill* 1: 14.

- Berry H.H. 1972.** Flamingo breeding on the Etosha Pan, South West Africa during 1971. Madoqua, Ser. I, No. 5: 5-31.
- Brown, L.H. and Root, A. 1971.** The breeding behaviour of the Lesser Flamingo *Phoeniconaias minor*. Ibis 113: 147-172.
- de Naurois, R. 1965.** Une colonie reproductrice du petit Flamant rose, *Phoeniconaias minor* (Geoffroy) dans l'Aftout es Sahel (Sud-Ouest mauritanien). Alauda 33: 166-176.
- Hamerlynck, O. and Ould Messaoud, B. 2000.** Suspected breeding of Lesser Flamingo *Phoeniconaias minor* in Mauritania. Bulletin of the African Bird Club 7: 109-110.
- Kumar, S. 1996.** New flamingo breeding ground at Sambhar Lake. Hornbill (1):26-27.
- Kumar, S and Bhargava R. N. 1996.** Sambhar Lake: a new breeding ground of flamingos in India. Sanctuary Asia 16: 59.
- McCulloch, G. and Irvine, K. 2004.** Breeding of Greater and Lesser Flamingos at Sua Pan, Botswana, 1998-2001. Ostrich 75: 246-242.
- Parasharya B.M., 2006.** Final Report: Monitoring of flamingo's traditional breeding sites and evaluation of alternate breeding sites for their conservation through remote sensing. Submitted to ISRO, Ahmedabad.
- Simmons R.E. Unpublished report.** Records of Etosha Flamingo breeding on Etosha Pan over 41 years.
- Vaishnav, H.A., Chavan, S.A. and Vora, U.A. 2005.** Nesting behaviour of flamingos in the Rann of Kachchh.

## 6.5. Diet, feeding behaviour, biology and ecology

- Childress, B. and Jarrett, N. 2005.** Methods of capturing and handling wild Lesser Flamingos for research. Afring News 34: 2-4.
- Childress, R.B., Harper, D.M., Hughes, B. & Ferris, C. 2005.** Sex determination in the Lesser Flamingo (*Phoenicopterus minor*) using morphological measurements. Ostrich 76: 148-153.
- Childress, R.B., Harper, D.M., Hughes, B. & Ferris, C. 2006.** Adaptive benefits of differential post-fledging growth patterns in the Lesser Flamingo (*Phoenicopterus minor*). Ostrich 77 (1&2): 84-89.
- Githaiga, J.M. 2003.** Ecological factors determining utilisation patterns and inter-lake movements of Lesser Flamingo (*Phoenicopterus minor* GEOFFROY) in Kenyan alkaline lakes. Unpublished PhD thesis. Department of Zoology, University of Nairobi. Nairobi, Kenya.
- Jenkins, P.M. 1957.** The filter-feeding and food of flamingos (*Phoenicopteri*). Philosophical Transactions of the Royal Society of London, Series B 240: 401-493.
- Martin, G.R., Jarrett, N., Tovey, P. and White, C.R. 2005.** Visual fields in flamingos: chick-feeding versus filter-feeding. Naturwissenschaften 92 (8): 351-354.
- McCulloch, G.P. and Borello, W. 2000.** The importance of the Makgadikgadi salt pans in Botswana for Flamingo in Africa. In: Baldassarre, G. A., Arengo, F. and Bildstein (eds) Special Publication 1: Conservation biology of Flamingo. Waterbirds 24: 64-68.
- Ridley, M.W., Moss, B.L. and Percy, R.C. 1955.** The food of flamingos in Kenya Colony. Journal of the East Africa Natural History Society 22: 147-158.

- Tere, A. 2005.** Ecology of Greater Flamingo (*Phoenicopterus roseus*) and Lesser Flamingo (*Phoenicopterus minor*) on the wetlands of Gujarat. Unpublished M.S. thesis. University of Baroda, Vadodara.
- Tuite, C.H. 1978.** The lesser flamingo (*Phoeniconaias minor*, Geoffroy): Aspects of its ecology and behaviour in the East African Rift Valley of Kenya and Northern Tanzania. Unpublished PhD Thesis. University of Bristol.
- Tuite, C.H. 1981.** Standing crop densities and distribution of *Spirulina* and benthic diatoms in East African alkaline lakes. *Freshwater Biology*, 11:345-360.
- Vareschi, E. 1978.** The ecology of Lake Nakuru (Kenya). I. Abundance and feeding of the Lesser Flamingo. *Oecologia (Bul.)* 32: 11-35.

## 6.6. Health, die-offs in East Africa

- Ballot, A., Krienitz, L., Kotut, K., Wiegand, C., Metcalf, J.S., Codd, G.A. and 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.
- 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.
- 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.
- Cooper JE, Karstad L & Boughton E. 1975.** Tuberculosis in Lesser Flamingos in Kenya. *Journal of Wildlife Diseases*. 11: 32-36.
- Greichus, Y.A., Greichus, A., Ammann, B.B. and Hopcraft, J. 1978.** Insecticides, polychlorinated biphenyls and metals in African lake ecosystems. III. Lake Nakuru, Kenya. *Bulletin of Environmental Toxicology* 19: 454-461.
- Kairu, J.K. 1996.** Heavy metals residues in birds of Lake Nakuru, Kenya. *African Journal of Ecology* 34: 397-400.
- Koch, N.D., Koch, R.A. Wambua, J., Kamau, G.J. and Mohan., K. 1999.** *Mycobacterium avium* related epizootic in free-ranging Lesser Flamingos in Kenya. *Journal of Wildlife Diseases* 35: 297-300.
- 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: 243-245.
- Krienitz, L., Ballot, A., Casper, P., Codd, G.A., Kotut, K., Metcalf, J.S., Morrison, L.F., Pflugmacher, S. and Wiegand, C. 2005.** Contribution of toxic cyanobacteria to massive deaths of Lesser Flamingos at saline-alkaline lakes of Kenya. *Verh. Internat. Verein. Limnol.* 29: 783-786.
- 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.
- 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.
- Lugomela, C., Pratap, H.B. and Mgaya, Y.D. 2006.** Cyanobacteria blooms—A possible cause of mass mortality of Lesser Flamingos in Lake Manyara and Lake Big Momela, Tanzania. *Harmful Algae* 5: 534-541.

**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.

**Nelson, Y.M., Thampy, R.J., Motelin, K., Raini, J.A., DiSanti, C.J. and Lion, L.W. 1998.** Model for trace metal exposure in filter-feeding flamingos in alkaline Rift Valley lakes, Kenya. *Environmental Toxicology and Chemistry* 17: 2402-2409.

**Oaks, J.L., Walsh, T., Bradway, D., Davis, M. and Harper, D.M. 2006.** Septic arthritis and disseminated infections caused by *Mycobacterium avium* in Lesser Flamingos, Lake Bogoria, Kenya. In: Childress, B., Arengo, F., Béchet, A. and Jarrett, N. (eds.) 2006. *Flamingo*, Bulletin of the IUCN-SSC/Wetlands International Flamingo Specialist Group, No. 14, December 2006. Wildfowl & Wetlands Trust, Slimbridge, UK.

**Sileo, L., Grootenhuis, J.G., Tuite, C.H. and Hopcraft, B.D. 1979.** Mycobacteriosis in the Lesser Flamingos of Lake Nakuru, Kenya. *Journal of Wildlife Diseases* 15: 387-389.

## **6.7. Ecology of key habitats**

**Bhaagat, H.B. 2002.** Runn of Kutch Information Sheet. Ramsar Convention Bureau, Gland, Switzerland ([www.wetlands.org/rsis/](http://www.wetlands.org/rsis/))

**Jabeen, R. 2004.** Impact of water scarcity on the wetlands of Sindh. Proceedings of the seminar: Environmental, Social and Cultural Impact of Water Scarcity in Sindh, 15<sup>th</sup>-16<sup>th</sup> January 2004, University of Sindh, Jamshoro, Pakistan. Pp: 173-184.

**Harper, D.M., Childress, R.B., Harper, M.M. Boar, R.R., Hickley, P., Mills, S.C., Otieno, N., Drane, T. Vareschi, E. Nasirwa, O., Mwatha, W.E., Darlington, J.P.E.C. and Escuté-Gasulla, X. 2003.** Aquatic biodiversity and saline lakes - Lake Bogoria National Reserve, Kenya. *Hydrobiologia* 500: 1-18.

**Singh, H.S., Patel, B.H., Pravez, R., Soni, V.C., Shah, N., Tatu, K. and Patel, D. 1999.** Ecological study of Wild Ass Sanctuary. Gujarat Ecological Education and Research (GEER) Foundation, Gandhinagar, India.

**Vareschi, E. 1982.** The Ecology of Lake Nakuru I Abiotic factors and primary production. *Oecologia (Ben.)*, 55:81-144.

**Vareschi, E. 1987.** Saline lakes ecosystems. In, *Ecological Studies* 61: Potentials and limitation of ecosystem analysis. Schulze, F. D. and Zwolfer, (Eds.) pp. 345-364. Springer-Verhlag Berlin.

**Vareschi, E. and Jacobs, J. 1984.** The ecology of Lake Nakuru (Kenya) V: Production and consumption of consumer organisms. *Oecologia (Berl.)*, 61:83-98.

## Annex 1a. Non-breeding population estimates in primary range states 2001-2007

National non-breeding population figures are based on counts during the past five years. They represent counts in different years of the number of birds at different lists of sites at different times of the year and reflect not only these variations, but also the frequent movement of this species among sites.

	<b>Non-breeding total - min</b>	<b>Non-breeding total - max</b>	<b>Trend</b>	<b>Data Quality</b>	<b>Baseline Population</b>
Botswana	18	412	F	GO	None
Ethiopia	3,269	24,021	F	ME	243,000 (1992/93)
Guinea	11,125	13,000	F	GO	None
India	17,045	411,355	F	ME	388,028 (?)
Kenya	279,620	1,452,513	F	GO	1,900,000
Mauritania	160	4,800	F	GO	None
Namibia	8,991	56,025	F	GO	None
South Africa	6,946	31,398	F	GE	5,815 (Various)
Tanzania	549,327	633,215	F	GO	None
Uganda	44	17085	F	GO	62,790 (1999)
Totals	865,441	2,643,824			

### Trends:

F = fluctuating

### Data Quality:

GO = Good (Observed) based on reliable or representative quantitative data derived from complete counts or comprehensive measurements.

GE = Good (Estimated) based on reliable or representative quantitative data derived from sampling or interpolation.

ME = Medium (Estimated) based on incomplete quantitative data derived from sampling or interpolation.

P = Poor/suspected not based on quantitative data, but reflects 'best guess' derived from circumstantial evidence.

U = Unknown no information on quality available.

## Annex 1b. Non-breeding population estimates in other range states 2001-2007

National non-breeding population figures are based on counts during the past five years. They represent counts in different years of the number of birds at different lists of sites at different times of the year and reflect not only these variations, but also the frequent movement of this species among sites. Blank spaces indicate no data available.

	Non-breeding total - min	Non-breeding total - max	Trend	Data Quality	Baseline Population
Angola	150	390	F	GO	None
Burundi					
Cameroon					
Congo, The Democratic Republic of the (br?)					
Djibouti	3,500	8,000	F	P	
Eritrea					
Gabon					
Gambia					
Guinea-Bissau	0	160	F	GO	None
Madagascar	263	3,849	F	ME	None
Malawi	130	130	F	GO	None
Mozambique					
Pakistan	270	560	F	GO	4,500: 1991
Senegal	2	1,892	F	GO	None
Sierra Leone					
Sudan					
Yemen					9,200, Aden Wetlands 1996
Zambia					600: 1955
Zimbabwe					

### Trends:

F = fluctuating

### Data Quality:

GO = Good (Observed) based on reliable or representative quantitative data derived from complete counts or comprehensive measurements.

GE = Good (Estimated) based on reliable or representative quantitative data derived from sampling or interpolation.

ME = Medium (Estimated) based on incomplete quantitative data derived from sampling or interpolation.

P = Poor/suspected not based on quantitative data, but reflects 'best guess' derived from circumstantial evidence.

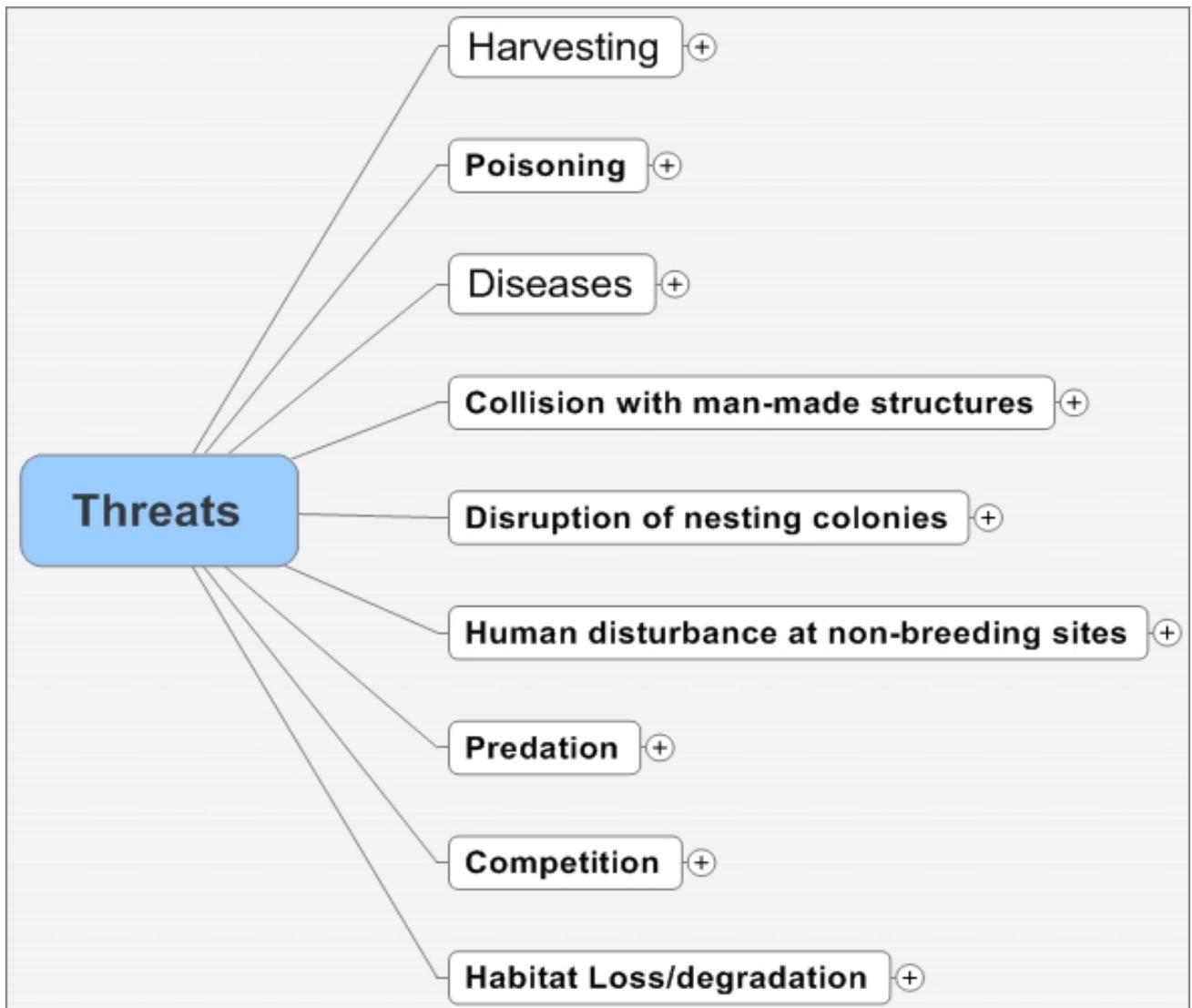
U = Unknown no information on quality available.

## Annex 2. Knowledge of habitat and diet, and occurrence of the Lesser Flamingo in Protected Areas, BirdLife Important Bird Areas and Ramsar sites in primary range states

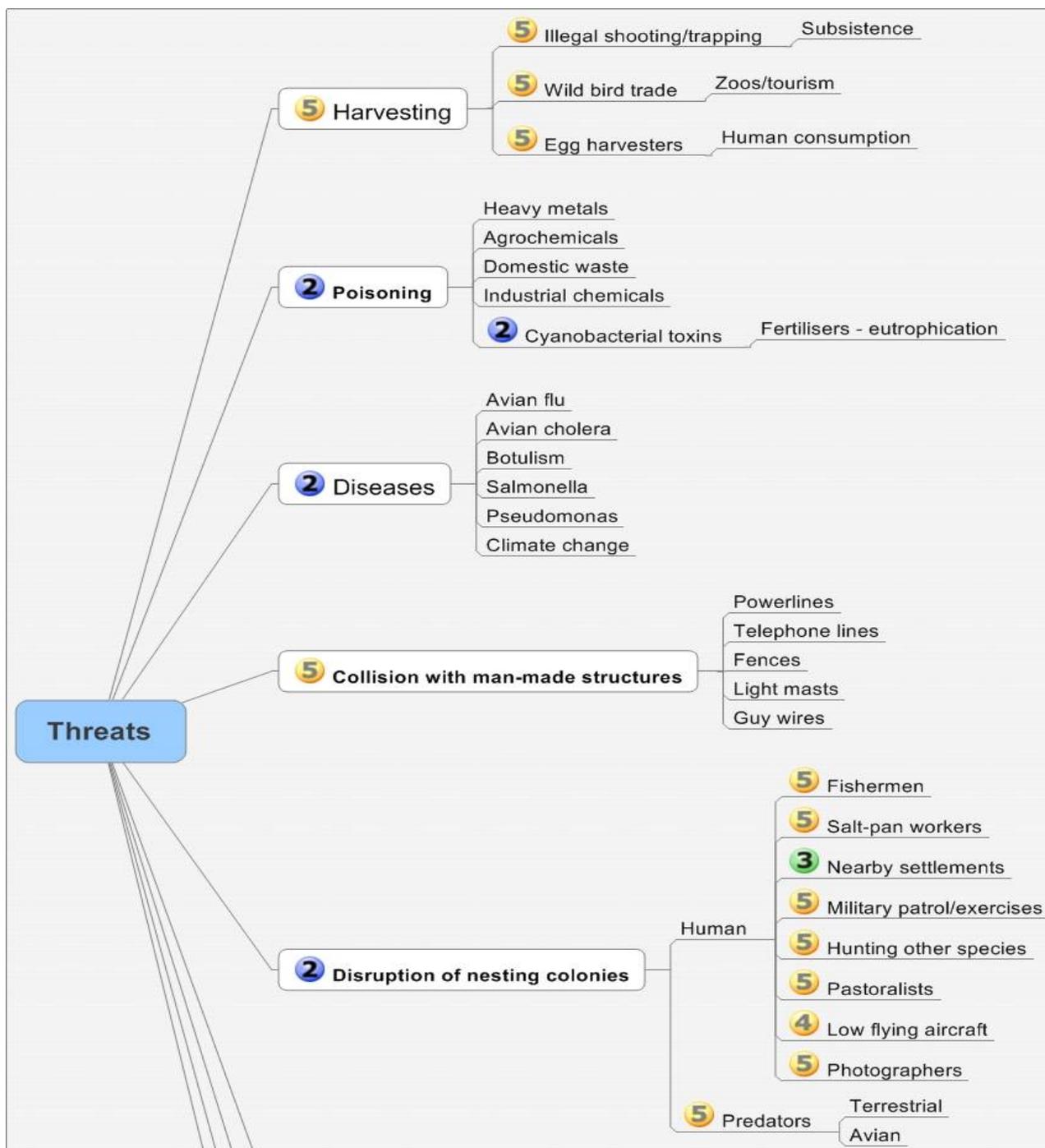
Protected areas include national parks and reserves, regional parks and reserves, and private reserves.

Country	Habitat and diet knowledge		Site protection status		
	Habitat use	Diet	Proportion of national population in protected areas	Proportion of national population in IBAs	Proportion of national population in Ramsar sites
Botswana	<i>Breeding – Sua Pan in Makgadikgadi Pans</i>  <i>Non-breeding – dispersal to small pans and wetlands throughout southern Africa</i>	<i>Cyanobacteria and benthic diatoms</i>	<i>Breeding: 0%</i>  <i>Non-breeding: 0%-75%</i>	<i>Breeding: 100% (BW005)</i>  <i>Non-breeding: 0%-40%</i>	<i>Breeding: 0%</i>  <i>Non-breeding: 0%</i>
Ethiopia	<i>Non-breeding – Intertidal mudflats</i>	<i>No data available</i>	<i>18%-38%</i>	<i>100%</i>	<i>0%</i>
Guinea	<i>Non-breeding</i>	<i>No data available</i>	<i>0%</i>	<i>100%</i>	<i>100%</i>
India	<i>Breeding - Zinzuwadia Salt Pan and Purabcheria Salt Pan in Wild Ass Wildlife Sanctuary</i>  <i>Non-breeding – dispersal to small pans and coastal wetlands</i>	<i>No data available</i>	<i>Breeding: 100%</i>  <i>Non-breeding: 4%-5%</i>	<i>Breeding: 100% (IN097)</i>  <i>Non-breeding: 16%-38%</i>	<i>Breeding: 0%</i>  <i>Non-breeding: 4%</i>
Kenya	<i>Non-breeding</i>	<i>Cyanobacteria and benthic diatoms</i>	<i>93%-100%</i>	<i>93%-100%</i>	<i>93%-100%</i>
Mauritania	<i>Non-breeding</i>	<i>No data available</i>	<i>2%-100%</i>	<i>100%</i>	<i>100%</i>
Namibia	<i>Breeding – Etosha Pan</i>  <i>Non-breeding – dispersal primarily to coastal wetlands, particularly Walvis Bay &amp; Sandwich Harbour</i>	<i>Benthic diatoms</i>	<i>Breeding: 100%</i>  <i>Non-breeding: 21-83%</i>	<i>Breeding: 100% (NA004)</i>  <i>Non-breeding: 97%-99%</i>	<i>Breeding: 100%</i>  <i>Non-breeding: 97%-99%</i>
South Africa	<i>Non-breeding</i>		<i>Non-breeding: 2%-59%</i>	<i>Non-breeding: 78-100%</i>	<i>Non-breeding: 2%-59%</i>
Tanzania, United Republic of	<i>Breeding – Lake Natron</i>  <i>Non-breeding – dispersal to saline lakes throughout East Africa</i>	<i>Cyanobacteria and benthic diatoms</i>	<i>Breeding: 0%</i>  <i>Non-breeding: 4%-94%</i>	<i>Breeding: 100% (TZ031)</i>  <i>Non-breeding: 94-100%</i>	<i>Breeding: 100%</i>  <i>Non-breeding: 0%-16%</i>
Uganda	<i>Non-breeding – dispersal to saline crater lakes of South-western part of the country</i>	<i>No data available</i>	<i>Non-breeding: 97-100% (Park &amp; Reserve) 0-3% (Wildlife Sanctuary)</i>	<i>Non-breeding: 100%</i>	<i>Non-breeding: 0%</i>

**Annex 3a1. Primary threat categories.** Threat priority tree for the Lesser Flamingo produced by the range state delegates to the action plan workshop, Nairobi, Kenya, 25-29 September 2006. '+' means there is additional detail on the following sheet.



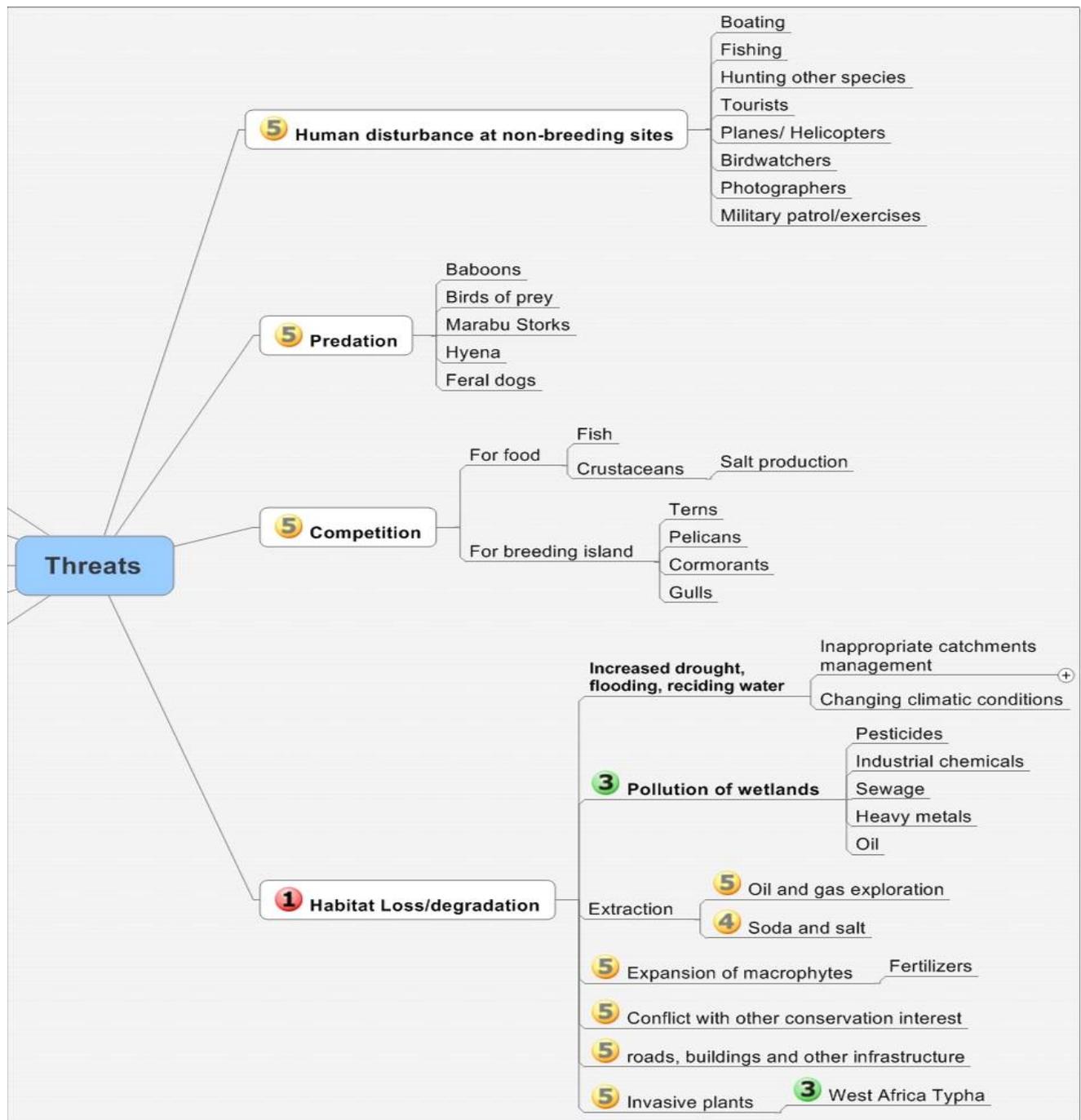
**Annex 3a1a. Primary sub-threats.** Threat priority tree for the Lesser Flamingo produced by the range state delegates to the action plan workshop, Nairobi, Kenya, 25-29 September 2006. Numbers 1-5 represent the perceived seriousness of the threat; see key below. '+' means there is additional detail on the following sheet.



**Key to ranks:**

- 1. Critical:** a factor causing or likely to cause very rapid declines (>30% over 10 years);
- 2. High:** a factor causing or likely to cause rapid declines (20-30% over 10 years);
- 3. Medium:** a factor causing or likely to cause relatively slow, but significant, declines (10-20% over 10 years);
- 4. Low:** a factor causing or likely to cause fluctuations;
- 5. Local:** a factor causing or likely to cause negligible declines;
- ? Unknown:** a factor that is likely to affect the species but it is unknown to what extent

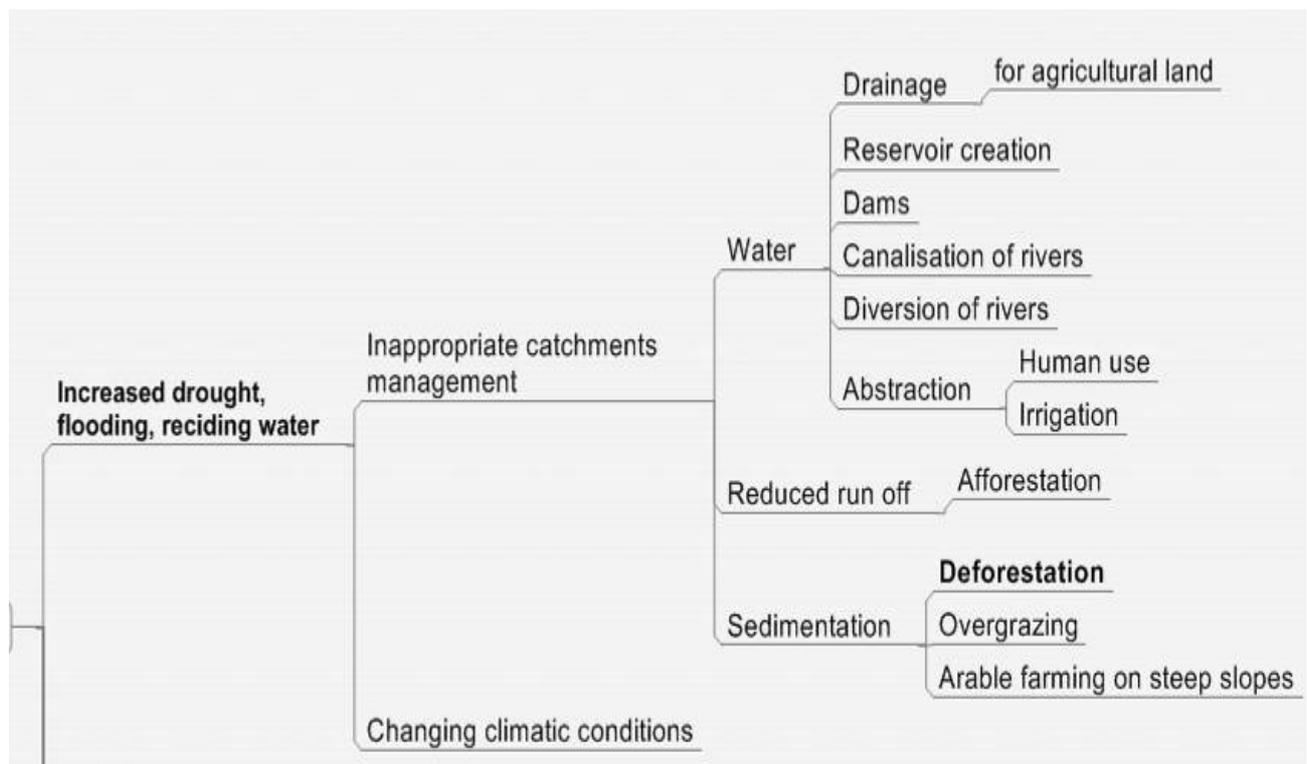
**Annex 3a1b. Primary sub-threats.** Threat priority tree for the Lesser Flamingo produced by the range state delegates to the action plan workshop, Nairobi, Kenya, 25-29 September 2006. Numbers 1-5 represent the perceived seriousness of the threat; see key below. '+' means there is additional detail on the following sheet.



**Key to ranks:**

- 1. Critical:** a factor causing or likely to cause very rapid declines (>30% over 10 years);
- 2. High:** a factor causing or likely to cause rapid declines (20-30% over 10 years);
- 3. Medium:** a factor causing or likely to cause relatively slow, but significant, declines (10-20% over 10 years);
- 4. Low:** a factor causing or likely to cause fluctuations;
- 5. Local:** a factor causing or likely to cause negligible declines;
- ? Unknown:** a factor that is likely to affect the species but it is unknown to what extent

**Annex 3a1c. Primary sub-threats.** Threat priority tree for the Lesser Flamingo produced by the range state delegates to the action plan workshop, Nairobi, Kenya, 25-29 September 2006.



## Annex 3b. Threat descriptions

### 3b.1. Habitat loss and/or degradation

*Importance: Critical*

The ecology of the Lesser Flamingo is highly specialised. Its diet is limited to microscopic cyanobacteria and benthic diatoms that occur only in saline/alkaline lakes, salt pans and coastal lagoons, and the species is known to breed in only five locations throughout its vast range from Ethiopia to South Africa and from West Africa to India (Figure 1). The species is not only dependent on a specialised habitat, but because it is adapted to respond to changes in environmental conditions by moving among sites regularly, it is dependent on a network of such sites.

#### 3b.1.1. Altered hydrology and/or water quality

*Importance: Critical*

The Lesser Flamingo is sensitive to changes in water levels and quality. Cyanobacteria, its primary food, require a certain range of salinity to reproduce in sufficient quantities to feed large numbers of Lesser Flamingos. Changes in the abundance of cyanobacteria can have a substantial effect on the Lesser Flamingo population at a site. Water levels are also critical to successful breeding. If the level is too high, the birds are unable to build their nests. If it is too low, terrestrial predators are able to reach the nests and destroy the breeding attempt. If the water level drops prematurely after the eggs are laid, but before the chicks are ambulatory, terrestrial predators are able to reach the colony and destroy the breeding attempt by feeding on the eggs and chicks.

Changes in water and salinity levels can occur either from natural causes (*e.g.* from flooding due to heavy rainfall or evaporation due to prolonged drought), or from man-made causes including increased flooding and sedimentation due to deforestation, over-grazing or an increase in arable farming on steep slopes in the catchment, or reduced inflows and water levels due to drainage of land for agricultural or roads, buildings and other infrastructure, creation of dams and reservoirs, canalisation of rivers, diversion of rivers, abstraction from feeder streams and rivers for irrigation and drinking water, and reforestation.

### **3b.1.2. Wetland pollution**

*Importance: Medium*

Pollution of the feeding lakes, pans and coastal areas may cause large scale illness and death. Large-scale die-offs, each involving tens of thousands of Lesser Flamingos and attributed variously to pollution by industrial heavy metals and pesticides, have occurred on feeding lakes in Kenya and Tanzania. Pollution due to pesticides and industrial heavy metals is a problem also in Botswana.

### **3b.1.3. Extraction of salt and soda ash**

*Importance: Low*

The saline lakes and pans traditionally have been important sources of salt for human use. Extraction methods vary from small local evaporation projects to large commercial operations run by international corporations often requiring their own power plants, roads and employee villages. While the flamingos can live with most small local projects, the large commercial operations can have devastating effects, depending on their size, location, methods and hours of operation.

### **3b.1.4. Invasive plants**

*Importance: Local*

Invasive fresh-water plants, particularly *Typha* in West Africa and macrophytes elsewhere may reduce the shallow littoral area available for Lesser Flamingo feeding. In the lower Senegal delta, both Greater and Lesser Flamingos are found in 'non-saline lakes. These lakes are linked to an estuarine hydrology, so their salt levels fluctuate. The water in these lakes is essentially brackish, sometimes fairly fresh, sometimes fairly salty depending on rains, tides etc. However, dams and canalisation have reduced the inflow of salt water to many areas, so many of the lakes have become more fresh water than brackish or saline. This has resulted in a massive growth of *Typha*. More recently, some counter-balance hydrological improvements have been initiated, which have resulted in some measure of restoration of former hydrological systems. However, the *Typha*, once established, is difficult to eradicate, and cannot simply be removed by periodical flooding with salty water.

### **3b.1.5. Building roads, buildings and other infrastructure**

*Importance: Local*

The disturbance caused by the building of roads, buildings and other infrastructure projects near a Lesser Flamingo feeding or breeding site, and the resulting long-term increase in human activity in the area may cause the abandonment of the site.

## **3b.2. Disruption of nesting colonies by human activities**

*Importance: Important*

Individual Lesser Flamingos are believed to breed only once every several years when conditions are suitable, and they are very sensitive to disturbance when nesting. The loss of a season's breeding attempt at one or more of the few breeding sites can have a major effect on the sustainability of the entire population. Major repeated disturbances have been known to cause the birds to abandon their breeding colony *en masse*. Even minor disturbances can cause large scale egg loss if incubating birds are frightened into leaving their nests too quickly, knocking their eggs out of the nests. They may or may not lay a second clutch. The most common causes of human disruption, all of which can cause a nesting colony to abandon their breeding attempt, and their level of importance are:

### **3b.2.1. Disruption by inhabitants of nearby settlements**

*Importance: Medium*

If human settlements are allowed to be built or expanded near a Lesser Flamingo nesting site, the activity surrounding the settlement could cause the birds to either not breed at all, or to abandon their breeding effort.

### **3b.2.2. Disruption by low-flying aircraft**

*Importance: Low*

Often private pilots are asked by tourists and professional photographers to fly low over breeding flamingos to make them fly so that they can get photographs of masses of flying flamingos. This not only causes the scared birds to leap off their nests quickly, flipping the eggs out of the nests, but can also cause the birds to abandon their breeding effort for the season.

### **3b.2.3. Disruption by fishermen**

*Importance: Local*

If Lesser Flamingos breed on an island site that is surrounded by shallow waters inhabited by fish, the activity of fishermen near the nesting colony can cause the birds to abandon their nesting effort.

### **3b.2.4. Disruption by salt pan workers**

*Importance: Local*

If Lesser Flamingos breed in an area that is near a local salt extraction project, repeated disturbance by the salt pan workers can cause the flamingos to abandon their breeding.

### **3b.2.5. Disruption by military exercises**

*Importance: Local*

Military patrols and exercises near a flamingo nesting site can also cause the birds to abandon their breeding.

### **3b.2.6. Disruption by the hunting of other species**

*Importance: Local*

Even though the flamingos themselves are not being hunted, the disturbance caused by the hunting of other species near the nesting site is likely to cause the flamingos to abandon their breeding.

### **3b.2.7. Disturbance by pastoralists**

*Importance: Local*

Shepherds herding their flocks of cattle, sheep or goats can cause sufficient disturbance to cause the flamingos to abandon their nesting efforts.

## **3b.3. Disruption of nesting colonies by predators**

*Importance: Local*

### **3b.3.1. Disruption by terrestrial predators**

*Importance: Local*

Nesting colonies are not often disrupted by terrestrial predators, unless the surrounding water level has dropped sufficiently to allow the predators to reach the colony. Feral dogs, hyenas, jackals and mongooses are typical of the terrestrial predators that will destroy a nesting colony if allowed to reach it.

### **3b.3.2. Disruption by avian predators**

*Importance: Local*

Avian predators include Marabou Stork, Egyptian Vulture, Lappet-faced Vulture, Steppe Eagle and African Fish Eagle, all of which can cause the abandonment of a nesting colony and destruction of the newly-hatched chicks.

## **3b.4. Toxicological Diseases**

*Importance: High*

Direct and indirect poisoning of Lesser Flamingos through the introduction of heavy metals, agrochemicals, domestic waste and industrial chemicals into the areas where they feed, or through cyanobacterial toxins and/or botulinus toxins may cause large scale illness and death. Large-scale die-offs, each involving tens of thousands of Lesser Flamingos and attributed variously to ingestion of industrial heavy metals, pesticides and cyanobacterial toxins, have occurred on feeding lakes in Kenya and Tanzania. Poisoning due to pesticides and industrial heavy metals is a problem also in Botswana.

## **3b.5. Infectious Diseases**

*Importance: High*

Diseases such as avian influenza, avian tuberculosis, avian cholera, salmonellosis and pseudomoniasis, might contribute to large scale die-offs among Lesser Flamingos. In the die-offs during the past 30 years at feeding lakes in Kenya and Tanzania, several of these diseases have been singled out as having contributed to the deaths.

### **3b.6. Harvesting**

*Importance: Local*

#### **3b.6.1. Illegal shooting for subsistence**

*Importance: Local*

The effect of this activity is largely unknown, although it apparently occurs at a low level in Botswana.

#### **3b.6.2. Wild bird trade**

*Importance: Local*

Officially, there has been a steady decline recently in the number of Lesser Flamingos taken from the wild, from approximately 2,000 in the year 2000 to 700 in 2003, the latest year for which CITES statistics are available. Almost all of the Lesser Flamingos taken from the wild are taken from Tanzania.

#### **3b.6.3. Egg harvesting for human consumption**

*Importance: Local*

Egg harvesting for human consumption can be a problem locally in those areas where the breeding site is accessible to local residents for whom the relatively large Lesser Flamingo eggs provide nutritious meals at no cost. It is particularly a problem at the Purabcheria breeding site in the Little Rann of Kachchh in India, where this activity is the only reason for the repeated breeding failure at this site.

### **3b.7. Human disturbance at non-breeding sites**

*Importance: Local*

Lesser Flamingos utilise two types of sites: breeding sites, and non-breeding sites that are used for feeding and roosting. Because Lesser Flamingos depend on a network of non-breeding sites and move readily among sites depending on local environmental conditions, human disturbance (*e.g.* from boating, fishing, hunting other species, tourists, aeroplanes, bird watchers, photographers or military exercises) at one non-breeding site should not be an important problem for the species. However, at those sites where sources of fresh water are limited, disturbance of any type that has the effect of preventing the birds from getting to fresh water for drinking and bathing could have serious implications for the birds on a local basis in the short term.

### **3b.8. Predation**

*Importance: Local*

Baboons, African Fish Eagles, Steppe Eagles, Marabou Storks, feral dogs and hyenas do occasionally attempt to predate adult flamingos, but predation on healthy adult Lesser Flamingos is not usually a problem. Predation can be a serious problem at breeding sites, particularly the water level has receded allowing access to terrestrial predators. Predation of eggs and chicks by Steppe Eagles is a common occurrence in the Rann of Kachchh near Kuda. Egyptian Vultures have been recorded predated eggs and chicks at Lake Magadi in Kenya.

### **3b.9. Competition**

*Importance: Local*

#### **3b.9.1. Competition for food**

*Importance: Local*

##### **3b.9.1.1. Competition with fish**

*Importance: Local*

There is little information concerning the level of competition with fish for the microscopic cyanobacteria and benthic diatoms that form the majority of the Lesser Flamingo's diet. However, it is considered to be minimal on a species basis. Because of the high salinity, at least two of the feeding lakes in Kenya have no fish at all (lakes Bogoria and Elmenteita). Lake Nakuru has had a plankton-feeding species (*Oreochromis alcalicus grahami*) only since 1960 when it was introduced to help control mosquitoes, and yet Lake Nakuru is one of the most productive feeding lakes for the Lesser Flamingo.

##### **3b.9.1.2. Competition with crustaceans**

*Importance: Local*

*Artemia* brine shrimp is sometimes introduced to the solar evaporation ponds of salt works to eat the algae that grow in the ponds, because algae reduce the quality of the salt and/or soda ash.

The potential threat posed by such an *Artemia* introduction would be the extinction of indigenous brine shrimp and a reduction in the food availability of the Lesser Flamingo through competition for the same food source. We know of no studies that have been conducted to determine whether it could survive in the wetland habitat surrounding the evaporation ponds, and if so how it would compete with the indigenous crustacean species and how it would affect cyanobacteria and diatom abundance.

### 3b.9.2. Competition for breeding sites

*Importance: Local*

There is also little information concerning the level of competition with other avian species (e.g. pelicans, cormorants, terns or gulls) for breeding sites. The Lesser Flamingos are known to breed in only five sites throughout its range, and these sites are so specialised that it seems unlikely that they would be suitable for other species. Great White Pelicans did usurp a Greater Flamingo breeding site in Lake Elmenteita in recent years, but the isolated, flooded Lesser Flamingo breeding sites would not seem suitable for other species.

### Annex 3c. Threat importance rankings at species and country levels in primary range states. Threat importance ranking key: 1 = critical, 2 = high, 3 = medium, 4 = low, 5 = local threat; see key descriptions at end of table.

Species level importance	Primary threat	Sub-threat	Sub-threat	Sub-threat	Sub-threat	Sub-threat	Botswana	Ethiopia	Guinea	India	Kenya	Mauritania	Namibia	South Africa	Tanzania	Uganda
1	Habitat loss and/or degradation	Altered hydrology and/or water quality	Reduced water flow	Inappropriate catchment management	Water management	Drainage for agricultural land	3	1		4	2			4	4	
						Drainage for roads, buildings and other infrastructure	4	2				2			4	
						Reservoir creation	3	4						5		
						Dams	2	4		4		2		5		
						Canalisation of rivers	?	4								
						Diversion of rivers	2	2					4			
						Abstraction for human use	4	4			2	2	2	5		
						Abstraction for irrigation	3	4			2	2			4	
					Reduced runoff	Reforestation	4									
					Increased flooding and sedimentation	Deforestation	3	2		4	2				4	
						Over-grazing	3	2						5	4	
						Arable farming on steep slopes	3									
			Increased drought	Climate change			2	4		2	2		4	2	4	?
			Wetland Pollution	Pesticides			2	?			2		4	5		
				Industrial chemicals			2	?			2			5		
				Sewage			4	?		4	2			5		
				Heavy metals			2	?		4	2			5		
				Oil			2	?		4	2	4		5		

Species level importance	Primary threat	Sub-threat	Sub-threat	Sub-threat	Sub-threat	Sub-threat	Botswana	Ethiopia	Guinea	India	Kenya	Mauritania	Namibia	South Africa	Tanzania	Uganda
		Extraction	Salt / minerals				3	4			4			4	4	?
			Oil & gas				?									
		Expansion of macrophytes	Fertilisers				3							5		
		Conflict with other conservation interests					4									
		Roads, buildings, other infrastructure					2									
		Invasive plants (W. Africa Typha)					3				2					
2	Disruption of nesting colonies	Human	Fishermen				?	4	2		2				4	
			Salt pan workers				4	4						5		
			Nearby settlements				4	4								
			Military exercises				4	4								
			Hunting other species				4	4						5		
			Pastoralists				4	4						5		
			Low-flying aircraft	Tourists			2	4	?	2		4				
				Film crews			2	4								
			Photographers				2									
		Predators	Terrestrial				4	4	2	2				3		
			Avian				3	4	?	2				5		
2	Toxicological Diseases	Heavy metals					3	3	?	2				5		
		Agro-chemicals					?	3	?	2				4		
		Domestic waste					4							5		
		Industrial chemicals					2	3	?	2				5		
		Botulism						3						5		
		Cyanobacterial toxins	Fertiliser eutrophication				4	3		2				5	?	
2	Infectious Diseases	Avian influenza					?	?						5	?	
		Avian cholera					?	?						5	?	
		Avian tuberculosis					?	?							?	
		<i>Salmonella</i>					?	?							?	
		<i>Pseudomonas</i>					?	?							?	
5	Harvesting	Illegal shooting	Subsistence				4	4	?							
		Wild bird trade	Zoos/ tourism				4	4							4	?
		Egg harvesting	Human consumption				4	4	2							
5	Human disturbance at non-breeding sites	Boating					?	4								
		Fishing					?	4	4	4	4			4		
		Hunting other species					4	4	4	4	4	4	4	4	4	?
		Tourists					?	4	4	?	4		4	4	4	4
		Planes/ Helicopters					4	4				4	5	4	4	4

Species level importance	Primary threat	Sub-threat	Sub-threat	Sub-threat	Sub-threat	Sub-threat	Botswana	Ethiopia	Guinea	India	Kenya	Mauritania	Namibia	South Africa	Tanzania	Uganda
		Birdwatchers					?	4					4	4	4	4
		Photographers					?	4	4		?	2	4	4	4	4
		Military exercises					4							4		
5	Predation	Baboons					?	4		?	2		5	4		5
		Birds of prey					4	4			2		5			5
		Maribou Storks					4	3			2		5			5
		Hyenas					4	4			2		5	4		5
		Feral dogs					?									
5	Competition	For food	Fish				?	4			?		?			?
			Crustaceans				4						?	4		?
		For breeding sites	Terns				?									
			Pelicans				?									
			Cormorants				?									
			Gulls				?									
5	Collision with man-made structures	Power lines					3	4		4			4			4
		Telephone lines					4	4					4			4
		Fences					3	4						4		
		Light masts					?	4						4		
		Guide wires					3	4						4		

**Key to ranks:**

- 1. Critical:** a factor causing or likely to cause very rapid declines (>30% over 10 years);
- 2. High:** a factor causing or likely to cause rapid declines (20-30% over 10 years);
- 3. Medium:** a factor causing or likely to cause relatively slow, but significant, declines (10-20% over 10 years);
- 4. Low:** a factor causing or likely to cause fluctuations;
- 5. Local:** a factor causing or likely to cause negligible declines;
- ? Unknown:** a factor that is likely to affect the species but it is unknown to what extent
- Blank space:** factor does not apply in this country

#### Annex 4a. Membership of primary range states in international conservation conventions and agreements

Primary Range States	Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES)	Convention on the Conservation of Migratory Species CMS	African-Eurasian Migratory Waterbird Agreement (AEWA)	AEWA Action Plan 2006-08	Ramsar Convention
	Appendix II	Appendix II	Annex II	Columns A & B	
Botswana	x				x
Ethiopia	x				
Guinea	x	x	x	x	x
India	x	x			x
Kenya	x	x	x	x	x
Mauritania	x	x			x
Namibia	x				x
South Africa	x	x	x	x	x
Tanzania	x	x	x	x	x
Uganda	x	x	x	x	x

#### Annex 4b. Membership of other range states in international conservation conventions and agreements

Primary Range States	Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES)	Convention on the Conservation of Migratory Species CMS	African-Eurasian Migratory Waterbird Agreement (AEWA)	AEWA Action Plan 2006-08	Ramsar Convention
	Appendix II	Appendix II	Annex II	Columns A & B	
Angola		x	x	x	
Burundi	x				x
Cameroon	x	x			x
Congo, The Dem. Rep. of the	x	x			
Djibouti	x	x	x	x	x
Eritrea	x	x			
Gabon	x				x
Gambia	x	x	x	x	x
Guinea-Bissau	x	x			x
Madagascar	x	x	x	x	x
Malawi	x				x
Mozambique	x				x
Pakistan	x	x			x
Senegal	x	x	x	x	x
Sierra Leone	x				x
Sudan	x				x
Yemen	x				
Zambia	x				x
Zimbabwe	x				

### Annex 5a. Lesser Flamingo conservation and protection status in primary range states

Country	Lesser Flamingo Status in national Red Data Book	Date of RDB	What is the national protection status of the LF?	Under what laws is the species protected?	Is the LF legally protected from being deliberately killed?	Is the LF legally protected from egg harvest?	Is the LF legally protected from nest destruct'n?	What are the penalties for:			Who is the highest national authority
								Illegal Killing	Egg Harvest	Nest Destruct	
<b>Botswana</b>	No national RDB	In process	Protected Game Animal - highest level of protection	1992 Wildlife Conservation and National Parks Act	Yes	Yes	Not necessarily, the Act is vague - hunting is defined as "... wilfully disturbing or molesting ... etc." but it would have to be proved that the intention is wilful.	Pula 10,000 (€1,205) and 7 years imprisonment		Not clear	Director of Department of Wildlife and National Parks
<b>Ethiopia</b>	No national RDB	NA	Protected from live trade and hunting	Wildlife conservation regulations, legal notice 416 of 1972 & Proclamation 192 of 1980	Yes, but enforcement of laws very low at all levels	Yes, but enforcement of laws very low at all levels	Generally protected but no legal statement defining the act	Not clear	Not clear	Not clear	Ethiopian Wildlife Development and Conservation Department
<b>Guinea</b>	No national RDB	NA									
<b>India</b>		1987									
<b>Kenya</b>											
<b>Mauritania</b>	No national RDB	NA		Protection of wild fauna and protected areas	Yes	No	Yes	It ranges from confiscation of the firearm to imprisonment		A reprimand by the managers of the reserve	The Director of Protected Areas

Country	Lesser Flamingo Status in national Red Data Book	Date of RDB	What is the national protection status of the LF?	Under what laws is the species protected?	Is the LF legally protected from being deliberately killed?	Is the LF legally protected from egg harvest?	Is the LF legally protected from nest destruct'n?	What are the penalties for:			Who is the highest national authority
								Illegal Killing	Egg Harvest	Nest Destruct	
<b>Namibia</b>											
<b>South Africa</b>	Near-threatened	2000	Not protected nationally	Nine provincial nature conservation ordinances	Yes	Yes	Yes, during breeding	In Northern Cape, maximum of R100,000 (€10,600) or ten years in jail or both or three times the commercial value of the birds			Provincial Depts. of Environmental Affairs & Tourism
<b>Tanzania</b>	No National RDB		National protection	Wildlife Conservation Act, National Parks Act and Ngorongoro Conservation Area Act.	Yes	Yes	Yes	USD 155.00 (Tanzanian Shillings 200,000) and/or imprisonment of not less than 10 years	Fine not exceeding TZS 5,000.00 and/or imprisonment not exceeding 2 years		Director of Wildlife
<b>Uganda</b>	Regional / Uganda: Near Threatened (NT)	2003	Fully Protected Species	Uganda wildlife statute (1996): Species which migrate to or through Uganda which are protected under any international convention to which Uganda is party, shall be protected under this statute.	Yes	Not applicable	Not applicable	First offenders: (Ushs30,000 – 3,000,000 and or 3months jail). Second offenders: (UShs300,000 – 6,000,000 and or 6months in jail).	Not applicable	Not applicable	Uganda Wildlife Authority

## Annex 5b. Lesser Flamingo research and conservation in primary range states

Country	What research has been conducted with the LF over the past 10 years?	What conservation efforts have there been for the LF over the past 10 years?	What is the general attitude of the public toward the LF?	What is the general attitude of the conservation authorities toward the LF?
<b>Botswana</b>	Annual breeding success monitoring on Sua Pan; satellite tracking of movements in 2001-02; diet study	None	Positive	It is a species of concern and protected as such by the authorities.
<b>Ethiopia</b>	Monitoring of numbers annually based on AfWC counts	None	Neutral	Though protected by non-specific wildlife laws, does not receive special attention.
<b>Guinea</b>	Some comprehensive annual counts of birds at key sites for flamingos have been carried out; no specific research for flamingos	Key sites for flamingos have been declared Ramsar Sites	Not widely known	A species that merits conservation attention
<b>India</b>				
<b>Kenya</b>				
<b>Mauritania</b>	Research on the breeding and monitoring of the population	The Chat Boul reserve was created to strengthen the protection of the LF	The LF is not well-known by the public as it frequents very isolated sites	It is a rare species that needs to be conserved/protected
<b>Namibia</b>				
<b>South Africa</b>	Coordinated Waterbird Counts	Conservation of wetlands, recognition of wetlands as Ramsar Sites	Positive	Positive
<b>Tanzania</b>	Satellite tracking of movements	<ul style="list-style-type: none"> <li>• Extension of the protected areas boundaries</li> <li>• Designation of wetlands of international importance (Ramsar Sites)</li> </ul>	Positive	Positive It is a key bird species and therefore of conservation importance by authorities.
<b>Uganda</b>	Regular monitoring of numbers through the African waterfowl counts done twice every year.	All sites are within the Parks and Wildlife Sanctuary and all considered IBAs.	Positive (Some local groups near wildlife sanctuaries are very enthusiastic about monitoring)	Positive

## Annex 6. Conservation measures and attitude towards the Lesser Flamingo in primary range states

Country	Is there a national Lesser Flamingo action plan?	Is there a national Lesser Flamingo working group?	Is there a national census?	Is there a monitoring programme in protected areas?	Are there routines for informing the responsible authorities regarding nesting areas and nest sites?	Have there been any conservation efforts specifically for this species over the last ten years?	General attitude towards the species
<b>Botswana</b>	No	No	Some sites	Yes	Yes	No	Positive
<b>Ethiopia</b>	No	No	Some sites	No	NA	No	Positive
<b>Guinea</b>	No	No	Yes	Yes	NA	Key sites for flamingos have been declared Ramsar Sites.	Not well known
<b>India</b>	No	No	Some sites	Yes	No	No	
<b>Kenya</b>	No	No	Yes	Yes	NA	No	Positive
<b>Mauritania</b>	No	No	Yes	Yes	Yes	The Chat Boul reserve was created to strengthen the protection of the LF	Not well known
<b>Namibia</b>	No	No	Yes	Yes	Yes	No	Positive
<b>South Africa</b>	No	No	Some sites	Yes	Yes	No	Positive
<b>Tanzania</b>	No	Yes	No	Yes	Yes	No	Positive
<b>Uganda</b>	No	No	Yes	Yes	NA	No	Positive

Key:

NA = Not applicable

## Annex 7. Key Lesser Flamingo site protection status in the primary range states

Key sites: > 1% of the estimated regional population has been counted at these sites at some time during the past five years.

Country	Local site name	International site name	Breeding (BR), non-breeding (NB) or both (BO)	Protection status	BirdLife IBA	Ramsar site
<b>Botswana</b>	Sua Pan	Makgadikgadi Pans	BO	NO	Yes	No
	Bokaa Dam	Bokaa Dam	NB	NO	Yes	No
	Gaborone Game Reserve Dam	None	NB	NP	No	No
	Shashi Dam	None	NB	NO	No	No
	Lake Ngami	Lake Ngami	NB	NP	Yes	No
<b>Ethiopia</b>	Akaki - Aba-Samuel Wetlands	Akaki - Aba-Samuel Wetlands	NB	NO	Yes	No
	Lake Abijatta	Abijatta - Shalla Lakes National Park	NB	NP	Yes	No
	Lake Awassa	Lake Awassa	NB	NO	Yes	No
	Green Lake	Green Lake	NB	NO	Yes	No
	Lake Chitu	Lake Chitu	NB	NO	No	No
<b>Guinea</b>	Vasieres de Khonibenki et Yongo Sale	Rio Kapatchez	NB	?	Yes	Yes
<b>India</b>	Wild Ass Sanctuary, Little Rann of Kachchh	Wild Ass Sanctuary	BO	NP	Yes	No
	Rann of Bela and Kuda, Great Rann of Kachchh		BO	NO	No	No
	Sambhar Lake, Rajasthan	Sambhar Lake	BO	NP	Yes	Yes
	Birla Khadi		NB	NO	No	No
	Charakhala salt pans	Charakhala Salt Works	NB	NO	Yes	No
	Chharidhandh		NB	NO	No	No
	Chhaya Rann		NB	NO	No	No
	GHCL salt pan		NB	NO	No	No
	Gopnath sea coast		NB	NO	No	No
	Gosa karli TR		NB	NO	No	No
	Hathab sea coast		NB	NO	No	No
	Jawar salt pans		NB	NO	No	No
	Khambhat-Vadgam		NB	NO	No	No
	Khambhat-Vasana P.H. in sea coast		NB	NO	No	No
	Khirjog Dhandh		NB	NO	No	No
	Kuchadi		NB	?	?	?
	Kumabharwada sewage pond		NB	NO	No	No
	Kumbharwada IPCL salt pans		NB	NO	No	No
	Nal Sarovar		NB	NO	No	No
	New Port salt pans		NB	NO	No	No

Country	Local site name	International site name	Breeding (BR), non-breeding (NB) or both (BO)	Protection status	BirdLife IBA	Ramsar site
<b>India (cont.)</b>	Nirma salt pans		NB	NO	No	No
	Sarod (Mahi Estuary)		NB	NO	No	No
	Sartanpur		NB	NO	No	No
	Sea coast nr. GHCL PH-2		NB	NO	No	No
	Sewree Bay, Mumbai, Maharashtra		NB	NO	No	No
	Tada Talav		NB	NO	No	No
<b>Kenya</b>	Lake Bogoria	Lake Bogoria	NB	NP	Yes	Yes
	Lake Elmenteita	Lake Elmenteita	NB	NO	Yes	Yes
	Lake Magadi	Lake Magadi	NB	NO	Yes	No
	Lake Nakuru	Lake Nakuru	NB	NP	Yes	Yes
	Lake Logipi	Lake Logipi	NB	NO	Yes	No
	Sonachi Crater Lake	Sonachi Crater Lake	NB	NO	Yes	Yes
	Lake Oloidien	Lake Oloidien	NB	NO	Yes	Yes
<b>Mauritania</b>	Aftout es Sâheli	Aftout es Sâheli	?	NO	Yes	Yes
	Chott Boul	Chott Boul	NB	NO	Yes	
	Senegal River Delta	Diawling National Park	NB	NP	Yes	Yes
<b>Namibia</b>	Etosha Pan	Etosha National Park	BO	NP	Yes	Yes
	Sandwich Harbour	Sandwich Harbour	NB	NP	Yes	Yes
	Walvis Bay	Walvis Bay	NB	NO	Yes	Yes
<b>South Africa</b>	Kamfers Dam	Kamfers Dam	BO	NO	Yes	No
	Goldfields Wetlands	Goldfields Wetlands	NB	NO	No	No
	Lake St Lucia	Lake St Lucia and Mkuzi Swamps	NB	NP	Yes	Yes
	Orange River Mouth	Orange River Mouth Wetlands	NB	NP	Yes	Yes
<b>Tanzania</b>	Balangidas	Lakes Balangida & Balangida Lelu	NB	NO	Yes	No
	Big Momella	Arusha National Park	NB	NP	Yes	No
	Empakai	Embakai Crater Lake (NCA)	NB	NP	Yes	No
	Lake Bahi (a.k.a. Bahi Swamp)	Lake Bahi	NB	NO	No	No
	Lake Eyasi	Lake Eyasi	NB	NO	Yes	No
	Lake Manyara	Lake Manyara National Park (partial)	NB	NP	Yes	No
	Lake Natron	Lake Natron and Engaruka basin	BO	NO	Yes	Yes
<b>Uganda</b>	Kasenya	Kazinga Wildlife Sanctuary	NB	NP	Yes	No
	Lakes Maseche, Nshenyi and Bagusa	Kyambura Wildlife Reserve	NB	NP	Yes	No
	Munyanyange	Kazinga Wildlife Sanctuary	NB	NP	Yes	No
	Nyamunuka	Queen Elizabeth National Park	NB	NP	Yes	No

## Annex 8a. Priority of Lesser Flamingo conservation objectives and tasks for key sites in East Africa primary range states

H = high priority; M = medium priority; L = low priority; X = already completed; blank = does not apply. Key sites: > 1% of the estimated regional population has been counted at these sites at some time during the past five years.

Primary range states:	Ethiopia					Kenya								Tanzania						Uganda				
Key site names:	Akaki-Aba-Samuel Wetls	Lakes Abijatta & Shalla	Green Lake	Lake Awassa	Lake Chitu	Lake Bogoria	Lake Elmenteita	Lake Magadi	Lake Nakuru	Lake Logipi	Sonachi Crater Lake	Lake Oloidien	Balangidas lakes	Empakai Crater Lake	Momella lakes	Lake Bahi (a.k.a. Bahi	Lake Eyasi - Kitangiri	Lake Manyara	Lake Natron	Kasenye	Kyambura Wildlife Res.	Munyanyange	Nyamunuka	
<b>Conservation objectives / tasks</b>																								
<b>Objective 1: Maintain all key sites in good ecological condition</b>																								
<b>Projects:</b>																								
- Designate key sites as protected areas and as Ramsar sites	L	H	H	L	H	X	X	L	X	H	X	X	L	X	X	M	H	H	H	X	H	H	X	
- Conduct strategic and project level Environmental Impact Assessment and audit of existing operation																								
- Develop and implement integrated (catchments/coastal zone) management plans for the key sites	H	H	M	M	M	X	H	L	X	L	H	H	M	X	X	H	H	X	H	X	X	H	X	
- Identify management needs of Lesser Flamingo habitat and implement necessary management actions to maintain all key in good ecological condition	M	H	H	L	M	X	X	H	X	M	X	X	L	X	X	M	M	X	H	X	X	H	X	
- Maintain, or restore where necessary, favourable hydrological conditions and water quality for the species																								
- Enhance the habitat at suitable sites (e.g. creation of breeding islands, rehabilitate/create wetlands) where necessary	L	L	L	L	L																			
- Prevent disturbance (especially low flying aircraft) through legislation, planning, zoning and through enforcement of these rules as appropriate																								
- Raise awareness about the conservation needs of the																								

<b>Primary range states:</b>	<b>Ethiopia</b>					<b>Kenya</b>							<b>Tanzania</b>						<b>Uganda</b>					
<b>Key site names:</b>	Akaki-Aba-Samuel Wetfs	Lakes Abijatta & Shalla	Green Lake	Lake Awassa	Lake Chitu	Lake Bogoria	Lake Elmenteita	Lake Magadi	Lake Nakuru	Lake Logipi	Sonachi Crater Lake	Lake Oloidien	Balangidas lakes	Empakai Crater Lake	Momella lakes	Lake Bahi (a.k.a. Bahi	Lake Eyasi - Kitangiri	Lake Manyara	Lake Natron	Kasenyi	Kyambura Wildlife Res.	Munyanyange	Nyamunuka	
<b>Conservation objectives / tasks</b>																								
species at national and local level																								
<b>Objective 2: Ensure that breeding colonies are not disturbed</b>																								
<b>Projects:</b>																								
- Prevent disturbance (especially low flying aircraft) through legislation, planning, zoning and through enforcement of these rules as appropriate								L	L										H		L			
- Raise awareness about the conservation needs of the species at national and local level	H	H	H	H	H			L	L										M					
- Help local communities to develop alternative livelihood practices to reduce disturbance (and to enhance new community-based tourism projects)	L	H	H	L	H													M	M					
<b>Objective 3: Reduce the impact of poisoning and diseases on LF populations</b>																								
<b>Projects:</b>																								
- Establish an integrated flamingo health surveillance program to assess the effects of mass die-offs on LF in E. Africa																								
- Raise awareness amongst decision-makers and industry about the risk of pollution to LF																								
- Ensure that pollution guidelines/legislation at key sites reflect the sensitivity of the species	H	M	L	M	L	L	M	L	H		L	L											H	
- Ensure that pollution guidelines/legislation are developed and enforced																								

## Annex 8b. Priority of Lesser Flamingo conservation objectives and tasks for key sites in southern Africa primary range states

H = high priority; M = medium priority; L = low priority; X = already completed; blank = does not apply. Key sites: > 1% of the estimated regional population has been counted at these sites at some time during the past five years.

Primary range states:	Botswana					Namibia							South Africa						
Key site names:	Makgadikgadi Pans	Bokaa Dam	Gaborone Reserve Dam	Shashi Dam	Lake Ngami	Etosha National Park	Ekuma River	Sandwich Harbour	Walvis Bay	Swakop River Estuary	Tsumkwe	Swakopmund Salt Wks	Luderitz sewage works	Kamfers Dam	Orange River Mouth	St Lucia	Berg River estuary	Langebaan Lagoon	Goldfields Wetlands
<b>Conservation objectives / tasks</b>																			
<b>Objective 1: Maintain all key sites in good ecological condition</b>																			
<b>Projects:</b>																			
- Designate key sites as protected areas and as Ramsar sites	H		X		H	X	M	X	H	L	M	M	L		H	M	X	H	X
- Conduct strategic and project level Environmental Impact Assessment and audit of existing operation																			
- Develop and implement integrated (catchments/coastal zone) management plans for the key sites	H				H	H	H	M	H	L	H	L	L		H	M	H	H	M
- Identify management needs of Lesser Flamingo habitat and implement necessary management actions to maintain all key in good ecological condition	H				H	M	M	M	H	L	M	M	L		M	M	H	M	L
- Maintain, or restore where necessary, favourable hydrological conditions and water quality for the species																			
- Enhance the habitat at suitable sites (e.g. creation of breeding islands, rehabilitate/create wetlands) where necessary	M					H			M						X	H	H	H	
- Prevent disturbance (especially low flying aircraft) through legislation, planning, zoning and through enforcement of	L					M	L	H	H	M	L	M	L		H	M	M	M	M

Primary range states:	Botswana					Namibia								South Africa								
Key site names:	Makgadikgadi Pans	Bokaa Dam	Gaborone Reserve Dam	Shashi Dam	Lake Ngami		Etosha National Park	Ekuma River	Sandwich Harbour	Walvis Bay	Swakop River Estuary	Tsumkwe	Swakopmund Salt Wks	Luderitz sewage works		Kamfers Dam	Orange River Mouth	St Lucia	Berg River estuary	Langebaan Lagoon	Goldfields Wetlands	
these rules as appropriate																						
- Raise awareness about the conservation needs of the species at national and local level	M				M			L	L	M	M	M	M	L		X	L	L	L	X		
<b>Objective 2: Ensure that breeding colonies are not disturbed</b>																						
<b>Projects:</b>																						
- Prevent disturbance (especially low flying aircraft) through legislation, planning, zoning and through enforcement of these rules as appropriate	H						H									M						
- Raise awareness about the conservation needs of the species at national and local level	H						X									L						
- Help local communities to develop alternative livelihood practices to reduce disturbance (and to enhance new community-based tourism projects)	M						L									L						
<b>Objective 3: Reduce the impact of poisoning and diseases on LF populations</b>																						
<b>Projects:</b>																						
- Establish an integrated flamingo health surveillance program to assess the effects of mass die-offs on LF in E. Africa																						
- Raise awareness amongst decision-makers and industry about the risk of pollution to LF																						
- Ensure that pollution guidelines/legislation at key sites reflect the sensitivity of the species	M						L	L		H	L					H	L	M	L	L		
- Ensure that pollution guidelines/legislation are developed and enforced																						

## Annex 8c. Priority of Lesser Flamingo conservation objectives and tasks for key sites in West Africa primary range states

H = high priority; M = medium priority; L = low priority; X = already completed; blank = does not apply. Key sites: > 1% of the estimated regional population has been counted at these sites at some time during the past five years.

Primary range states:	Guinea		Mauritania		
Key site names:	Vasieres de Khonibenki et Yongo Sale		Aftout es Sâheli	Chott Boul	Diawling National Park
Conservation objectives / tasks					
Objective 1: Maintain all key sites in good ecological condition					
Projects:					
- Designate key sites as protected areas and as Ramsar sites	H		H	H	X
- Conduct strategic and project level Environmental Impact Assessment and audit of existing operation					
- Develop and implement integrated (catchments/coastal zone) management plans for the key sites	M		H	H	H
- Identify management needs of Lesser Flamingo habitat and implement necessary management actions to maintain all key in good ecological condition	H		H	H	M
- Maintain, or restore where necessary, favourable hydrological conditions and water quality for the species					
- Enhance the habitat at suitable sites (e.g. creation of breeding islands, rehabilitate/create wetlands) where necessary	L		H	M	L
- Prevent disturbance (especially low flying aircraft) through legislation, planning, zoning and through enforcement of these rules as appropriate					
- Raise awareness about the conservation needs of the	H		H	H	L

<b>Primary range states:</b>	<b>Guinea</b>	<b>Mauritania</b>			
<b>Key site names:</b>	Vasieres de Khonibenki et Yongo Sale		Aftout es Sâheli	Chott Boul	Diawling National Park
species at national and local level					
<b>Objective 2: Ensure that breeding colonies are not disturbed</b>					
<b>Projects:</b>					
- Prevent disturbance (especially low flying aircraft) through legislation, planning, zoning and through enforcement of these rules as appropriate	L		H	M	L
- Raise awareness about the conservation needs of the species at national and local level	L		H	M	L
- Help local communities to develop alternative livelihood practices to reduce disturbance (and to enhance new community-based tourism projects)	L		H	M	L
<b>Objective 3: Reduce the impact of poisoning and diseases on LF populations</b>					
<b>Projects:</b>					
- Establish an integrated flamingo health surveillance program to assess the effects of mass die-offs on LF in E. Africa	L		M	M	L
- Raise awareness amongst decision-makers and industry about the risk of pollution to LF	L		M	M	L
- Ensure that pollution guidelines/legislation at key sites reflect the sensitivity of the species	L		M	M	L
- Ensure that pollution guidelines/legislation are developed and enforced	L		M	M	L



