



AGREEMENT ON THE CONSERVATION OF  
AFRICAN-EURASIAN MIGRATORY  
WATERBIRDS

Doc: AEWA/MOP 6.32  
Agenda item:23  
Original: English

Date: 10 September 2015

**6<sup>th</sup> SESSION OF THE MEETING OF THE PARTIES**

9-14 November 2015, Bonn, Germany

*“Making flyway conservation happen”*

---

**DRAFT REVISED INTERNATIONAL SINGLE SPECIES ACTION PLAN FOR THE  
CONSERVATION OF THE NORTHERN BALD IBIS**

**Introduction**

This draft revised International Single Species Action Plan (ISSAP) for the Conservation of the Northern Bald Ibis (*Geronticus eremita*) has been compiled on behalf of the AEWA Northern Bald Ibis International Working Group (NBI IWG) by its Coordinator Dr Chris Bowden (RSPB).

The action plan revision process was initiated at the 1<sup>st</sup> meeting of the AEWA Northern Bald Ibis International Working Group meeting in November 2012 hosted by Saudi Wildlife Authority and Jazan University. A first draft was circulated to the NBI IWG in October 2014. The Technical Committee examined the revised draft at its meeting in March 2015 and suggested modifications, which were incorporated by the compilers. The third draft was sent to the government officials at the Range States of the species for official consultation in April 2015 and was approved for submission to the Meeting of the Parties by the AEWA Standing Committee at its 10<sup>th</sup> Meeting in July 2015, pending the incorporation of final comments from the Range States which have been taken into account in this final draft.

**Action Requested from the Meeting of the Parties**

The Meeting of the Parties is invited to review this draft revised ISSAP and to adopt it for further implementation.

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

## **Draft revised International Single Species Action Plan for the Conservation of the Northern Bald Ibis**

*Geronticus eremita*



**November 2015 (1. Revision)**

*Prepared by RSPB*

*With support from the Saudi Wildlife Authority and RSPB*



**Compiled by: Chris Bowden**

RSPB, The Lodge, Sandy, Bedfordshire, SG19 2DL, UK

Email: [chris.bowden@rspb.org.uk](mailto:chris.bowden@rspb.org.uk)

**Contributors:**

Muhannad Abutarab (Syria), Mohammad Al-Salamah (Saudi Arabia), HHP Bandar bin Saud bin Mohammad Al-Saud (Saudi Arabia), Ruba Alssarhan (Syria), Nabegh Ghazal Asswad (Syria), Christiane Boehm (IAGNBI expert), Chris Bowden (Coordinator), Sergey Dereliev (AEWA), George Eshiamwata (BirdLife Africa), Mihret Ewnetu (Ethiopia), Amina Fellous (IAGNBI Algeria), Johannes Fritz (IAGNBI Austria), SALHI Hamida (Algeria), Jaber Harise (Saudi Arabia), Taner Hatipoglu (Turkey), Sureyya Cevat Isfendiyaroglu (Turkey), Sharif Al Jbour (Eastern regional chair), Mike Jordan (IAGNBI South Africa) Omar Al Khushaim (Saudi Arabia), Nina Mikander (AEWA), MOULAY Melliani Khadidja (Algeria), José Manuel López (Spain), Yousuf Mohageb (Yemen), Noaman Mohamed (Morocco), Ammar Momen (Saudi Arabia), Rubén Moreno-Opo (Spain), Widade Oubrou (Morocco), Jorge Fernandez Orueta (Western regional chair), Lubomir Peske (IAGNBI expert), Miguel Angel Quevedo (IAGNBI Spain), Roger Safford (BirdLife International), Gianluca Serra (IAGNBI expert), Rob Sheldon (Independent), Mohammed Shobrak (Saudi Arabia), Dawit Tesfai (Eritrea), Zafar Ul Islam (Saudi Arabia), Can Yenyurt (Turkey), Yacob Yohannes (Eritrea), Fehmi Yuksel (Turkey).

**Milestones in the Production of the Plan:**

- 1<sup>st</sup> Meeting of the AEWA Northern Bald Ibis International Working Group (NBI IWG), Jazan, Saudi Arabia, 19-22 November 2012
- First draft: presented to the NBI IWG in October 2014
- Second draft: presented to the AEWA Technical Committee in March 2015  
circulated to Range States for formal consultation in April 2015  
presented to the AEWA Standing Committee in August 2015
- Final draft: presented to the 6<sup>th</sup> session of the Meeting of the Parties to AEWA (Bonn, 9-14 November 2015)

**Geographical scope:**

This International Single Species Action Plan requires implementation in the following countries: Algeria, Eritrea, Ethiopia, Morocco, Saudi Arabia, Syria, Turkey, and Yemen.

**Reviews:**

This International Single Species Action Plan supersedes the Action Plan adopted at the 3<sup>rd</sup> Meeting of the AEWA Parties in 2005 and should be revised again in 2025. An emergency review shall be undertaken if there are sudden major changes liable to affect the population.

**Recommended citation:**

Bowden, C. (Compiler). 2015. International Single Species Action Plan for the Conservation of the Northern Bald Ibis *Geronticus eremita*. AEWA Technical Series No. [...]. Bonn, Germany.

**Picture on cover:** [Northern bald ibis at Souss-Massa National Park feeding site (Chris Gomersall/RSPB)]

**Disclaimer:** The designation employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of UNEP/AEWA concerning the legal status of any State, territory, city or area, or of its authorities, or concerning the delimitation of their frontiers and boundaries.

**Contents**

Preface .....5

0 – Executive Summary .....6

1 – Biological Assessment .....8

    1.3 Distribution Throughout the Annual Cycle.....8

    1.4. Habitat Requirements .....10

    1.5. Survival and Productivity .....12

    1.6. Population Sizes and Trends .....12

2 – Threats .....16

    2.1. General Overview .....16

    2.2 Critical and High Threats .....16

    2.3. Medium Threats .....18

3 – Knowledge Needs.....21

4 - Policies and Legislation Relevant for Management.....22

    4.1. International Conservation and Legal Status of the Species.....22

    4.2 National Policies, Legislation and Ongoing Activities.....22

    4.3 Site and Habitat Protection .....23

    4.4 Recent Conservation Measures and Coordination of Implementation .....24

    4.5 The Potential Role for Reintroduction.....26

5 - Ongoing Translocation Projects and their Potential Association with the ISSAP .....27

6 – Framework for Action .....29

7 – References .....38

8 – Annexes .....41

Annex 1. - AEWA Northern Bald Ibis International Working Group Terms of Reference.....41

Annex 2. –List of Abbreviations and Acronyms .....43

## **Preface**

The first AEWA International Single Species Action Plan for the Conservation of the Northern Bald Ibis was approved by the 3<sup>rd</sup> Session of the Meeting of the Parties to AEWA in 2005. A revision of this ISSAP led by Mr. Chris Bowden (RSPB) commenced at the 1<sup>st</sup> Meeting of the AEWA Northern Bald Ibis International Working Group in November 2012 in Jazan, Saudi Arabia. The resulting draft was circulated to the Jazan workshop participants in October 2014. The second draft was consulted with the AEWA Technical Committee in March 2015 and was submitted for formal consultation with the Range States in April 2015. The final draft was endorsed by the AEWA Standing Committee in August 2015 [and approved by the 6<sup>th</sup> Session of the Meeting of the Parties to AEWA in November 2015.]

This revised Action Plan is based on the AEWA International Single Species Action Plan for the Conservation of the Northern Bald Ibis adopted by the 3<sup>rd</sup> Meeting of the AEWA Parties in 2005, which remains and invaluable source of published information on the species:

**Jimenez Armesto, M.J., Boehm, C. & Bowden, C.G.R. (Compilers).** 2006. International Single Species Action Plan for the Conservation of the Northern Bald Ibis *Geronticus eremita*. AEWA Technical Series No. 10. Bonn, Germany.

## 0 - Executive Summary

The Northern Bald Ibis *Geronticus eremita* is classified as Critically Endangered on the IUCN Red List due to its small range and small population size. The species has undergone a serious decline over a period of hundreds of years, with a particularly sharp downturn recorded since the 1950s, attributed to a combination of habitat loss, DDT pesticide poisoning, direct persecution and disturbance. The main threats the species now faces vary in the countries where it still occurs.

Once distributed over much of North and North East Africa, central Europe and the Middle East, the Northern Bald Ibis now remains in two geographically distinct populations, which are also genetically distinct:

- **Main western population (W)**/occurs in Morocco, where the population now numbers 115 breeding pairs).
- **Main eastern population (E)**/the relict population of three pairs rediscovered in 2002 has since dwindled and by 2013 no breeding pairs apparently persisted in Syria. The wild population could now be considered extinct although a few birds still occur in the wintering area. A semi-wild population exists and is now increasing in Turkey, which constitutes a very important genetic resource for a time when reintroduction methodology has been developed further).

The main focus of this International Single Species Action Plan is the conservation of these two populations. In addition, the Action Plan takes into account released populations being established in the historic range in Europe (Spain and Austria/Germany/Italy) and how these can develop the methodology needed for future releases within the priority areas.

The Northern Bald Ibis currently occurs in 8 countries within the AEWA Agreement Area. These are referred to as Principle Range States and have the major responsibility for its implementation:

Algeria (W)	Saudi Arabia (E)
Ethiopia (E)	Syria (E)
Eritrea (E)	Turkey (E)
Morocco (W)	Yemen (E)

This plan identifies the key threats to the species as well as the key actions required to improve the conservation status of the Northern Bald Ibis in the Principle Range States. In addition, there have been incidental but very brief recent occurrences of the species in Jordan, Sudan and Djibouti. These countries have, however, not been included in this Action Plan for pragmatic reasons, although this could change for future updates.

The **AIM** of this Action Plan is to restore the Northern Bald Ibis to a favourable conservation status.

The **GOAL** is to downlist the species from the Critically Endangered category on the IUCN Red List within the ten year lifespan of the plan. The **PURPOSE** is to increase the breeding population size and range of the species. To meet this goal, the following four objectives (to be achieved by 2025) are set out in the plan:

- Objective 1:** Increase reproduction success
- Objective 2:** Reduce adult/juvenile mortality
- Objective 3:** Establish new colonies
- Objective 4:** Fill key knowledge gaps

The plan also identifies **RESULTS** and **ACTIONS** through which each objectives is to be delivered.

This plan covers the period 2016 to 2025. A revision should be undertaken in 2025. However, an emergency review can be undertaken prior to 2025 if there are any sudden major changes liable to effect either population.

The implementation of the plan will be coordinated and reviewed by the inter-governmental AEW Northern Bald Ibis International Working Group which is open to all range states and relevant stakeholder organisations.

# 1 - Biological Assessment

## 1.1. General Information

The Northern Bald Ibis or Waldrapp Ibis *Geronticus eremita* is about 70-80 cm long and weighs 1,000-1,500 g. The body is elongated with a fairly long neck. The legs are fairly long and brownish red. Head and throat are naked and deep red. The nape feathers are elongated. Juvenile birds up to two years have feathers on head and neck, which are greyish-brown and shorter than in adults.

## 1.2. Taxonomy and Biogeographic Populations

Phylum: Chordata

Class: Aves

Order: Ciconiiformes

Suborder: Ciconiae

Family: Threskiornithidae

Subfamily: Threskiornithinae

Genus: *Geronticus*

Species: *Geronticus eremita* L. 1758

The Northern Bald Ibis is a monotypic species with two genetically distinct populations having just one congeneric species in southern Africa, Southern Bald Ibis *Geronticus calvus*. The main Western population in Morocco is maintaining a relatively stable if still precariously small population, whilst for the Eastern population the situation has deteriorated further towards the brink of extinction. Meanwhile there has been significant progress over the past ten years with captive and semi-wild reintroduction trials which are showing new potential for re-establishing populations within the former range. Although there are no major morphological distinctions between the eastern and western populations, there is evidence (Pegoraro et al 2001, Broderick et al. 2001) of a genetic distinction between them, and it should be noted that the majority of the very substantial captive population, including the birds used for releases in Europe, are of Western (Moroccan) origin. A comprehensive genetic study is underway.

## 1.3 Distribution Throughout the Annual Cycle

Breeding for both Eastern and Western populations takes place from late February until early June, with egg laying from late March into April. In the non-breeding season, the eastern adult population remains in highland grassland habitats of unintensified agriculture in Ethiopia, whilst sub-adults (at least in recent times) apparently spend this time wandering within the Arabian peninsula (Saudi Arabia and Yemen) and it is possible that some may even linger further north. The remaining Western population shows some signs of dispersing south within Morocco, especially during the two months immediately following the breeding season. Although it is possible that a few may still venture outside Morocco as early records show was formerly the case, the vast majority certainly remain in Morocco in relatively close proximity to the two coastal breeding sites near Agadir.

### 1.3.1. Eastern population

Satellite tagging of birds in Syria has helped map the migration route for the Eastern population (Lindsell et al. 2009 Fig. 1) and how the birds move very quickly south in June and July, spending a few weeks in Saudi Arabia and Yemen, before crossing the Red Sea to the Ethiopian highlands in August. Juvenile and sub-adult birds appear to stop off along the same route and although information is less well substantiated, it appears that some may even remain further north, which may mean they are more exposed to higher mortality risks including illegal hunting (Serra et al 2014). It should be noted that Jordan, Eritrea and Sudan also regularly host the migrating birds but only very briefly.



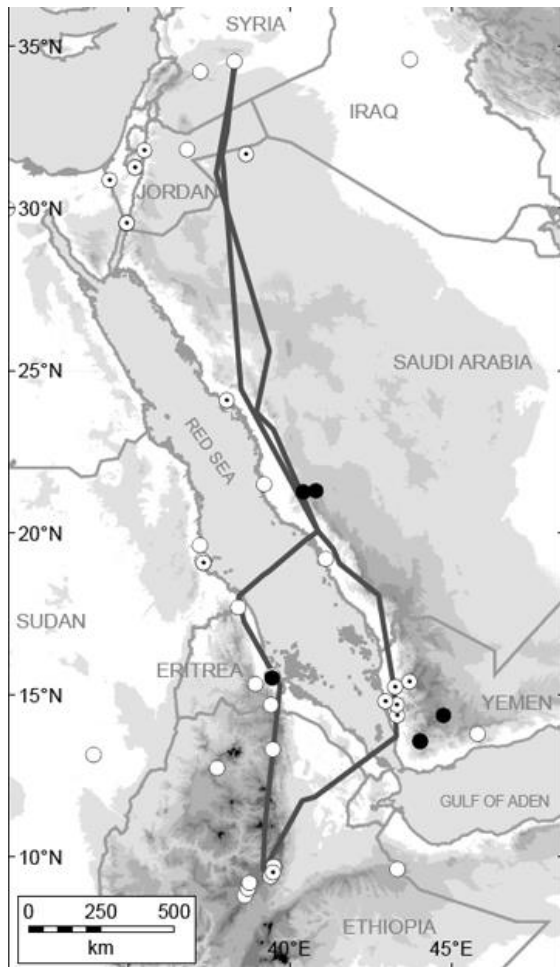


Figure 1. Migratory route of the Eastern population as it was discovered in 2006 through satellite telemetry. Autumn southward journey to the east, spring northward journey to the west, each of them being about 3200 Km long. (map from Lindsell et al. 2009)

### 1.3.2. Western population

The Western population breeds at two main sites in Morocco. Observations and preliminary tagging work has shown that birds from the Western population (in Morocco) regularly interchange between the two Moroccan breeding sites during the non-breeding period, but knowledge of juvenile post-breeding period dispersal is not yet fully understood. However, a limited number of birds do move hundreds of kilometres to the south along the coast. By February, most of the birds including immature individuals and non-breeding sub-adults visit the breeding sites, and the breeding populations mainly forage within 25km of the two main breeding sites using the steppe and un-intensive agricultural habitats within Souss-Massa National Park and the Tamri area just 100km to the north (Bowden et al. 2003).

Outside the breeding season the majority of birds still feed and roost within the boundaries of the National Park and within 20km of Tamri (Fig. 2 below from Bowden et al. 2003). Historical records strongly suggest that the now extinct populations from further north in Morocco (primarily Atlas and Middle Atlas ranges), and very probably including the small former population in Algeria, were more migratory than the two remaining colonies, and regularly wintered further south in Morocco and even as far as Mauritania and Mali. Recent studies in Europe involving descendants from the Moroccan Atlas populations, indicate that these birds are able to adapt to a migratory lifestyle (Portugal et al. 2014; Voelkl et al. (in prep.); Bairlein et al. (in prep.)).

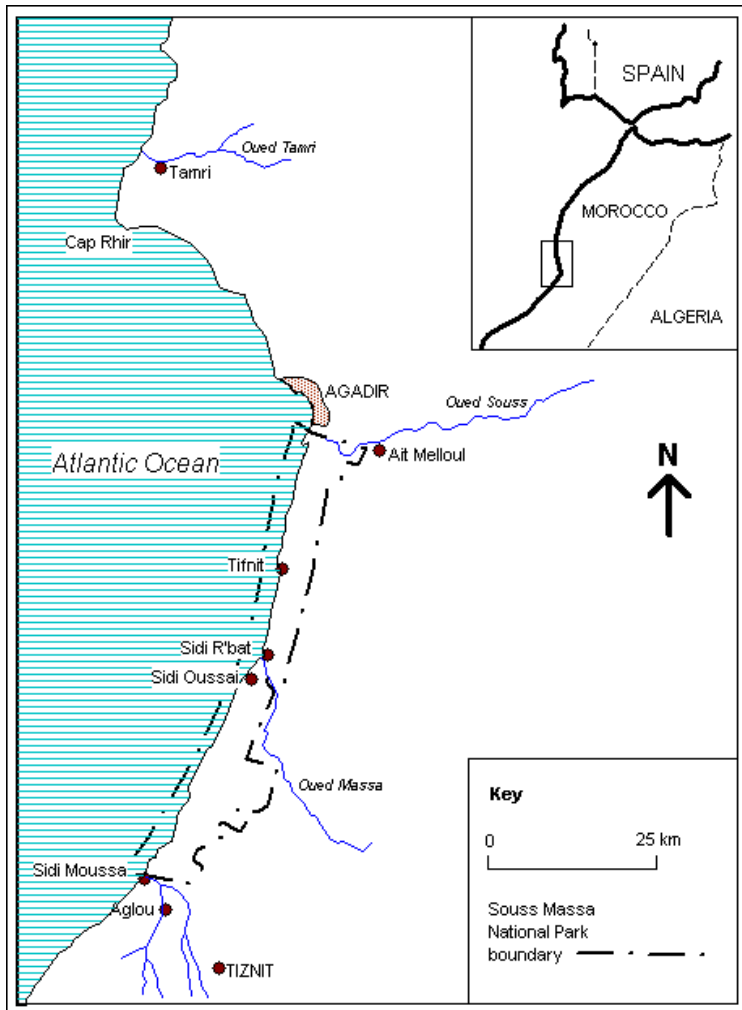


Figure 2. The two remaining Western population colonies in Morocco occur in Souss-Massa national Park and in the region of Tamri. (map from Bowden et al 2003)

## 1.4. Habitat Requirements

### 1.4.1 Breeding habitat selection and use

The general habitat of the Northern Bald Ibis during the breeding season is the combination of available cliff nesting sites in sufficiently close proximity to large areas of feeding habitat. This is generally semi-arid and rocky plains, but in close proximity (less than 15-20km) to cultivated land, steppe and meadows which it uses to forage. It is a colonial breeder and the nests of loosely constructed twigs and vegetation are placed on cliff ledges at least one metre wide which may be sea or large river cliffs and even occasionally large buildings. It will also use artificial ledges. However, the height, size and shape of the ledges are all important in terms of their safety from predators and other disturbance and also the aspect and the amount of shade provided (Pegoraro 1996). The remaining population in Morocco uses exclusively sea cliffs, (Bowden et al. 2003) whilst that in Syria uses limestone rock faces (Serra et al. 2009) – all are extremely difficult of access to humans. Note that the semi-wild population in Turkey occupy mainly artificial nest boxes as well as some rock platforms provided and a small minority on natural rock faces and caverns.

### 1.4.2 Feeding habitat selection and use including at stopover sites

The diet includes any available animal life including insects, spiders, scorpions, earthworms, snails and vertebrates such as fish, amphibians, lizards and snakes (Aghnaj et al. 2001, Serra et al. 2008), and even

occasional small rodents and small birds. It will also feed on vegetation including berries, shoots, duckweed, and rhizomes of aquatic plants (Hancock *et al.* 1992).

Feeding areas in Morocco are primarily littoral steppe, fallow areas of cultivation, and more occasionally active but un-intensively cultivated areas. Feeding areas in Syria are not dissimilar, but somewhat more degraded, usually in undulating and degraded steppe with sparse dwarf shrubland within a large drainage basin of mountain ranges (providing sheer cliffs for nesting). Probably due to advanced degree of degradation of the original feeding habitats, they rely on temporary abundance of young toads living in human-made artificial reservoirs (Serra *et al.* 2008). The altitude of the feeding areas increases through the season from spring to the summer months (Serra *et al.* 2008). The substrate of feeding areas varies enormously between soft mobile sand, through a full range of other substrates to almost entirely rocky areas if there is a temporary abundance of prey in the area, but these are all open terrain areas. Free flying birds in Central Europe use almost exclusively meadows and pastures as feeding areas (Fritz & Unsöld 2011). The birds need sufficient visibility to avoid approaching predators and also sufficiently open to allow their characteristic (often fast walking) foraging style, which is mainly tactile by probing within soft substrate, preferably soil and sand. But they are also able to hunt using optical cues on and above the substrate surface. Feeding areas during the breeding season in Morocco were always within 26km of the nesting sites, but most areas were less than half that distance (Bowden *et al.* 2003). It is important that the vegetation is either sparse and open (semi-arid areas) or not taller than 10 to 15 cm (meadows and pasture). Changes in vegetation structure and in cultivation may lead to quick abandonment of feeding areas and nesting grounds (Hirsch pers. comm.)

Little is known about the use of habitats whilst birds are on migration, although satellite tracking and surveys in the field have shown that in addition to open arid habitats they also use recent or active cultivations (Serra *et al.* 2010). GPS tracking data from the released European birds indicate that during migration they use habitats with similar characteristic to those in the breeding area, ie mainly meadows and pastures with low vegetation.

The scarcity of trees and cliffs along the Eastern migration route means that tall human-made objects including electricity pylons are often used for roosting and these present their own hazards as was demonstrated in Jordan when there was an electrocution incident of at least three birds (Serra *et al.* 2014). Also for the released European birds, electrocution along the migration route is a major cause of mortality (Fritz & Unsöld 2013). In Turkey, the semi-wild population frequently forages in the surrounding areas despite the food provisioning there. Areas used include a large tree nursery, agricultural fields, margins of the Euphrates River and areas of grassland steppe.

#### *1.4.3. Winter habitat selection and use*

In the main Moroccan breeding areas, the winter distribution is largely similar to that during the breeding season. There are some seasonal variations, and areas of littoral steppe still within the Souss-Massa National Park are used more extensively outside the breeding season, as are some otherwise more heavily disturbed and unprotected areas north of Agadir.

For the Eastern population, the satellite tracking has uncovered the main wintering grounds and the majority of the relict population has consistently returned to a very restricted area in highland Ethiopia. The birds utilise wet and dry pastures, including recently cut hayfields, in an area where human disturbance is low, but it is also notable that there is no evidence of any hunting pressures. Repeated visits have shown that the birds consistently use the same areas (mostly just 9km<sup>2</sup>) and utilise tall trees for roosting (Serra *et al.* 2013).

## 1.5. Survival and Productivity

### 1.5.1. Nest survival and causes of nest loss

The nest is a loose construction of twigs lined with smaller sticks, grass or straw. Eggs are very pale blue and weigh on average 50.1g. Clutch size averages around three but regularly varies between one and five. Incubation is 24-28 days, fledging period 40-50 days, and time to full independence varies between individuals but is usually about two months. Both parents incubate and feed the chicks. The age of maturity is three years (in captivity), but apparently even longer in the wild in some cases (Hirsch 1979). At the Moroccan colonies, 9.1% of clutches were lost during incubation and these were attributed to nest destruction by other ibis individuals and Common Ravens *Corvus corax* although there was also evidence of nocturnal predation, possibly by Pharaoh Eagle Owl *Bubo ascalaphus* and for the majority of such clutches, they simply went missing with no known cause (Bowden et al. 2008). Limited Syrian information shows similar trends and causes (Serra et al. 2009a & 2011). Clearly in the absence of wardening, human disturbance and predation has also been a major factor as wardens have prevented potentially serious disturbance and predation events both in Morocco and Syria (Bowden et al. 2008, Serra et al. 2009 a & b).

Failed clutches are only replaced by relaying eggs if the failure happens early in the season, and chick survival is much more variable and apparently mainly related to climatic conditions largely relating to food availability (see below). It was demonstrated that chick survival can be significantly improved by provision of a regular nearby water source (Smith et al. 2009).

### 1.5.2. Productivity and annual survival

Between 1994 and 2004, the reproduction rate per breeding pair has varied from 0.6 to 1.6 fledged chicks in Morocco (El Bekkay et al. 2003). Circumstances like time away from the nest when the chicks are young may have the biggest influence in the reproductive success which is largely influenced by the proximity of feeding areas and recent climatic conditions (especially rainfall) which affect the food availability, particularly the invertebrate abundance. (Bowden et al. 2003, Smith et al. 2009). Intensive round-the clock protection was certainly a factor in the production in Syria during period 2002-2004 which was 1.75 chick per nest (Serra et al. 2009).

The Northern Bald Ibis is a long lived species. In captivity, birds reach an average of 20-25 years (oldest male 37 years, oldest female 30 years (Boehm 1999). Reproduction take place when birds are two years old, however normally only if they have an experienced older partner. So many birds only start breeding at 3-5 years. Breeding is possible till the age of 26-28, even if a bird has never bred before. However peak breeding age is between 8-15 years for both sexes.

Satellite tracking revealed a particularly high mortality rate for immature birds during migration from the Syrian colony (Serra et al. 2014) and the suggestion despite the inevitably small sample that this may be driving the overall decline of that population.

## 1.6. Population Sizes and Trends

Since the beginning of the 20<sup>th</sup> century and even earlier, there have been sharp declines of both the Western and Eastern populations.

### 1.6.1. Eastern population

Former records tell of thousands of birds (19<sup>th</sup> century, Danford 1880, KUMMERLOEVE 1962); 3000 birds in Birecik 1930, down to 400 in 1982, 5 pairs in 1986, 7 in 1987 and 1 left in 1989 (Akçakaya 1990). The wild colony was declared extinct in 1992 (Akçakaya *et al.* 1992). Main cause of decline was the use of pesticides (DDT) and human disturbance in Turkey, and hunting in Syria and when on migration further south in Arabia. In 2002 there was the discovery of a relict colony in Syria, with 7 birds comprising three actively breeding

pairs (Serra et al. 2004). By 2012 however, only three birds returned from migration in spring, and although there was one welcome addition soon after, making a total of four, just the one pair laid eggs but failed to rear any young. No reinforcement was possible using Turkish birds that year, which was a great pity as failed trial releases in 2011 had shown some very promising signs that this methodology could succeed, with the released birds joining the wild ones on migration as far as southern Saudi Arabia (Bowden et al. 2011). Unfortunately, there have not been any breeding pairs subsequently recorded, despite four birds being seen at the regular Ethiopian wintering site, just one adult female returning in both 2013 and 2014 ([www.iagnbi.org](http://www.iagnbi.org)). The wild population appears therefore to be on the very brink of extinction.

### 1.6.2. Western population

The number of colonies in Morocco and Algeria has sharply declined since the early 20<sup>th</sup> century. The last colony in Algeria disappeared in the late 1980s. In Morocco, in 1940 there were still about 38 colonies, in 1975 15 and in 1989 only 3 colonies survived. Reasons for the decline were a combination of human disturbance, hunting and the use of pesticides (Collar & Stuart 1985). Since the late 1990s the population in Souss Massa NP has been stable and since 1999 increasing (Status in 2012 105 breeding pairs increasing to a recent high of 115 in 2014 (Oubrou & El Bekkay 2014). This overall positive trend has continued, and although breeding failure at Tamri in 2012 is of concern, the figure of 105 which includes pairs that failed to lay eggs is quite comparable and less alarming than the figure for pairs that laid eggs suggests. This trend does however warrant closer attention in the coming year.

**Table 1. Population size in the wild and trend by country**

Country	Number of birds	Breeding pairs	Quality	Year(s) of the estimate	Breeding population trend in the last 10 years (or 3 generations)	Quality
<i>Morocco</i>	524 (includes recent fledglings)	115 pairs	Good (Observed)	2014	Stable & Increasing	Good (Observed)
<i>Syria</i>	1 (but 4 in Ethiopia wintering site)	0 (1 bird)	Good (Observed)	2014	Declining	Good (Observed)
<b>Overall</b>	<b>528</b>	<b>115 pairs</b>		<b>2014</b>		

**Table 2. Population size of semi-wild, release trials and captive populations**

Country	Number of birds	Quality	Year(s) of the estimate	Breeding population trend in the last 10 years (or 3 generations)	Quality
<i>Turkey (semi-wild)</i>	189	Good (Observed)	2014	Increasing	Good (Observed)
<i>Turkey Zoos (captive Turkish stock)</i>	Unknown at time of writing	-	-	Unknown at time of writing	-
<i>Syria (captive Turkish stock)</i>	3	Good (Observed)	2014	N/A	Good (Observed)

<i>Austria (trial release Moroccan stock)</i>	42 (to be updated)	Good (Observed)	2012 (to be updated)	Increasing	Good (Observed)
<i>Spain (trial release-Moroccan stock)</i>	74 (12 breeding pairs)	Good (Observed)	2013	Increasing	Good (Observed)
<i>Zoos (outside Turkey) (captive Moroccan stock)</i>	c.3000  (1540 studbook registered)	Medium (Estimated)  Good (Observed) for studbook	2014	Stable/slight decrease	Good (Estimated)

Birds now within the EEP (studbook in Europe) are about 1,300 birds, and in addition there are studbooks in Japan with 120 birds and in North America with another 120 birds, all of which are Moroccan stock. These population are stable and slightly decreasing, but the level of 1200 birds is being deliberately maintained at this level since 65% of all birds are within the best breeding age of 8-15 years and genetic diversity is being managed.

Eastern stock are far fewer, with almost the entire population held in a semi-wild state at Birecik where they are free-flying for half the year and numbers are increasing with improved management. Other eastern stock are confined to very small numbers held in Turkish zoos, and three birds held in Syria.

All birds used in the release trials in Europe have been hatched and reared from the European studbook Moroccan stock.

**Table 3. Year of national, or breeding population, extinctions.**

<b>Breeding</b>	<b>Formerly breeding (date of extinction)</b>	<b>Migration (period)</b>
Morocco	1900-1989 c.50 colonies in Atlas, Middle Atlas, Atlantic coast north of Souss-Massa colonies. (Collar & Stuart 1985)	All extinct populations were apparently migratory (unlike sedentary surviving population) July-February
Algeria	1987-1990 (Fellous 2004)	Migrant. June-Feb
Turkey	1989 extinction of wild population (Arihan 1999)	Migrant Early July to mid-February
Syria	Thought extinct 1940s but one colony rediscovered 2002	Migrant Early July to mid-February
Germany	1593	Presumed to have been a summer migrant wintering further south (no data, but see Conrad Gessner 1555)
Austria	1621	Presumed to have been a summer migrant wintering further south (no data, but see Conrad Gessner 1555)

Switzerland	1535	Presumed to have been a summer migrant wintering further south (no data, but see Conrad Gessner account)
-------------	------	--

**Table 4. Current range states for the species, the ones in bold being priority in which the Action Plan should be implemented** (*countries in brackets where presence is only extremely brief so not currently of major importance*)

Breeding	Migration	Wintering	Priority Release Potential
Morocco	Saudi Arabia	Ethiopia	Turkey
Syria	Yemen	Morocco	Syria
	Eritrea	(Djibouti)	Algeria
	(Jordan)		
	(Sudan)		

## 2 - Threats

### 2.1. General Overview

The first AEWA Single Species Action Plan for the Conservation of the Northern Bald Ibis (Armesto et al 2006) identified the following critical threats:

- Illegal building - primarily on the breeding grounds in Morocco;
- Increased greenhouse crops, irrigated barley and other agricultural intensification around the breeding grounds in Morocco;
- Impact of overgrazing and firewood collection on the breeding grounds in Syria;
- Intensive poultry farming in close proximity to main roost site poses disease risks potentially affecting adult survival in Morocco.

Whilst measures have been taken specifically to reduce all of these critical threats during the lifetime of the previous plan, all four remain as serious threats to the survival of the species.

In addition, since the adoption of the previous ISSAP it has emerged that there are additional key threats mainly to the Eastern population which include:

- Illegal hunting at the breeding site in Syria but especially along the migratory route
- Electrocution (power lines and particularly poorly designed electricity pylons) along migration route and Birecik area
- Breeding habitat degradation and destruction due to overgrazing and uncontrolled infrastructure building (Syria)

These threats are exacerbated by the small population size.

The key threats to the Western population are the loss of breeding and feeding habitat through various development (both direct construction threats as well as various leisure/tourism activities that increase human visitation, hang-gliding, surfing, sightseers and birdwatchers etc), plus intensification and changes of agricultural practices, most notably horticulture and higher intensity farming practices - and the associated human disturbance at the breeding sites, but other factors like pesticide locust control in feeding areas and poultry units in close proximity to roost sites etc. are also potentially critical. The main threats for both populations as identified by the AEWA Northern Bald Ibis International Working Group are outlined in more detail below.

### 2.2 Critical and High Threats

#### 2.2.1. Hunting - Eastern population (critical)

The available evidence points to low survival rates particularly for subadult birds of the eastern population, and for hunting as a primary source of this high mortality. Hunting mortality has been indicated mainly in the Arabian Peninsula along the migration route and also in Syria (Serra et al. 2009a & 2014). The fact that subadults spend more of their time in Arabia coincides with the perception that this is where the hunting threat is greatest. There have also been hunting mortality cases from Morocco and this requires vigilance, but is a more incidental problem there, partly because the population is largely sedentary. Even the Turkish population which is not thought to have suffered significant hunting pressure at Birecik could become susceptible, particularly with the recent influx of refugees from Syria. It is however an issue that needs very serious and careful evaluation (eg by tagging birds of the Moroccan population) for any potential reintroduction areas and plans. The release programme in Central Europe has clearly demonstrated bird hunting as a major threat for establishing migratory populations. 65% of the losses during the period 2002-2012 can be assigned to illegal bird hunting in Italy during autumn migration (Fritz & Unsöld 2013).



### *2.2.2. Infrastructure development - Morocco and Syria (critical)*

Hotel and tourism developments or indeed other construction and leisure developments that directly reduce the feeding areas or indeed lead to direct disturbance of breeding or key roosting sites pose an ever increasing threat both in Morocco and Syria, as well as in Turkey. Oil prospection has been an additional pressure in Syria. Protection legislation and implementation needs increased efforts as these pressures inevitably grow, and the Tamri area which supports half the Moroccan population is particularly in need of more formal. Even within the Souss-Massa National Park these threats are still a major concern due to limitations of the legislation (Bowden et al. 2008, Serra et al. 2011).

### *2.2.3. Human disturbance at breeding sites - Eastern & Western populations (critical)*

This issue has led to the abandonment of earlier sites altogether (Hirsch 1979, Pegoraro 1996) and without adequate protection measures such as wardening and site protection in place is still a major issue in all cases. Note it may appear less of a priority where those measures are effective and already in place.

### *2.2.4. The potential for disease to spread through breeding populations - Eastern & Western populations (unknown, but potentially critical)*

The mortality incident in Morocco in 1996 (Touti et al. 1999) highlighted the risks to the population posed by disease or indeed a contaminated food or water source, exacerbated by the highly social behaviour and clustered distribution of the remaining birds. Close proximity of poultry facilities to roosting sites in Morocco pose a serious risk that could be reduced, and the concentration of almost all the remaining genetic source for eastern population at Birecik in Turkey also leaves the population highly susceptible to this unquantified but undoubtedly real risk (Cunningham 2000).

### *2.2.5. Use of locust treatments on the feeding grounds in Morocco (high, but potentially critical)*

Locusts can feature prominently in the diet and any treatments can potentially cause dramatic mortality through secondary poisoning. Use of lower toxicity pesticides and close contact between the control agencies and the National Park have apparently helped avert any major impact in 'locust years' but this requires ongoing concerted efforts (Cunningham 2000).

### *2.2.6. Expansion and intensification of agriculture and any switch to glasshouse crops - Morocco (high)*

Steppe and long-interval fallow fields are the primary feeding areas of the breeding population in Morocco, and any increase in the frequency of cultivations or more directly if such areas are covered by glasshouses and thereby effectively lost as feeding sites will have a detrimental impact on the overall habitat availability and thereby the carrying capacity (Bowden et al. 2009).

### *2.2.7. Electrocutation by powerlines and poorly designed electricity pylons - Eastern population (high)*

There is strong evidence that electrocution is a contributing factor to the high adult and sub-adult mortality for the eastern population in particular as well as in both Central Europe and Spanish release projects. Perching and roosting on pylons is known to be frequent in areas where cliffs or tall trees are not available, so along the migration route of the eastern population in particular (Serra et al. 2013). This is reinforced with data from the Central European released birds. There, electrocution is the second highest mortality cause (Fritz & Unsöld 2013). In Spain the project there suffered comparable high losses and has made major efforts to modify particular sections of pylons to help address this (Quevedo pers. comm).

## **2.3. Medium Threats**

### *2.3.1. Depleted food availability and lack of access to water (medium)*

Years with relatively high rainfall have higher productivity, and the provision of water points close to breeding sites in Morocco was demonstrated to be statistically significant in improving chick survival (Smith et al. 2008). Such measures and ensuring undisturbed access to water and adequate feeding areas are key measures.

### *2.3.2. Overgrazing and firewood collection – Syria (medium)*

Feeding areas are subject to degradation through unsustainable grazing pressure by goats as well as firewood collection. These have negative impacts on NBI prey abundance (Serra et al. 2008).

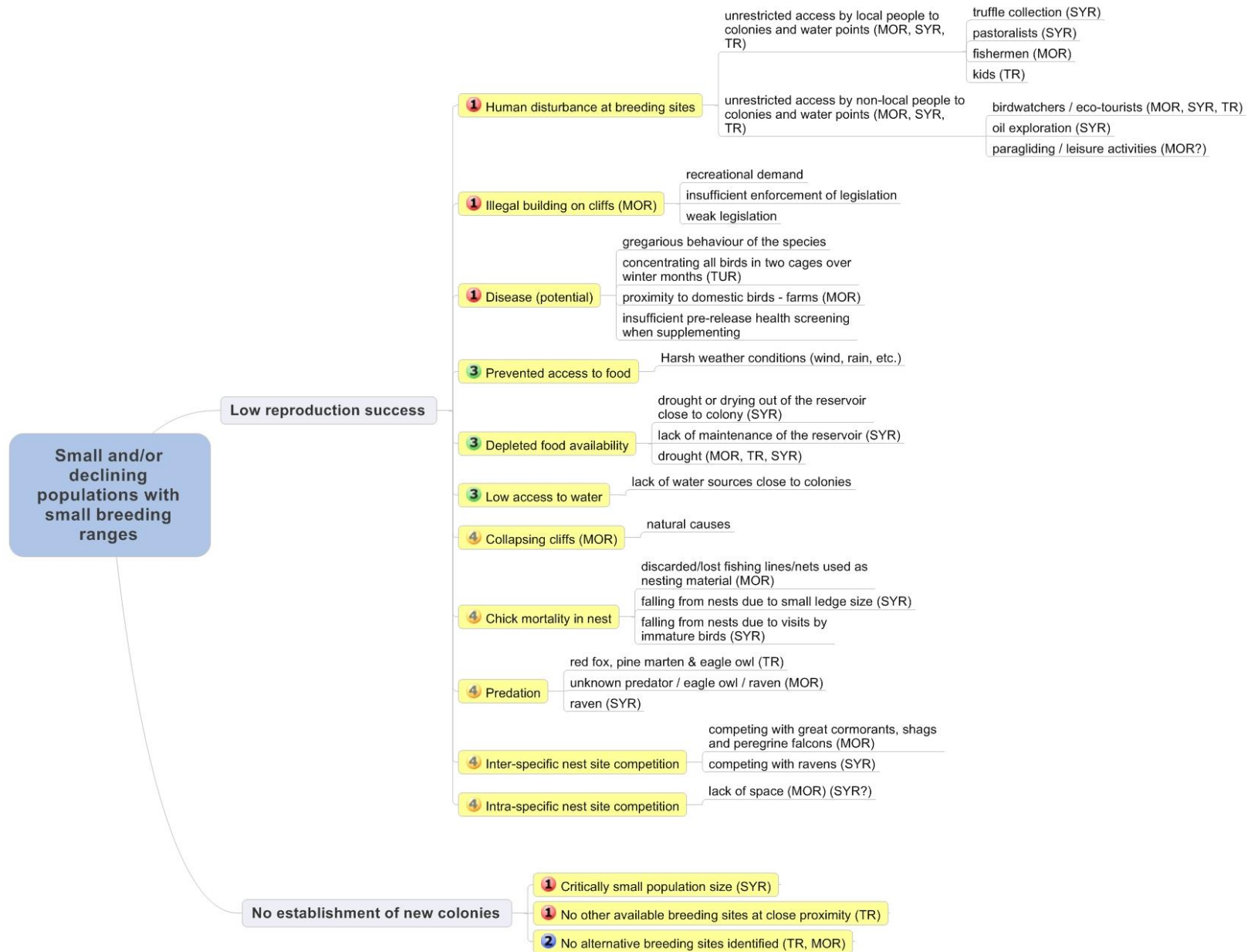


Figure 3. Problem tree analysis: Threats causing low reproduction success and no establishment of new colonies (1 = critical, 2 = high, 3 = medium, 4 = low)

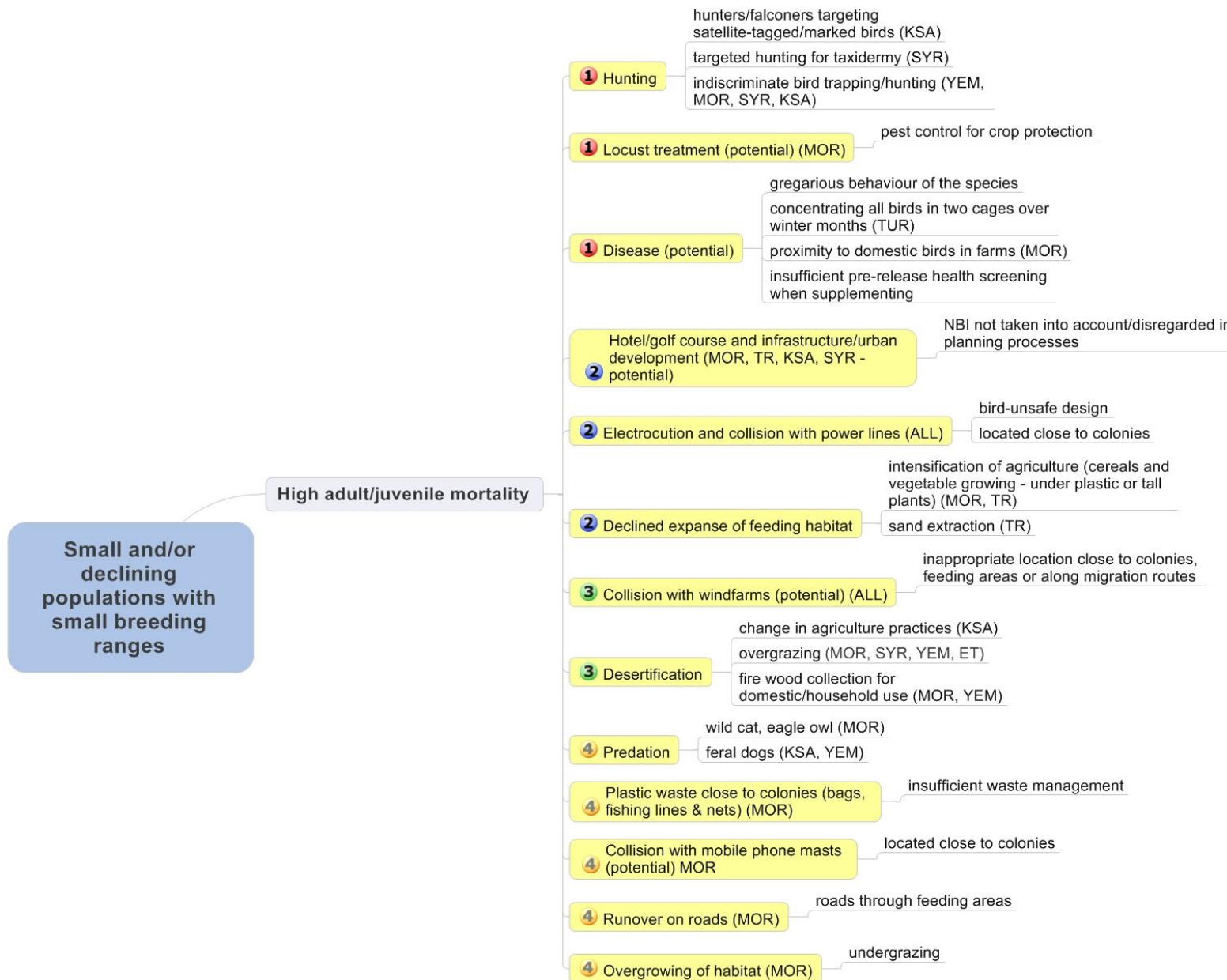


Figure 4. Problem tree analysis: Threats causing high adult / juvenile mortality (1 = critical, 2 = high, 3 = medium, 4 = low)

### 3 – Knowledge Needs

Current knowledge of the Northern Bald Ibis is limited in several areas that have crucial relevance for the successful implementation of comprehensive conservation measures.

Key areas identified by the AEWAs Northern Bald Ibis International Working Group where gaps in knowledge exist include:

- Updated local assessments of immediate threats or pressures (both human and natural) at Moroccan breeding and feeding sites (*high*)
- Population assessment system continually updated and evaluated (Morocco, Syria & Turkey) (*high*)
- The frequentation of alternative sites (including former colonies) in the region of southern Morocco and their suitability for colonisation is unknown (*high*);
- The potential for re-colonisation of former breeding sites is unknown (*high*);
- A method of managing juveniles after splitting up from migrating flock needs to be developed (*high*);
- More information is needed on the potential risk of power line collision and electrocution (*high*);
- No population viability assessment for the Western and Eastern populations is available (*medium*);
- The use of stop-over and wintering sites by birds is unknown (*medium*);
- Actual sites identified through satellite tracking need to be verified, delineated and mapped (*medium*);
- There is a lack of understanding of feeding micro-habitat selection in breeding, stop-over and wintering areas (*medium*);
- Genetic make-up and levels of inbreeding/outbreeding have yet to be determined in the Eastern (including Turkish semi-wild flock) population (*medium*);
- Juvenile dispersal in the Western population needs to be mapped (*medium*);
- The reasons for the extinction of former colonies are not yet understood and documented (*medium*);
- The possible impact of parasites and disease is unknown (*low*);
- The possible impact of windfarms is unknown (*low*).

## 4 - Policies and Legislation Relevant for Management

### 4.1. International Conservation and Legal Status of the Species

The Northern Bald Ibis *Geronticus eremita* is globally threatened, being recognized as Critically Endangered on the IUCN Red List and it is listed in Column A of Table 1 of the Action Plan under the African-Eurasian Migratory Waterbird Agreement (AEWA).

**Table 5. Summary of the international conservation designations and legal status of the Northern Bald Ibis**

Global status (IUCN Red-List) <sup>1</sup>	AEWA <sup>2</sup>	CMS <sup>3</sup>	CITES <sup>4</sup>	Bern Convention <sup>5</sup>	EU Birds Directive <sup>6</sup>
Critically Endangered (C2a(ii))	A1a, 1b & 1c	Appendix I & II	Appendix I	Yes	No

It is important to note that the international instruments mentioned here – such as the Directives of the European Union – do not apply throughout the range of the Northern Bald Ibis.

**Table 6. Applicability of major international conservation instruments to the Principal Range States for the Northern Bald Ibis<sup>7</sup>**

Principal range state	EU Member State	Beneficiary of EU European Neighbourhood Policy	Party to AEWA	Party to CMS	Party to Bern	Party to CBD	Party to Ramsar
Algeria	n/a	yes	yes	yes	n/a	yes	yes
Eritrea	n/a	no	no	yes	n/a	yes	no
Ethiopia	n/a	no	yes	yes	n/a	yes	no
Morocco	n/a	yes	yes	yes	yes	yes	yes
Saudi Arabia	n/a	no	no	yes	n/a	yes	no
Syria	n/a	yes	yes	yes	n/a	yes	yes
Turkey	no	n/a*	no	no	yes	yes	yes
Yemen	n/a	no	no	yes	n/a	yes	yes

\* Turkey is an EU candidate country, which means that it can be eligible for EU funding but not as primary proposer/benefactor.<sup>8</sup>

### 4.2 National Policies, Legislation and Ongoing Activities

The Northern Bald Ibis is legally protected across its range. However, implementation and enforcement of conservation legislation remains a main challenge. Along the migration route of the eastern population in particular (Syria, Yemen and Saudi Arabia), the enforcement of protection against hunting is one of the biggest concerns. Such issues are also present in all range states.

<sup>1</sup> 2014 IUCN red list

<sup>2</sup> [www.unep-aewa.org](http://www.unep-aewa.org)

<sup>3</sup> Migratory species that have been categorized as being in danger of extinction throughout all or a significant proportion of their range. For more details see the Convention text [www.cms.int](http://www.cms.int)

<sup>4</sup> Convention on International Trade in Endangered Species of Wild Flora and Fauna, 1973

<sup>5</sup> Convention on the Conservation of European Wildlife and Natural Habitats, Bern, 1979

<sup>6</sup> European Council Directive on the Conservation of Wild Birds (2009/147/EC 2009)

<sup>7</sup> As per information posted on the websites of the relevant treaty Secretariats in August 2014

<sup>8</sup> [http://ec.europa.eu/enlargement/countries/detailed-country-information/turkey/index\\_en.htm](http://ec.europa.eu/enlargement/countries/detailed-country-information/turkey/index_en.htm)

**Table 7. Conservation and protection status within each of the Principal Range States for the Northern Bald Ibis**

Principal range state	Conservation and formal protection status (at national level)	Remarks
<b>Algeria</b>	Listed as a highly protected threatened species under the ordinance n°06-05 of 15 July 2006 covering the protection of certain threatened animal species	This ordonnance is a high level law where the offender incurs heavy penalties such as financial sanctions and imprisonment.
<b>Eritrea</b>	<i>No information at time of writing</i>	-
<b>Ethiopia</b>	Northern Bald Ibis (Waldrapp) has a legally protected status in Ethiopia. This means that it cannot be hunted or traded. The only time it can be collected is for scientific or research ensuring the safe release of birds.  Listed under the Wildlife Development Conservation and Utilization Regulation, Council of Ministers' Regulation – ref regulation no 163/2008	Note the paucity of records over the past century has hindered conservation attention for the species. The recent regular sightings potentially provide a premise for developing conservation action including formal protection of the main site and habitats.
<b>Morocco</b>	Included in national legislation (hunting law), listed as a protected species, permitting no hunting, capture, holding in captivity, nor any egg, chick or nest destruction.  The species is also protected by law 29-05 on the protection of wild flora and fauna species regulating trade (adopted in 2011). Also by law on protected areas 22-07.	Note the legal text (29-05) is in the process of being adopted.
<b>Saudi Arabia</b>	<i>No information at time of writing</i>	-
<b>Syria</b>	High profile protection due to national and international attention since rediscovery in 2002. But in formal terms is included in the draft updated Hunting Law anticipated to be issued in 2015 together with other endangered species.	Enforcement and awareness within local community is key issue, and progress is being made.  Syrian Government recognised the beneficial role played by NBI in national agriculture through Decree n. 28 issued in 1967.
<b>Turkey</b>	Fully Protected (Land Hunting Law coded 4915)	Hunting of this species is prohibited throughout Turkey and all year round.
<b>Yemen</b>	<i>No information at time of writing</i>	-

Protection status is generally good (Table 7) and the species recognised as having importance, although it is not given significant additional priority over other less threatened species.

#### 4.3. Site and Habitat Protection

In 1991, Morocco took the major step of creating Souss-Massa National Park (33,800 ha) to protect the breeding roosting and feeding areas known at that time. For Tamri the Government has undertaken an evaluation specifically aimed to give the region formal protection status.

One major issue has been the need for stronger protection status for the Tamri area in Morocco which currently supports over half the world's wild ibis population but has only formal protection from hunting. Tamri has been

highlighted for increased protection status since the earlier action plan, but to date this has not been formally agreed or achieved.

In Syria, the area around the breeding colony including the feeding sites has been demarcated as a no hunting area, and was also proposed and recently declared a designated Protected Area for the NBI. No wide scale interference is allowed within the area. This formal protection status requires monitoring and further strengthening, especially in terms of defining the borders according to updated knowledge about bird land use, of adopting a management plan, hiring staff etc. (Serra et al. 2009b).

In Turkey 180 hectare of Birecik habitat frequented by the ibis was designated as “Wildlife Improvement Area” in 2011. The management plan has been prepared and waiting for approval

Note the regular stop-over areas along the Arabian migration route (in Saudi Arabia and Yemen) once clearly defined from tracking results may also require protection measures. The main Ethiopian wintering site is currently regarded as secure and not appropriate for formal protection status, but needs regular monitoring for potential review on this.

#### **4.4. Recent Conservation Measures and Coordination of Implementation**

##### *4.4.1. AEWA Northern Bald Ibis International Working Group*

The AEWA Northern Bald Ibis International Working Group was convened by the UNEP/AEWA Secretariat in 2012 following the earlier adoption of the first AEWA International Single Species Action Plan for the Conservation of the Northern Bald Ibis at the 3<sup>rd</sup> Meeting of the AEWA Parties in 2005. In line with the framework established for AEWA International Species Working Groups, members consist of designated government representatives and species experts from most of the eight Principle Range States, the Range States with trial releases as well as observers from international conservation organisations notably through the expertise network for the species of the International Advisory Group for Northern bald Ibis (IAGNBI). Coordination of the Working Group is currently being provided by the Royal Society for the Protection of Birds (RSPB) on behalf of BirdLife International. All meeting documents as well as final reports of the Working Group can be found on the AEWA website (<http://www.unep-aewa.org/en/workinggroup/aewa-international-species-working-groups-iswg>).

At the time of writing, a website and international workspace provided by the UNEP/AEWA Secretariat for all Species Working Groups was in development to facilitate the inter-sessional communication between Working Group members and to communicate the activities of the Working Group to the wider conservation community. For up-to-date information on Working Group activities, please visit the Working Group website (<http://northernbaldibis.aewa.info>).

##### *4.4.2. Recent conservation projects*

Ongoing monitoring and some related awareness and rural development work has taken place at both of the project areas in Morocco and Syria. The monitoring is mentioned below, and in addition some preliminary satellite tagging work has been carried out in Morocco.

In Morocco, monitoring especially at the breeding and roosting sites has continued and this reinforced the success of the conservation measures taken up over recent years. Awareness rising by the locally appointed wardens and the Souss-Massa National Park team, together with socioeconomic projects implemented are delivering positive results, in the form of respect and cooperation for the breeding, roosting and feeding areas. The latest rural development project finished in 2010 and included several aspects regarding beekeeping, fisheries and ecotourism.

One project is ongoing to clean and improve the quality of the colonies’ ledges to facilitate further occupation by the birds in sites where disturbance is well controlled. Throughout 2015 surveys are planned to check potential roosting sites for a group of ibis frequently seen to the north of the currently monitored area. One bird is also being monitored through satellite tracking since 2011, giving detailed information on its movements.



In Syria, three conservation projects, under different leadership (FAO, BirdLife and IUCN), were run between 2002 and 2010. Low-level wardening has continued sporadically despite the challenges of more recent civil unrest, and several workshops were held by SSCW in cooperation with MAAR-GCB with support from BirdLife International and RSPB. These were to assess and inform stakeholders on the updated status of the NBI population in Syria and to highlight the national Hunting Regulations and the need to update these laws for the benefit of endangered species (including Sociable Lapwing) and wildlife in general.

A reinforcement attempt was made in Syria in 2010 involving an immensely diverse set of partners, and although ultimately unsuccessful it showed very promising indications that such an initiative could well work in future (Bowden et al. 2012).

Further trial releases of small numbers of birds (2007 (4), 2008 (4), 2009 (4), 2011(4), 2013 (7) so in total 23) have taken place from Birecik, Turkey, with most birds being tagged or satellite tagged. Again these have not been successful further indicating very high mortality rates soon after release in Syria/northern Saudi Arabia (Serra et al. 2014, [www.IAGNBI.org](http://www.IAGNBI.org) website).

In Turkey reproductive success has been monitored each year since 2005. A three year study on foraging behaviour, examining the relative dependence on artificial (food provided) and natural foraging, the key sites for natural foraging during the breeding season has just been completed and the results are being compiled. For identified immediate threats, measures have already been taken. Public awareness activities targeting locals, particularly farmers, is an ongoing activity for future years, focusing on the ecological importance of the species and the negative effects of using pesticides.

Because the profile of Northern Bald Ibis has remained relatively low, particularly in Morocco which ironically holds the main wild population, there is limited political support for prioritising the key actions required. Awareness-raising in Turkey had important impact, the species being more familiar to a wider audience there than elsewhere, and means that actions for the species are more likely to receive support. There have been some recent initiatives and television documentaries in Morocco but clearly more is needed and this will have a very important long-term impact.

Finally, the International Advisory Group for Northern Bald Ibis (IAGNBI [www.iagnbi.org](http://www.iagnbi.org)) which was established in 1999 has continued to provide a network of the key partners involved in work for the species, and provides a web presence that informs enquiries on the wider situation and all major ongoing work. This virtual group last held a formal three day meeting in 2009 in Syria but has continued to provide a channel of contact between the interested parties. It provides an established body of the key expertise that is available to the International Working Group for the species.

#### *4.4.3. Monitoring*

Regular and intensive monitoring is carried out at the breeding and key roosting sites in Morocco by a team of locally based wardens. Their work is managed and coordinated by the staff of the Souss-Massa National Park in conjunction with support from GREPOM, a national NGO together with SEO/BirdLife. Wardens are present at all colonies throughout the breeding season, and at key roost sites and feeding area within Souss-Massa NP and Tamri, throughout the year, despite an ongoing need to formalise and secure their employment status. Summaries are produced annually from the information collected.

In Syria, a small team of wardens continues to function despite the difficult working conditions in the country, and this work is carried out through the General Badia Commission (GBC) with input from both the Syrian Society for Wildlife Conservation (SSCW) and the BirdLife Middle East office with RSPB support. Only brief summary reports are possible from this scaled down work. In Ethiopia, an annual visit is made to the wintering site supported by RSPB, but carried out by experienced Ethiopian Wildlife and Natural History Society staff.

In Turkey, the semi-wild population is funded and managed by the Turkish Forest and Wildlife Ministry but has recently been closely and thoroughly monitored by staff of Doga Dernegi (BirdLife Turkey). Information from the recent monitoring is compiled and will be published and otherwise made available.

#### **4.5. The Potential Role for Reintroduction**

Although early reintroduction work encountered major problems and limitations (eg Mendelssohn 1994, Pegoraro 1996), many of these issues have been subsequently overcome by using a combination of initial hand-rearing and imprinting on humans followed by a progression of soft release techniques. So despite several early setbacks, there are now established methodologies available for the re-establishment of sedentary populations (Kotrschal 2001) and there are very encouraging signs of these being adapted in Spain, and even methodology for re-establishing migratory populations in central Europe are being developed.

The work at Gruenau in Austria showed that the combination of intensive hand rearing/imprinting, exposure of the birds to a variety of terrains can with care lead to maintaining a stable social structure. An important element was the enclosure of the birds during the pre-migration period (ten weeks is sufficient, and only required for the first 2-3 years) which is effective for establishing the population, during which time and subsequently the human involvement can be gradually reduced. The major issue in Austria is that the birds cannot survive the winter on site and so food provisioning and enclosure is necessary through the winter.

More recent attention has focused on simplifying and reducing costs in the lengthy methodology in Spain (Quevedo pers. comm.) and also the on addressing the significantly greater challenges involved in establishing a migratory population (Fritz pers. comm.). In both cases, major headway has been made in developing methodology and techniques. Free-flying birds are now breeding in the wild in both cases.

In summary, with the significant progress over the past five to ten years, conservation translocation and especially reintroduction has become a serious option to consider among the potential ways to re-establish or increase the overall population of the species in the wild. It was agreed during the 1st meeting of the AEWA NBI IWG (November 2012, Jazan, Saudi Arabia) that Algeria should be the higher priority for a reintroduction programme for the western population, being further from the existing wild population but in areas that have held birds relatively recently (within the past 25 years). Turkey was considered the next priority or possibly further south (either Syria or possibly elsewhere within the Arabian peninsula, e.g. further south along the flyway of the Syrian population) for reintroduction or reinforcement of the eastern population, but again subject to further evaluation in both cases, with reference to the AEWA Translocation Guidelines, expert opinion and other practical considerations.

## **5 - Ongoing Translocation Projects and their Potential Association with the ISSAP**

The two main European release projects in central Europe and Spain respectively have developed independently of the AEWA process and strategic planning. Their aims are to create self-sustaining populations, and the EU LIFE+ project (cf. 5.2 below) also has important elements to evaluate the genetics of captive populations which has so far developed primers and should produce published outputs in the near future.

Early soft release trials using captive stock encountered major problems (Pegoraro 2003, Mendelssohn 1994), having no success in establishing birds in a wild state despite multiple trials. This highlighted the fact that translocation and releases required major advances before they could be regarded as a useful tool for the reestablishment of populations into the wild. Earlier action plans and red data book accounts have therefore not considered translocation to be a priority action, instead putting emphasis on *in situ* actions and to a lesser extent on the development of translocation methodology.

Since the development of the 2005 Action Plan there have been some significant advances in this area, and two projects have taken the initiative in the process of developing release methodology, which later converted into full translocation programmes. This has been done outside the prioritised action-planning process, and before these can be incorporated, there is a need to systematically review the projects with their objectives, justifications and implementation against the AEWA criteria.

### **5.1 Translocation project in Spain**

The Spanish project ‘Proyecto eremita’ started in 2003 and has been mainly supported by the Andalusian Government although it comprises multiple partners. Early testing of techniques including cross-fostering with Cattle Egrets but evolved into less intensive hand-rearing methodology than the Austrian techniques, but using ‘characterised hand-rearing’ by a larger team of human foster parents wearing characteristic clothing and headgear. Although a larger proportion of birds was lost than in Austria, it has ultimately been successful in establishing an essentially sedentary population. There is now an independent non-migratory colony of 14 breeding pairs that is becoming well-established in the area, mainly at one location within 40km of the release site. The project is currently running at a low and un-intensive level of mainly monitoring although supplementation has still been continued each year. Problems of electrocution (caused by poor pylon design), wider dispersal, rat nest-predation as well as other losses have been addressed in specific areas, and the birds are now thought to be close to being self-sustaining.

### **5.2 Translocation project for a migratory population breeding in Austria**

The European EU LIFE+ project (LIFE+12-BIO\_AT\_000143) has developed from a 12-year feasibility study which has established a small migratory breeding colony in Austria. Since 2011, up to 30 birds independently migrate between breeding sites north of the Alps and a wintering site in southern Tuscany, Italy. They breed regularly and lead juveniles to the wintering area usually without human intervention in more recent years. All birds are GPS tracked to follow their movements. The major objective of the EU LIFE+ project is the reintroduction of a self-sustaining, migratory NBI population in central Europe and more specifically the establishment of three breeding colonies north of the Alps (120+ individuals) by the end of 2019. Further major objectives are (1) the development of methodology for the reintroduction of migratory populations, (2) a sustainable reduction of illegal hunting in Italy, (3) extensive veterinary screening of the released population, (4) development of genetic markers and detailed NBI genetics study to optimize the genetic variability of the zoo breeding stock and for release, and (5) basic science on aspects of birds flight and birds migration. The project has a large team involved and the outputs from this work attract significant media profile, and are constantly updated on websites as well as through a series of publications.

Both projects have been developed outside the AEWA framework and processes and without prior strategic agreement that these locations represent the priority or preferred locations. Neither was initiated as a reintroduction project although both have undoubtedly progressed highly relevant methodologies and full publication of these methodological advances will be an important contribution. Before they can be considered for full association with this ISSAP, it seems appropriate to undertake an AEWA-led review of their objectives, justification and status, and utilise the criteria laid out in the AEWA guidelines on translocation to do so.

With the above points in mind, the key actions required are as follows:

- Establish a detailed scientific record of the release methodologies used in successful (and unsuccessful) cases;
- (Ongoing) monitoring of released populations including satellite tracking or similar;
- Detailed assessment of the self-sustainability of trial populations and carry out regular reviews of documentation of methodology and potential lessons for use in main flyways and with reference to the AEWA Translocation Guidelines.

The results of these actions will be assessed, amongst other things, before deciding on the association of these projects to a future form of this ISSAP.

## 6 – Framework for Action

**GOAL:** Restore the Northern Bald Ibis to a favourable conservation status.

INDICATOR	MEANS OF VERIFICATION
Downlist the species from the globally threatened categories on the IUCN Red List and from Column A, Category 1 of the AEWA Table 1	IUCN Red List and related discussion forums; AEWA Table 1

**PURPOSE:** Increase population size and breeding range in the wild by 2025.

INDICATOR	MEANS OF VERIFICATION
Two new colonies (of 5 or more pairs each) established away from current breeding sites in Morocco or other former sites, and Moroccan population continuing to increase to 700 individuals	Reports and publications from Morocco, Turkey, Syria, Algeria

Four **OBJECTIVES** have been identified to deliver the goal:

- Objective 1:** Increase reproduction success;
- Objective 2:** Reduce adult/juvenile mortality;
- Objective 3:** Establish new colonies;
- Objective 4:** Fill key knowledge gaps.

For each Objective a number of related **RESULTS** have been identified, which are to be achieved through the implementation of specific **ACTIONS**, which address the identified key threats (Tables 7-10 below). Actions should be implemented in all range states and significant progress should be made on all activities by 2025 unless otherwise indicated. It should be noted that the prioritization of activities will not be equally applicable to all range states.

The main focus of this International Single Species Action Plan is on the conservation of the remaining wild and semi-wild Western and Eastern populations. Range states are encouraged to adopt National Action Plans for the species, which should incorporate the relevant results and actions outlined in this plan. The AEWA Northern Bald Ibis International Working Group will provide further coordination and assist range states with the implementation of the plan as well as assess implementation progress based on information provided by the range states.

## ACTIONS

**Table 8. Objective 1: Increase reproduction success**

**INDICATOR:** *Breeding productivity figures above 1.2 chicks fledged per breeding pair in each colony (including semi-wild Turkish population)*

**VERIFICATION:** *Monitoring, field survey and project reports, National Reports submitted to meetings of the AEWA Northern Bald Ibis International Working Group, Papers published in peer reviewed scientific journals.*

[Timescales: **Immediate:** Initiated by 2016; **Short:** 2017-18; **Medium:** By 2020; **Long:** By 2022-25]

Result	Action	Priority	Timescale	Organisations
<b>1.1. Chick mortality on nest is minimised</b>	1.1.1. Prevent human disturbance and incidental nest destruction by predators such as ravens through close monitoring  Applicable: <b>Morocco, Syria &amp; Turkey</b>	High	Ongoing	Haut Commissariat aux Eaux et Forêt et à la lutte Contre la Désertification (HCEFLCD), GREPOM General Badia Commission (GBC) Ministry of Forestry and Water Affairs
	1.1.2. Collect discarded/lost fishing lines and nets around colonies  Applicable: <b>Morocco</b>	Medium	Ongoing	HCEFLCD, GREPOM
	1.1.3. Increase awareness amongst fishermen  Applicable: <b>Morocco</b>	Medium	Ongoing	HCEFLCD, GREPOM
	1.1.4. Provide (safe) nesting material around colonies  Applicable: <b>Morocco, Syria</b>	Medium	Immediate	HCEFLCD, GREPOM General Badia Commission (GBC)
	1.1.5. Improve nesting ledges if Syrian population increases  Applicable: <b>Syria</b>	High	As needed	General Badia Commission (GBC)
<b>1.2. Food availability is increased</b>	1.2.1. Maintain the reservoir in proximity of the colony  Applicable: <b>Syria</b>	High	Ongoing	General Badia Commission (GBC)
	1.2.2. Establish food availability monitoring and alarm system for cases of drought  Applicable: <b>Morocco, Syria</b>	High	Short- by 2017	HCEFLCD, GREPOM
<b>1.3. Improved access to water</b>	1.3.1. Maintain supply of fresh water at waterholes close to colonies  Applicable: <b>Morocco</b>	Medium	Ongoing	HCEFLCD, GREPOM
	1.3.2. Establish emergency water ponds for cases of drought	High	Ongoing	General Badia Commission (GBC)

	Applicable: <b>Syria</b>			
<b>1.4. Catastrophic impact of diseases prevented</b>	1.4.1. Maintain regular monitoring and hygiene protocol  Applicable: <b>Turkey</b>	High	Immediate	Ministry of Forestry and Water Affairs
	1.4.2. Create new semi-wild population away from Birecik  Applicable: <b>Turkey</b>	High	Immediate	Ministry of Forestry and Water Affairs
	1.4.3. Establish disease emergency response system  Applicable: <b>Morocco, Turkey</b>	High	Immediate	HCEFLCD, GREPOM  Ministry of Forestry and Water Affairs
	1.4.4. Raise awareness among domestic bird farmers  Applicable <b>Morocco</b>	High	Medium – by 2016	HCEFLCD, GREPOM
	1.4.5. Enforce protocols for carcass and waste removal from domestic bird farms in case of outbreaks  Applicable: <b>Morocco</b>	High	Medium	Relevant state authorities
	1.4.6. Apply stringent health control and screening of captive birds prior to conservation translocation  Applicable: <b>ALL</b>	High	As needed	Government institutions in charge of nature conservation in collaboration with NBI experts and relevant stakeholders
<b>1.5. Reduced intra-specific competition for nesting sites</b>	1.5.1. Enlarge and improve nesting ledges  Applicable: <b>Morocco</b>	High	Immediate	HCEFLCD, GREPOM
	1.5.2. Test and establish artificial ledges  Applicable: <b>Morocco</b>	High	Immediate	HCEFLCD, GREPOM
<b>1.6. Human disturbance is minimised</b>	1.6.1. Maintain and improve wardening in the colonies  Applicable: <b>Morocco, Syria</b>	Essential	Ongoing	HCEFLCD, GREPOM General Badia Commission (GBC)
	1.6.2. Increase awareness amongst local people and visitors  Applicable: <b>Morocco, Syria</b>	High	Ongoing	HCEFLCD, GREPOM General Badia Commission (GBC), Syrian Society for the Conservation of Wildlife (SSCW)
	1.6.3. Provide alternative water sources for pastoralists  Applicable: <b>Syria</b>	Medium	Medium	General Badia Commission (GBC)
	1.6.4. Manage access by pastoralists to existing water sources  Applicable: <b>Syria</b>	Medium	Short	General Badia Commission (GBC)

	1.6.5. Designate all colonies as protected  Applicable: <b>Morocco, Syria, Turkey</b>	Essential	Medium	HCEFLCD General Badia Commission (GBC))- Ministry of Agriculture and Agrarian Reform (MAAR) Ministry of Forestry and Water Affairs
	1.6.6. Develop and implement management plans for the protected areas  Applicable: <b>Morocco, Syria, Turkey</b>	Essential	Medium	HCEFLCD General Badia Commission (GBC))- Ministry of Agriculture and Agrarian Reform (MAAR)Ministry of Forestry and Water Affairs
<b>1.7. Predation is minimised</b>	1.7.1. Monitor predation levels  Applicable: <b>Morocco, Syria</b>	Essential	Immediate/ Short	HCEFLCD General Badia Commission (GBC)
	1.7.2. Undertake predation control measures when necessary  Applicable: <b>Morocco, Syria</b>	Essential	As needed	HCEFLCD General Badia Commission (GBC)
<b>1.8. Problematic buildings on cliffs are removed and new ones prevented</b>	1.8.1. Strengthen enforcement of legislation, also through the involvement of other authorities than NP  Applicable: <b>Morocco</b>	Essential	Ongoing	HCEFLCD, Relevant state authorities
<b>1.9. Impact of collapse of breeding cliffs is minimised</b>	1.9.1. Evaluate possibility of improving current roosting sites as potential new breeding sites Applicable: <b>Morocco</b>	Medium	Medium	HCEFLCD, GREPOM

**Table 9. Objective 2: Reduce adult/juvenile mortality**

**INDICATOR:** *No reports of mortality caused by human-induced factors*

**VERIFICATION:** *Monitoring, field survey and project reports, National Reports submitted to meetings of the AEWA Northern Bald Ibis International Working Group, Papers published in peer reviewed scientific journals.*

[Timescales: **Immediate:** Initiated by 2016; **Short:** 2017-18; **Medium:** By 2020; **Long:** By 2022-25]

Result	Action	Priority	Timescale	Organisations
<b>2.1. Impact of locust treatment is prevented</b>	2.1.1. Continue work with locust control unit to avoid toxic treatment within Souss Massa NP  Applicable: <b>Morocco</b>	Essential	Ongoing	HCEFLCD
<b>2.2. Illegal killing and trapping is minimised</b>	2.2.1. Raise awareness among hunter/falconers on satellite tagging and NBI conservation  Applicable: <b>Saudi Arabia</b>	High	Ongoing	Saudi Wildlife Authority
	2.2.2. Reduce visibility of satellite tags through way of attachment  Applicable: <b>ALL</b>	High	Ongoing	Project teams



	2.2.3. Raise awareness among hunters/trappers and/or general public on NBI in key areas, where needed  Applicable: <b>ALL</b>	Essential	Short	Relevant state authorities
<b>2.3. Risk of electrocution and collision with power lines is minimised</b>	2.3.1. Identify critical and dangerous power lines around known key sites  Applicable: <b>ALL</b>	High	Short	Relevant state authorities
	2.3.2. Retrofit design or put dangerous sections of power lines underground  Applicable: <b>ALL</b>	High	Long	Relevant state authorities
	2.3.3. Take NBI into account in SEA/EIA procedures for new power lines (possible re-routing) around key areas  Applicable: <b>ALL</b>	High	Ongoing	Relevant state authorities
	2.3.4. Introduce bird safe standards into national regulations  Applicable: <b>ALL</b>	Medium	Long	Relevant state authorities
<b>2.4. Establishment of windfarms close to key sites is avoided</b>	2.4.1. Exclude NBI key areas from renewable energy development  Applicable: <b>ALL</b>	High	Short	Relevant state authorities
	2.4.2. take NBI into account in SEA/EIA procedures for windfarms (possible re-location) around key areas  Applicable: <b>ALL</b>	High	Ongoing/ As needed	Relevant state authorities
<b>2.5. Survival chance of dispersing juveniles is increased</b>	2.5.1. Identify feeding and roosting sites outside Souss-Massa/Tamri and assess their status  Applicable: <b>Morocco</b>	Essential	Short	HCEFLCD, GREPOM
	2.5.2. Put conservation measures in place as necessary  Applicable: <b>Morocco</b>	Essential	Medium	HCEFLCD
<b>2.6. Decline in area of feeding habitat is minimised</b>	2.6.1. Monitor and control sand extraction activities; enforce existing legislation  Applicable: <b>Turkey</b>	Medium	Ongoing	Ministry of Forestry and Water Affairs
	2.6.2. Promote NBI friendly crop pattern, e.g. by subsidising  Applicable: <b>Morocco, Turkey</b>	Essential	Medium	HCEFLCD Ministry of Forestry and Water Affairs NGOs
	2.6.3. Promotion of low-input crops  Applicable: <b>Morocco, Turkey</b>	Essential	Medium	HCEFLCD, Relevant state authorities Ministry of Forestry and Water Affairs

				NGOs
	2.6.4. Promote eco-friendly source of income  Applicable: <b>Morocco, Turkey</b>	Essential	Short	HCEFLCD, GREPOM Ministry of Forestry and Water Affairs NGOs
	2.6.5. Promote NBI-based tourism for direct benefit to local community  Applicable: <b>Morocco, Turkey</b>	Essential	Short	HCEFLCD, GREPOM Ministry of Forestry and Water Affairs NGOs
<b>2.7. Habitat loss/degradation due to infrastructure/urban development is minimised</b>	2.7.1. NBI areas taken into account in physical planning and SEA/EIA procedures  Applicable: <b>ALL</b>	Essential	Ongoing	Relevant state authorities
<b>2.8. Desertification of habitat in key areas is prevented or mitigated</b>	2.8.1. Regulate agriculture activities in key areas  Applicable: <b>Saudi Arabia</b>	Medium	Medium / Long	Saudi Wildlife Authority
	2.8.2. Regulate grazing in key areas (through promotion of sustainable practices with local communities)  Applicable: <b>Ethiopia, Morocco, Syria, Yemen</b>	High	Medium	Relevant state authorities
	2.8.3. Support provision of alternative sources of energy (gas, solar, etc.) and improve energy use efficiency  Applicable: <b>Syria, Morocco</b>	High	Long	Relevant state authorities
	2.8.4. Enforce environmental regulations on charcoal production  Applicable: <b>Yemen</b>	Medium	Ongoing	State authority
	2.8.5. Identify degraded habitats in key areas and restore them  Applicable: <b>ALL</b>	Medium	Long	Relevant state authorities

**Table 10. Objective 3: Establish new colonies**

**INDICATOR:** *One site away from Souss-Massa colonised in Morocco, a population established in Algeria, and a semi-wild population established away from Birecik in Turkey.*

**VERIFICATION:** *Monitoring, field survey and project reports, National Reports submitted to meetings of the AEWA Northern Bald Ibis International Working Group, Papers published in peer reviewed scientific journals.*

[**Timescales: Immediate:** Initiated by 2016; **Short:** 2017-18; **Medium:** By 2020; **Long:** By 2022-25]

Result	Action	Priority	Timescale	Organisations
<b>3.1. Eastern population increased 5-fold</b>	3.1.1. Develop project for further reinforcement of the Syrian population and implement it	Essential	Immediate	Relevant state authorities

	Applicable: <b>Syria, Turkey</b>			
<b>3.2. Semi-wild population in Birecik is maintained at a minimum of 150 birds</b>	3.2.1. Continue the conservation programme in Birecik  Applicable: <b>Turkey</b>	Essential	Ongoing	Ministry of Forestry and Water Affairs
<b>3.3. A wild migratory population is established in Birecik</b>	3.3.1. Further releases from Birecik  Applicable: <b>Turkey</b>	High	Ongoing	Ministry of Forestry and Water Affairs
<b>3.4. Semi-wild population established at a second site in Turkey (ideally in area compatible with 3.5)</b>	3.4.1. Identify potential areas and undertake feasibility studies and risk assessments  Applicable: <b>Turkey</b>	High	Short	Ministry of Forestry and Water Affairs
<b>3.5. A wild population is established away from Birecik</b>	3.5.1. Identify potential areas for reintroduction and undertake feasibility studies and risk assessments  Applicable: <b>Turkey</b>	High	Short	Ministry of Forestry and Water Affairs
	3.5.2. Implement reintroduction upon positive conclusions from feasibility studies and risk assessments  Applicable: <b>Turkey</b>	High	Long	Ministry of Forestry and Water Affairs
<b>3.6. Sites away from Souss-Massa/Tamri are re-colonised/colonised</b>	3.6.1. Monitor and assess potential/feasibility of roosting/former colony sites which are visited by birds  Applicable: <b>Morocco</b>	Essential	Short	HCEFLCD, GREPOM
	3.6.2. Improve conditions in the most favourably assessed sites to attract breeders  Applicable: <b>Morocco</b>	Essential	Medium	HCEFLCD, GREPOM
<b>3.7. A population is re-established in Algeria</b>	3.7.1. Identify potential areas for reintroduction, including possible wintering areas and undertake feasibility studies and risk assessments  Applicable: <b>Algeria</b>	Medium	Short	Relevant state authorities Researchers
	3.7.2. Implement reintroduction upon positive conclusions of the feasibility studies and risk assessments  Applicable: <b>Algeria</b>	Medium	Medium/Long	Relevant state authorities

**Table 11. Objective 4: Fill key knowledge gaps**

**INDICATOR:** *High priority knowledge gaps are filled by 2018 and medium priority gaps filled by 2025.*

**VERIFICATION:** *Monitoring, field survey and project reports, National Reports submitted to meetings of the AEWA Northern Bald Ibis International Working Group, Papers published in peer reviewed scientific journals.*

[Timescales: **Immediate:** Initiated by 2016; **Short:** 2017-18; **Medium:** By 2020; **Long:** By 2022-25]

Result	Action	Priority	Timescale	Organisations
<b>4.1. Use of dispersal sites and suitability for colonisation as breeding sites is identified</b>	4.1.1. Assess suitability of nesting and feeding areas  Applicable: <b>Morocco</b>	High	2018	HCEFLCD, GREPOM
<b>4.2. Potential for re-colonisation of former breeding sites is identified</b>	4.2.1. Assess suitability of nesting and feeding areas  Applicable: <b>Morocco</b>	High	2018	HCEFLCD, GREPOM, SEO
<b>4.3. A method of managing juveniles after split up from migrating flock is developed</b>	4.3.1. Undertake trial with experimental flock  Applicable: <b>All</b>	High	2018	LIFE+ project team
<b>4.4. Population viability assessment for both Western and Eastern populations is available</b>	4.4.1. Run and publish population viability assessment  Applicable: <b>ALL</b>	Medium	2025	IUCN SSC CBSG (Conservation Breeding)
<b>4.5. Use of stop-over and wintering sites by birds is determined</b>	4.5.1. Undertake field surveys  Applicable: <b>ALL</b>	Medium	2025	LIFE+ project team
<b>4.6. Actual sites identified through satellite tracking have been verified on the grounds, delineated and mapped</b>	4.6.1. Undertake field work and mapping  Applicable: [ <b>Turkey</b> ]	Medium	2025	Ministry of Forestry and Water Affairs
<b>4.7. Feeding micro-habitat selection in breeding, stop-over and wintering areas understood</b>	4.7.1. Undertake studies  Applicable: <b>ALL</b>	Medium	2025	Ministry of Forestry and Water Affairs (Turkey) LIFE+ project team
<b>4.8. Genetic make-up and levels of inbreeding/outbreeding have been determined in Syrian and Turkish populations</b>	4.8.1. Collect samples at any possible occasion  Applicable: <b>all Eastern population range states</b>	Medium	2025	LIFE+ project team
	4.8.2. Undertake genetic analysis and publish results  Applicable: : <b>all Eastern population range states</b>	Medium	2025	LIFE+ project team
<b>4.9. Juvenile dispersal in Moroccan population is mapped</b>	4.9.1. Satellite telemetry study  Applicable: <b>Morocco</b>	Medium	2025	HCEFLCD, GREPOM Researchers

	4.9.2. Ground verification Applicable: <b>Morocco</b> ,	Medium	2025	HCEFLCD, GREPOM Researchers
<b>4.10. Potential risk of power line collision and electrocution is understood</b>	4.10.1. Undertake assessment of risks through monitoring Applicable: <b>ALL</b>	Medium	2025	Relevant state authorities and research agencies
<b>4.11. Reasons for extinction of former colonies are understood and documented</b>	4.11.1. Design and undertake study Applicable: <b>Morocco</b>	Medium	2025	To be designated by HCEFLCD

## Awareness and Communications Work

Despite the extreme rarity, distinctiveness, historical and cultural significance of this species, NBI has a distinctly low profile particularly in the main country (Morocco) where it persists in a natural state. There have been some recent initiatives to try to improve this through television documentaries, local environmental education program initiatives in Souss-Massa NP targeting young people through posters/brochures etc, and it is very notable how the revival of former traditions in Turkey and a major publicity campaign by WWF over thirty years ago in that country have had major impacts which remain today. The increased familiarisation has improved public interest and this higher profile results both in better responsiveness of the relevant authorities to implementing actions for the species, as well as more potential funding and support opportunities from within the country.

A species having a low profile may not qualify as an overt threat and cannot be treated as such, but this does not mean it shouldn't receive priority action and attention. Steps to seek and revive local cultural values of the bird, and to produce publications including books and brochures as well as running carefully managed awareness events (often targeting children) are the types of activity that have been successful elsewhere. It is not necessarily an area that Government can be expected to initiate itself, but it can facilitate and potentially even support local or national associations or NGOs to carry out such work in partnership. Both Morocco and probably Algeria are the main relevant areas where such additional efforts would be most beneficial, but they need to be carried out with full coordination of Government especially National Park staff, as they may instigate increased pressures at the sensitive field sites if they successfully increase interest, and these need to be managed and taken care of through combined and planned efforts. Promoting ibis statues or other culturally relevant profile-raising initiatives are further options to consider here. Wider international and release projects can also contribute to this aim, and again, building links is a very important aspect of this.

## 7. References

- Aghnaj, A.; Smith, K. W.; Bowden, C. G. R.; Ribi, M. 2001. Studies of the feeding ecology and habitat use of Northern Bald Ibis, *Geronticus eremita*, in the Souss-Massa National Park, Morocco. *Ostrich* Suppl. 15: 197.
- Akçakaya, H.R. 1990. Bald Ibis *Geronticus eremita* population in Turkey: an evaluation of the captive breeding project for reintroduction. *Biol. Cons.* 51: 225-237.
- Collar NJ, Stuart SN 1985 Northern Bald Ibis *Geronticus eremita*. In: Collar NJ (Ed.) *Threatened birds of Africa and related islands*. The ICBP/IUCN Red Data Book, Part 1, International Council for Bird Preservation, Cambridge, pp 74–108.
- Böhm, C. (Ed) 2006. Northern Bald Ibis *Geronticus eremita*, 2<sup>nd</sup> EEP Studbook 2006 Alpenzoo, Innsbruck-Tyrol.
- Boehm, C. & K. Pegoraro (2011): *Der Waldrapp*.- Neue Brehm Bücherei 659
- Bowden, C.G.R., A. Aghnaj, K.W. Smith & M. Ribi. 2003. The status and recent breeding performance of the critically endangered Northern Bald Ibis *Geronticus eremita* population on the Atlantic coast of Morocco. *Ibis* 145: 419-431.
- Bowden CGR, Smith KW, El Bekkay M, Oubrou W, Aghnaj A, Jimenez-Armesto M 2008. Contribution of research to conservation action for the Northern Bald Ibis *Geronticus eremita* in Morocco. *Bird Conserv Int* 18:74–90
- Bowden C G R, Hamoud A, Jbour S, Fritz J, Peske L, Riedler B., Lindsell J A, Al Shaiesh M, Abdallah A., Boehm C., Hatipoglu T, Tavares J P, Al Salamah M, Shobrak M & Serra G 2012. Attempted supplementation of the relict wild Eastern population of Northern Bald Ibis in Syria with Turkish semi-wild juveniles. *IUCN Reintroduction Specialists Group Case Studies Part III*: 130-134
- Broderick D, Korrida A, Idaghdour Y (2001) Genetic diversity in the last remaining wild population of Northern Bald Ibis (*Geronticus eremita*); preliminary results inferred from mtDNA sequence data. *Newslett Int Advisory Group Northern Bald Ibis* 1:25–26
- Cunningham AA 2000. Investigation of disease threats to the Northern Bald Ibis *Geronticus eremita* in Morocco. Report on behalf of the Royal Society for the Protection of Birds and Souss-Massa National Park. Sandy Beds. Pp29.
- Danford, C.G. 1880. A further contribution to the ornithology of Asia Minor. *Ibis* (4) 4: 81-99.
- Fellous, A. 2004. A short review of the historical distribution of the Northern Bald ibis (*Geronticus eremita*) in Algeria. in *IAGNBI newsletter* 3 (Boehm, C. Ed.). 48-49.
- Bairlein F, Fritz J, Scope A, Schwendenwein I, Stanclova G, van Dijk G, Meijer HAJ, Verhulst S, Dittami J subm. In-flight energy expenditure and metabolic processes in a free-ranging migratory bird. *PLOS ONE*.
- Fritz J & Unsöld M 2011. Artenschutz und Forschung für einen historischen Schweizer Vogel: Der Waldrapp im Aufwind. *Wildbiologie* 3/2011, 1-16.
- Fritz J & Unsöld M 2013. Aufwind für den Waldrapp: Von der Wiederansiedlung eines europäischen Zugvogels. *Verein zum Schutz der Bergwelt, Jahrbuch* 2013: 121-138.
- Portugal SJ, Hubel TY, Fritz J, Heese S, Trobe D, Voelkl B, Hailes S, Wilson AM & Usherwood JR 2014. Upwash exploitation and downwash avoidance by flap phasing in ibis formation flight. *Nature*, 505, 399-402.
- Voelkl B, Portugal SJ, Unsöld M, Wilson AM & Fritz J subm. Flip for flap: Direct reciprocation in taking the lead can help Northern bald ibis to reduce costs of migration flights. *Proceedings of the National Academy of Sciences*.
- Gesner, C. 1555. *Icones Avium omnium quae in Historia Avium Conradi Gesneri describuntur*. Christoffel Froschouer Zürich

- Hancock, J. A.; Kushlan, J. A.; Kahl, M. P. 1992. *Storks, ibises and spoonbills of the world*. Academic Press, London.
- Hirsch, U. 1979. Studies of West Palearctic birds. 183 Bald Ibis.Br. Birds 72: 313–325.
- Kotrschal, K.(1999). Trapped in „Noah's Ark“? The Grünau Bald Ibis Project. 2nd Int. EEP Studbook, 36-51, Alpenzoo Innsbruck (1999)
- Sorato, E. & Kotrschal, K. Hormonal and behavioural symmetries between the sexes in the Northern bald ibis (*Geronticus eremita*).Journal of Comparative Endocrinology, 146, 265-274 (2006)
- Kotrschal K 2001. The Grünau project is in its 5th year: How to establish a Waldrapp *Geronticus eremita* colony from scratch. Proceedings of the International Advisory Group for the Northern Bald Ibis (IAGNBI): Newsletter 2001
- Kumerloeve, H. 1962. Zur Geschichte der Waldrapp-Kolonie in Birecik am oberen Euphrat. J. Ornithol. 103: 389-398.
- Kumerloeve, H. 1984. The Waldrapp, *Geronticus eremita* (Linnaeus, 1758): historical review, taxonomic history, and present status. Biol. Cons. 30: 363-373.
- Lindsell, J., Serra ,G., Abdallah , M. S., al Qaim, G. and Peske, L. 2009. Satellite tracking reveals the migration route and wintering area of the Middle Eastern population of Northern Bald Ibis .*Oryx* 196 :
- Mendelssohn H 1994. Experimental releases of Waldrapp Ibis *Geronticus eremita*: an unsuccessful trial. Int. Zoo Yb. 33: 79-85
- Oubrou, W. and El Bekkay, M. 2014. Rapport sur la reproduction 2014 de la population des Ibis chauves dans la région de Souss-Massa. Report of the 2013 Northern Bald Ibis breeding season at Souss-Massa NP, Morocco. Available at: <http://northernbaldibis.blogspot.co.uk/>.
- Pegoraro, K. 1996. Der Waldrapp. Vom Ibis, den man für einen Raben hielt. 144 pp. Wiesbaden. AULA Verlag.
- Pegoraro, K., & M. Föger. 1999. The Northern Bald Ibis *Geronticus eremita* in Europe: A Historical Review In: Northern Bald ibis *Geronticus eremita*. 2<sup>nd</sup> EEP Studbook (Böhm, C. ed.) Alpenzoo Innsbruck-Tirol: 10 - 20.
- Pegoraro, K.; Föger, M.; Parson, W. 2001. First evidence of DNA sequence differences between Northern Bald Ibises (*Geronticus eremita*) of Moroccan and Turkish origin. *Journal für Ornithologie* 142: 425-428.
- Pegoraro K (2003) Release trials of Northern Bald Ibis: An overview. In: Procs of IAGNBI meeting Alpenzoo, Innsbruck, Tirol, 2003 - Eds Boehm C, Bowden CGR, Jordan MJR. p36-41.
- Serra G., Abdallah M., Abdallah A., Al Qaim G., Fayed T., Assaed A., Williamson D. 2004. Discovery of a relict breeding colony of Northern Bald Ibis *Geronticus eremita* in Syria: still in time to save the eastern population? *Oryx*, 38 (1): 1-7.
- Serra G., Abdallah M. and G. Al Qaim. 2008. Feeding ecology and behaviour of last surviving middle eastern N. Bald Ibises breeding in the Syrian steppe. *Zoology in the Middle East* 43: 55-68.
- Serra G., Peske L., Abdallah M.S., al Qaim G., Kanani A. 2009a. Breeding ecology of the last oriental N. Bald Ibises in the Syria desert. *Journal of Ornithology* 150: 769-782.
- Serra G., Nahaz M.M., Idan M., Peske L., Savioli A., Bruschini C., Alomari K. 2009b. Assessment and characterization of the Ibis Protected Area in the Palmyra Desert - a proposed 5-year management and development framework. IUCN publication, 156 pp.
- Serra G. 2010. Surveying Northern Bald Ibis Migratory Route Along Western Saudi Arabia, in March and August 2010. Research Report, National Geographic Society, Committee for Research and Exploration, Grant # 8479-08. 44pp.

Serra, G., Bruschini, C., Lindsell, J., Peske, L. and Kanani, A. 2011. Breeding range of the last eastern colony of critically endangered N. Bald Ibises *Geronticus eremita* in the Syrian steppe: a threatened area. *Bird Conserv. Internat.* 21 : 284 – 295 .

Serra, G, C. Bruschini, L. Peske, A. Kubsa, M. Wondafrash & J. A. Lindsell. 2013. An assessment of ecological conditions and threats at the Ethiopian wintering site of the last known eastern colony of Critically Endangered Northern Bald Ibis *Geronticus eremita*. *Bird Conservation International* 23 (4): 399 - 413

Serra G, Peske L, Fritz J, Lindsell J, Bowden CGR, Bruschini C, Welch G, Tavares J & Wondafrash M. 2014. Accounting for the low survival of the Critically Endangered northern bald ibis *Geronticus eremita* on a major migratory flyway. *Oryx* doi:10.1017/S0030605313000665 (1):1-9

Smith, K. W.; Aghnaj, A.; El Bekkay, M.; Oubrou, W.; Ribi, M.; Jimenez Armesto, M.; Bowden, C. G. R. 2008. The provision of supplementary fresh water improves the breeding success of the globally threatened Northern Bald Ibis *Geronticus eremita*. *Ibis* 150(4): 728-734.

Touti, J., Oumellouk, F., Bowden, C. G. R, Kirkwood, J. K., & Smith, K. W. 1999. Mortality incident in Northern Bald Ibis *Geronticus eremita* in Morocco in May 1996. *Oryx* 33: 160-167



## 8 - Annexes

### Annex 1. - AEWA Northern Bald Ibis International Working Group

#### Terms of Reference<sup>9</sup>

**Goals** (as defined in the International Single Species Action Plan for the Northern Bald Ibis)

- To conserve the Northern Bald Ibis by securing the wild colonies, increasing the number of birds and improving our understanding of their needs;
- Increase the number of breeding colonies;
- Preserve the stop-over and wintering sites and make the E population flyway safe for the birds

#### Role

The role of the AEWA Northern Bald Ibis International Working Group will be to:

- 1) coordinate and catalyse the implementation of the International Northern Bald Ibis Single Species Action Plan (SSAP);
- 2) stimulate and support Range States in the implementation of the SSAP; and
- 3) monitor and report on the implementation and the effectiveness of the SSAP.

#### Scope

The AEWA Northern Bald Ibis International Working Group will:

- set priorities for action and implement them;
- coordinate the overall international implementation;
- raise funds for implementation;
- assist Range States in producing national action plans;
- ensure regular and thorough monitoring of the species populations;
- stimulate and support scientific research in the species necessary for conservation;
- promote the protection of the network of critical sites for the species;
- facilitate internal and external communication and exchange of scientific, technical, legal and other required information, including with other specialists and interested parties;
- assist with information in determination of the red list status and population size and trends of the species;
- regularly monitor the effectiveness of implementation of the SSAP and take appropriate action according to the findings of this monitoring;
- regularly report on the implementation of the SSAP to the AEWA Meeting of the Parties through the National Focal Points; and
- update the international SSAP in 2015 or as required.

#### Membership

The AEWA Northern Bald Ibis International Working Group will comprise (1) designated representatives of national state authorities in charge of the implementation of AEWA and (2) representatives of national expert and conservation organisations as invited to the national delegations by the state authorities from all major Range States.

---

<sup>9</sup> As approved by the 1<sup>st</sup> meeting of the AEWA Northern Bald Ibis International Working Group, 19-22 November 2012, Jazan, Saudi Arabia

**Countries forming the working group:** Eritrea, Ethiopia, Morocco, Saudi Arabia, Syria, Turkey and Yemen.

**Observer countries where captive breeding/reintroduction projects are currently proposed or ongoing:** Spain, Austria, Italy, Germany and Algeria.

The Chair of the AEWA Northern Bald Ibis International Working Group may invite and admit international expert and conservation organisations as well as individual experts as observers to the Working Group, as necessary. Observer organization confirmed by the Range States at the first meeting of the Working Group is the International Advisory Group on the Northern Bald Ibis (IAGNBI).

### **Officers**

A Chairperson of the AEWA Northern Bald Ibis International Working Group will be elected amongst its members.

A part-time Coordinator will be nominated by BirdLife International from within the BirdLife Partnership, with a medium term objective to establish this role at BirdLife International. The Coordinator will be in charge of the day-to-day operations of the Working Group and shall act in close cooperation with the Chairperson and the AEWA Secretariat.

The designated representatives of national state authorities will act as National Focal Points for the SSAP and will be the main contact persons for the Chairperson and the Coordinator.

### **Meetings**

The AEWA Northern Bald Ibis International Working Group should aim to hold face-to-face meetings once every three years. Other face-to-face meetings may be arranged as circumstances allow (e.g. back-to-back meetings with other international fora). Between meetings, business will be conducted electronically via Working Group's website and list server.

### **Reporting**

A thorough report on the implementation of the SSAP will be produced according to a standard format with contributions from all Range States and submitted for inclusion into the general International Review on the Stage of Preparation and Implementation of Single Species Action Plans to the AEWA Meeting of the Parties. Reports shall also be prepared by each Range State to a format agreed by the Working Group and presented at each face-to-face meeting of the Working Group. These National Reports shall be submitted to the Coordinator at the latest three months prior to the date of the next Meeting of the Working Group. Financial support for meeting attendance and for the implementation of the SSAP for eligible range states (according to AEWA MOP decisions) will be coupled with the timely submission of national reports. Other reports will be produced as required by the AEWA Technical Committee or the AEWA Secretariat.

### **Financing**

The operations of the AEWA Northern Bald Ibis International Working Group, including the coordinator post, as necessary, are to be financed primarily by its members and, if applicable, by its observers; the AEWA Secretariat cannot commit regular financial support and may only provide such if possible. Funding for SSAP activities of the Working Group or its members is to be sought from various sources.

## **Annex 2. –List of abbreviations and acronyms**

BirdLife International / BirdLife Middle East (BLI / BLME)  
Doga Dernegi (DD) Natural Society (BirdLife Turkey)  
Haut Commissariat àux Eaux et Fôrets et la Lutte contre la Desertification (HCEFLD)  
International Advisory Group on the Northern Bald Ibis (IAGNBI)  
International Centre for Agricultural Research in the Dry Areas – Morocco (ICARDA)  
Ministry of Agriculture and Agrarian Reform – Syria (MAAR)  
AEWA International Single Species Action Plan (ISSAP)  
Sociedad Española de Ornitología (SEO/BirdLife)  
Species Survival Commission of the IUCN (SSC)  
Syrian Society for Conservation of Wildlife (SSCW)  
The Arab Centre for the Study of Arid Zones and Dry Lands (ACSAD)  
The Royal Society for the Protection of Birds (RSPB)  
The World Conservation Union (IUCN)  
AEWA Northern Bald Ibis International Working Group (NBI IWG)