IAGNBI Newsletter 2

May 2003

International Advisory Group for Northern Bald Ibis

An update on current projects involving wild and captive Northern Bald Ibis *Geronticus eremita*

Edited by Chris Bowden

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What is IAGNBI?

Introduction to IAGNBI

Who we are and mission statement
In order to ensure international co-ordination and co-operation on Northern Bald Ibis projects, it was decided to create the International Advisory Group for Northern Bald Ibis (IAGNBI) with the following Terms of Reference:

- receive propositions for all Northern Bald Ibis release/re-introduction projects
- review propositions according to the IUCN and workshop guidelines and a potential Northern Bald Ibis action plan (the group will seek advice from other experts as appropriate, and give advice only, not permits)
- ensure information exchange/*act as an* information centre
- give advice if required *regarding* release methods, habitats, emergencies, etc.
- submit release/re-introduction proposal*s* to IUCN (RSG)
- encourage *adapted* scientific research to close gaps of knowledge on Northern bald ibis

Current group composition May 2003:

Koen BROUWER	–	Chair person IUCN (SSISG) [Chair person]
Ali AGHNAJ/Chris BOWDEN	–	Souss-Massa population [Secretary]
Miguel A. QUEVEDO	–	Veterinary
Karin PEGORARO	–	Research Biology
Christiane BÖHM	–	Captive Breeding Community
Taner HATIPOGLU	–	Eastern population

Creation of IAGNBI

The group was created on 12 March 1999 at the 'International workshop on a strategy for the rehabilitation of the Northern Bald Ibis' held in Agadir, Morocco 8-12 March 1999. The following recommendations were made at the workshop:

1 An analysis of the current status of the critically endangered wild population of Northern Bald Ibis was undertaken. It was concluded that the unique Souss-Massa population (South-west Morocco) is currently stable but is not increasing.

2 As a priority it was agreed that the 1997 action plan for the conservation of Northern Bald Ibis in the Souss-Massa region should be regularly updated and implemented.

3 The possibility of supplementing the Souss-Massa population was considered and rejected for the time being as the risks are considered unacceptable.

4 The only chance to increase the number and range of Northern Bald Ibis in a significant manner is by reintroduction. Any reintroduction programme should have the goal of removing this species from the critically endangered list by creating additional, self-sustaining wild populations of Northern Bald Ibis. It was noted that, as there is no urgency for reintroduction, and in view of the fact that a detailed and tested release method has not yet been identified, so caution is urged. However, it is urgent to intensify research on release methods and to test them to gain sufficient experience.

5 It was recognised that there are two distinctive populations, an Eastern and a Western form and their respective range should be respected. In view of the very successfully managed captive Western population, sufficient birds can be made available for potential release or reintroduction programmes over the next 10-20 years.

6 The workshop developed specific guidelines for release/reintroduction of Northern Bald Ibis based on the IUCN/SSC Reintroduction Specialist Group recommendations. The guidelines developed by the workshop must be regularly updated in the light of experience and must be followed during any programmes involving release/ reintroduction.

7 In order to ensure international co-ordination and co-operation, it was decided to create the International Advisory Group for Northern Bald Ibis (IAGNBI) with the Terms of Reference given above.

Contacting the committee

Correspondence should be directed via the joint secretary:
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Second meeting of IAGNBI July 2003

It was agreed by the committee that sufficient time has passed, and progress on projects made to call a second IAGNBI meeting and workshop to update all interested parties, and pull that work together to contribute towards reintroduction guidelines for the species. The following provisional programme has been developed, and it is hoped that the output will feed into a full Species Action Plan, which will be developed at a further workshop within the next year.

The Provisional Programme:

Monday 30 June: Arrival Innsbruck

18:00 Icebreaker at Alpenzoo!

Tuesday 1 July: The overview of what has happened since 1999

08:30 *Introduction of participants, the aims of the meeting, ways it can feed into a Species Action Plan, by covering the release aspects and priorities*

Presentations:

10:00 **Souss-Massa population** - Mohammed El Bekkay, Chris Bowden, Ken Smith,

population update, Club Med threat, grottes problem, predators, water points, wardens, ecotourism, small projects, etc.

10.45 **Syria population** - Gianluca Serra & Chris Bowden

discovery, searching for more, wardening, threats

11.15 **Turkey population** – Nurettin Ozbagdatly

population, management system & genetics

13:30 **Captive populations**, an overview - Christiane Boehm

how many, where they are, genetic origins, studbook, include USA and ther threatened ibis species

14:15 An **overview of release trials** from the beginning, and including current projects - Karin Pegoraro

Israel, Italy, Turkey, Gruenau, Morocco, Spain, the IAGNBI gaps in knowledge,

15:00 **Veterinary considerations** concerning releases of captive birds, an overview - Andrew Cunningham

16:00 The diseases and health problems known for captive NBI

- Miguel Quevedo

16:30 **IUCN criteria** for release programmes, and the reasons for NBI's decline - Mike Jordan

17:00 **IAGNBI** and what its done since 1999 - Chris Bowden

Wednesday 2 July: The ongoing and proposed projects

08:30 Gruenau & Italy

09:30 North Morocco

11:00 Spain

12:00 Turkey

14:00 Developing guidelines for releasing NBI - groups on different aspects:

Group A: Site selection criteria - nest sites, feeding areas, climate, food availability etc

Group B: Stock - genetic, pedigree, origin, and include veterinary protocols

Group C: Release methodology

Group D: Monitoring pre- and post- release

17:00 Feedback session from each group (some may be finished? for others it will be an update)

Thursday 3 July: Developing NBI release guidelines

08:30 (Contd) Developing guidelines for releasing NBI - groups on different aspects:

Site selection criteria

Stock

Release methodology

Monitoring pre- and post- release

11:00 Feedback session for remaining groups, and adoption

14:00 Review of gaps in knowledge, and workshops to update these

Present the existing gaps document and identify those in need of changes

Decide what to do with the outputs from this exercise and the release guidelines

Initiating a studbook for the Eastern population

16:00 Review how IAGNBI works, membership, communication, links etc.

20:00 Closed meeting of IAGNBI committee in evening

Friday 4 July

08:30 Closing session of the meeting, with handout statements

11:30 Lunch

12:30 Leave for Gruenau, where we arrive by 16:30 for tour and explanations of the work there

Stay overnight at Gruenau

Saturday 5 July

Visit free-flying project during morning

14:00 Leave for Innsbruck after lunch

New and ongoing projects

1 Newly discovered wild population of Northern Bald Ibis in Syria and provisional plans to develop a project to conserve them

Gianluca Serra, Talal Razzouk, Mahmoud Taher, Adnan Budieri, Chris Bowden

A wildlife survey of the Syrian steppe under an Italian-funded, Food and Agriculture Organization (FAO) implemented project (UN-FAO GCP/SYR/009/ITA), made an astonishing and important discovery in May 2002. Following up reports by local hunters, in a systematic way, with questionnaires and field visits, seven adult ibis were found in the Palmyra region and better still, these birds had three nests, and successfully fledged three young. The birds then left the area in early July, but six adults returned to breed in the spring of 2003. Furthermore, the results from the questionnaires indicate that far from going extinct after the last published record in 1928, there were very probably multiple colonies until just twenty years ago or less.

Details of the lead up and more background to the discovery are given elsewhere (Serra 2003, Serra et al in press), but the Syrian Steppe project (UN-FAO GCP/SYR/009/ITA) has been following up on the discovery, training wardens, gathering more information on the birds, their feeding areas and the likely threats to the area. The birds have now received considerable publicity internationally, but more importantly within Syria (national media and television coverage), even the president has expressed some interest in the discovery.

Further searches this spring failed to locate any more birds, so it does seem that this colony may really be the very last of the truly wild eastern population, which further increases the importance of protecting them, and indeed finding out where they spend the rest of the year.

It is planned that a project will be developed to pool resources and get involvement of all stakeholders, to expand on the work in the region of FAO and the Syrian Government, together with involvement of local NGOs and of BirdLife International.

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Bowden, CGR, Serra G, Budieri, A & Al Jbour, S (2002) Report on a visit by BirdLife International in response to the recent discovery of breeding Northern Bald Ibis in the Palmyra region of Syria. RSPB unpublished report, RSPB, Sandy, UK pp10

Serra G., Abdallah M., Abdallah A., Al Qaim G., Fayed T., Assaed A. and D. Williamson. (*Accepted)*. Discovery of a relict breeding colony of Northern Bald Ibis *Geronticus eremita* in Syria: still in time to save the eastern population? *Oryx*.

Serra, G (2003) The discovery of Northern Bald Ibis in Syria. World Birdwatch 25 (1):10-13.

2. Update on the Moroccan population of Northern Bald Ibis in the Souss-Massa region - SW Morocco

The population has finally fully recovered from the mortality incident of 1996, and the total number of pairs for 2003 reached 85. A full summary of the figures including this years breeding productivity, management actions and the current threats will be presented at the July IAGNBI meeting.

3 Update on the Semi-wild population at Bireçik, Turkey and future plans for the breeding station

Nurettin Ozbagdatlý, Taner Hatipoglu, Jose Tavares, Andrew Cunningham & Chris Bowden

Following two years of placing an extra observer at the breeding station, and gathering information on the current management and the behaviour of the birds, (see Ozbagdatly 2001), a technical visit was made to discuss the future plans for managing the breeding station at Bircik in October 2002. In addition, all of the birds were caught and marked with darvic and metal leg rings. A full report of breeding activity of the birds and their numbers is being prepared.

A number of important recommendations were agreed at the meeting, which had a very good attendance by senior Forestry and Wildlife Department staff. A report of these recommendations was prepared (initially in Turkish) and some of the actions therein are already being implemented. It is hoped that the importance of this semi-wild northern bald ibis population means that more of these measures will be acted upon in the near future.

Principle actions that were discussed included improvements to the cages, and a major enlargement of the rear cage, reviewing feeding methodology and composition (but verifying current practices an important first step), felling many of the trees planted within the compound, establishing veterinary protocols and lab facilities and adapting and developing visitor facilities. Full details are given in the report, Tavares et al (2003).

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Tavares J, Bowden C, Cunningham A and Cooper B. (2003) Conclusions and recommendations of a technical visit to Birecik Kelaynak Breeding Station 22-23 October 2002. (Parts 1 & 2) Unpublished report, Royal Society for the Protection of Birds, Sandy, UK.

Ozbagdatli, N. (2001). The current situation of the Northern Bald Ibis, south-eastern Turkey. A report on the status of the population from observations between May and July of 2001. Unpublished report to DHKD.

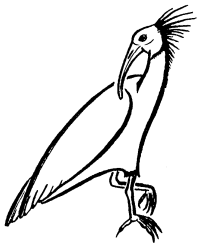
4 Konrad Lorenz Institute behaviour and release methodology project – Austria and Italy

Johannes Fritz & Kurt Kotrschal

The "Almtal Northern Bald Ibis Projects"
Johannes Fritz, Kurt Kotrschal

There are two closely linked Northern Bald Ibis (NBI) projects in the Upper Austrian Almtal valley, the Grünau Project (project manager K. Kotrschal, Konrad Lorenz Research Center) and the Scharnstein Project (project manager J. Fritz, www.waldrappteam.at). These projects are increasingly producing results towards a potential re-introduction of the NBI. It seems timely to bring a summary of our approach, methods and results achieved, to the attention of IAGNBI, and to ask the IAGNBI members for their comments.

4.1 The Grünau Project: Establishing a non-migratory Northern Bald Ibis colony from zoo offspring



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At the Konrad Lorenz Research Center (Forschungsstelle) -KLF in Grünau, Austria, we started an experimental project in 1997 with the general goal of establishing a local colony of semi-tame birds (see IAGNBI newsletter No.1). Particularly in the first two years, this developed into an expensive and labour-intense struggle. Now, six years later, 25 experienced birds are roaming our valley. The aviary is open yearlong except for migration time, September to November. In 2002, the colony showed the first full reproductive cycle, with 9 nests, 22 eggs and 4 fledglings, which were raised with only marginal supplemental food.

Hence, we consider the first phase of this project as a success. For years to come, the local Grünau colony will remain a subject of intense research. Investigations are underway concerning 1) the cooperation within pairs, including the relationships between steroid hormones and behaviour, 2) behavioural and ecological aspects of natural foraging and 3) the establishing of traditions via social learning. We expect successful reproduction in the years to come.

Still, our colony is situated North of the Alps. Therefore, birds will remain dependent on human care, particularly provision of food in autumn and winter. Therefore, the next logical step will be experiments in teaching the NBI, specially hand-raised for this purpose, a migration route South (see the Scharnstein Project).

Scientific results
Our project already contributed much useful know-how towards reintroductions (Anon. 1999, Kotrschal 1999). And there is a great potential for basic behavioural science. In the following, a selection of results is given:

- Even hand-raised individuals tend to disperse (fly away) 1-3 months after fledging. The birds from Grünau flew N or NE to up to 1600 km (Kotrschal 1999, Tintner & Kotrschal 2002).

- In some cases, such dispersed birds returned on their own, which suggests that orientation mechanisms in these captive-bred individuals are intact, but migration routes may be passed on as a tradition, such as in geese or cranes (Kotrschal 1999, Tintner & Kotrschal 2002).

- Dispersers were in good physical condition even after 4 weeks without supplemental feeding (Kotrschal 1999, Tintner & Kotrschal 2002).

- The flock now show a regular spatio-temporal pattern within the valley. Birds usually stay within 10 km of their night roost.

- With the introduction of birds into the new, highly functional aviary in the Cumberland-park, which serves as a night roost and nest site, birds do not show any more tendencies to stay outside overnight, which provides safety against predation, notably by eagle owls.

- The 4 ibis-raised fledglings of 2002 stayed in company of their parents at meadows close to the aviary the first 3 weeks after fledging and then joined the flock in their foraging excursions to the meadows at the village of Grünau. Fledglings did not form a group of their own, integrated into the main group within a few weeks after fledging and hence, assumed group habits and traditions. At the colony site (aviary) they are nearly as approachable as the hand-raised individuals.

- The 6 older NBI (6-10 years of age) of the Cumberland park also left the aviary upon permanent opening, but neither joined the well-orientated flock of hand-raised birds, nor returned to the aviary. All of them dispersed within 3 months of release. This showed once more, that 1) birds of different origin (different cultures) may not form a coherent flock, even after a long period of being kept together and 2) that aviary birds are unsuitable to be released probably due to the need to make early post-fledging experience to be able to fly in a socially and spatially orientated way.

- Naturally asynchronous hatchlings grow better and are less stressed (excreted corticosteron) than relatively synchronised hatchlings (Tuckova 2000)

- Social versus solitary rearing in the nest only 3 weeks after hatching significantly affects growth, behaviour and socialisation within the group (Tintner & Kotrschal 2002).

- The Grünau NBI group socially (pairs, clans) at the colony (night roost), but not during foraging up to 10km off colony. They forage as a group showing

producer-scrounger dyads, with the producer being mainly a female, the scrounger mainly a male (Meran 2002, Koth 2002).

- The Grünau NBI only utilised wide and open meadows close to the village of Grünau, approx. 5-8 km North of the breeding site for foraging, where vegetation height did not exceed 10 cm. All of these meadows are organically fertilised for producing cattle feed. For collecting 250-300 g of prey (mainly earthworms and beetle larvae), individuals had to forage 6-8 hours. NBI were even able to continue their foraging during periods of heavy rains (up to 3 days in a row) (Koth 2002).

- NBI prefer soft substrates for foraging (actually avoid gravel) and use simple enhancement mechanisms and scrounging to profit from the competence of flock mates during foraging (Meran 2002, Koth 2002).

- Within the pair, co-operation is relatively symmetrical (pilot studies by Schnapp 2002, Hölzl 1998), with males and females taking similar shares of incubation and feeding the young.

- Within the pair, females and males excrete similar amounts of testosterone metabolites during the reproductive phase (Dorn, unpubl.). Either females in the competitive colony situation need particularly high T or males maintain low T not to constrain their paternal behaviour. Symmetrical T fits the symmetry in size and colour intensity, of the bare red skin of head and throat (Schluckebier unpubl.).

Research plans for 2003

- There will be a monitoring group of at least two masters students and a few volunteers for 1) quantitatively observing foraging behaviour, individual feeding success and scrounging patterns and 2) for evaluating food densities at sites our NBI are foraging and at control sites. This will be done with the Grünau group as well as with the 2002 birds of the Scharnstein group, which can be directed to a range of meadows by the ultra-light planes.

- Another group of students will expand on the results of the pilot studies of 2002 concerning cooperation at the nest and the symmetry of male and female testosterone levels. This will mainly be done by PhD Enrico Sorato and include 1) monitoring of behaviour and excreted T metabolites (by EIA, method well established) beginning with January 2003, 2) evaluation of size and redness of the bare patches at the head and throat, 3) checking for condition and parasites, 4) evaluation of the cellular immune response by repeated injections of phytohaemagglutinin into the patagial wing web, 5) monitoring behaviour of pairs at the nests and 6) staging social challenges and analysing excreted T metabolites thereafter.

Plans for the future with the sedentary Grünau colony

In the forthcoming years, basic and applied research with the sedentary, free-flying birds will be continued. Every year, bird-raised young will integrate into our flock, gradually shifting the balance from hand-raised to bird-raised. We will see how this will affect behaviour and manageability of our flock.

Starting with fall 2004, when flock size will be above 30 individuals, we plan not to lock in the flock into the aviary during migration any more. We predict that the adults and sub-adults will stay in the valley, but there may be a risk of losing the young-of-the-year due to dispersal (as 1997 and 1998, see above). However there is also the chance, that the young will stay with the flock. This would be the final step in establishing a local, non-migratory flock in the Almtal.

For 2005 we are considering to split off a segment of our flock (adult breeders, adolescents, juveniles) and use these birds as a nucleus for another non-migratory flock at the Wildpark Herberstein, in Eastern Styria (instead of starting this flock by tedious hand raising again). This transfer of a segment of a flock 200 km to the Southeast will also show 1) whether these birds will be able to transfer their capacity for orientated flight to a new area and 2) whether there will be a tendency to migrate back to the site of origin. If successful, colony splitting would be a relatively easy method for establishing new colonies. Because of a local branch of the Konrad Lorenz Research Center (Forschungsstelle) at the Wildpark Herberstein, scientific monitoring will be guaranteed.

In 2005 or 2006, we plan to integrate a limited number of individuals representing founders of the world zoo population into the Grünau flock. This will either be done by hand raising or by foster parenting of external nestlings by pairs of the Grünau flock.

Present state of knowledge and arguments towards the re-introduction of migratory NBI in mid-Europe

1 The Northern bald ibis in mid Europe always lived in close relationship with humans.
2 The habitats of the remaining wild populations of NBI due to degradation over the past 2000 years and also the past 20 years, are ecologically sub-optimal.
3 NBI cope well with the feeding conditions in areas of extensive agriculture (see above).
4 Global warming, particularly in the Alpine area (which warms twice as fast as world average) favours re-introduction.
5 Little, if any, conflict with human interests are to be expected (see above).
6 The NBI as a symbol of the relationships between nature and culture in Europe and hence, has the potential of becoming a symbol of European integration.
7 Mid Europe is comparatively safe for the NBI and has a well-educated, benevolent human population which can easily be reached and informed via the media.

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4.2 The Scharnstein Project: Establishing a migratory Northern Bald Ibis colony by introducing a new migration route with ultra-light planes

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The Grünau project is the only successful attempt at present, to establish a sedentary free-flying colony of Northern Bald Ibis (NBI). They used the method of hand raising and human fostering (see the Grünau report; Kotrschal 1999). Several programs with different other release methods failed, mainly due to the inability to avoid or control the uncoordinated dispersal/migration of the birds in late summer and early autumn (see 2nd EEP Studbook 1999; Mendelssohn 1994).

Even the Grünau colony has to be taken into an aviary from August to October, to avoid losses due to migration. The aim of the Scharnstein Project is to further develop the fostering method already used in the Grünau Project.

Hand-raising allows the foster parents to take the place of the (missing) biological parents with respect to several contexts, or, as K. Lorenz (1935) called it, to take the place of the 'Elternkumpan' or parental care. One of these contexts is to lead the juveniles to the south and to establish a new migration tradition. test a method to

control and guide the autumn migration of a founder population, which then can pass this migration tradition to the next generations.

Our particular aim is to (1) to establish a self-sustaining 'model-colony' of 30 to 40 NBI in Scharnstein (Upper Austria), with a migration tradition to a wintering area in the southern Tuscany (SIC Monte Labbro), (2) to address several of the questions, identified by the IAGNBI as 'gaps in knowledge, which when filled will significantly improve the probability of successful release' (1st IAGNBI Newsletter, 2001) and (3) to develop a methodological and geographical 'reintroduction scenario' in accordance with the advise of the IAGNBI and the IUCN/SSC Reintroduction Specialist Group recommendations.

We assume that the ability to control autumn migration is of significant relevance for every reintroduction attempt, independent of the origin of the birds (Eastern or Western population) and location (Europe, Africa or Asia). Thus, the choice of the locations during this experimental phase (Almtal, Monte Labbro) is of secondary relevance. However, due to the experiences of the first year of our project and with the Grünau birds (see the Grünau report) we assume, that a reintroduction of the NBI in Europe, in particular along our planned migration route from the Alps to the southern Tuscany, will be possible and reasonable, provided that we succeed with our program.

Despite the proximate aim for the reintroduction of the NBI, flying with human-imprinted birds offers a broad range of options not only for bird conservation but also for behavioural and physiological research in the context of bird flight and migration. We are not the first and not the only one who use this approach, but we see the potential and want to contribute to the development of this innovative method.

Establishing a self-sustaining migrating 'model-colony'

Experiences of the first year 2002

In May 2002 our project started by hand-raising eleven NBI at a special aviary with an indoor enclosure, which was placed close to a small airfield in Scharnstein, Upper Austria. The birds came from the Vienna Zoo, Alpenzoo Innsbruck and the Grünau colony. Composition of the group was organised by the stud-book co-ordinator C. Böhm. Hand raising was done by a team of three foster parents (A. Reiter, I. Meran, K. Tuckova), all of them already experienced in raising and fostering NBI.

The foster parents were with the birds most of the day; contact with other people was largely avoided. This way a close and specific social relationship could be established. Since birds were raised in (asynchron) nests of 3 to 4 birds, they will not be sexually misprinted (Tintner & Kotrschal 2002).

On July 19th (30 days after fledging of the oldest bird) the group followed us for the first time to a meadows three km away from the airfield. From then on we made trips as often as the weather conditions allowed, simulating local feeding flights. Due to a concession of the Upper Austrian government we were allowed to land on five meadows 3 to 18 km away. From 19th July until 10th August we made 15 trips to different meadows; in sum we flew about 350 km.

The birds either followed the two microlights or, if they lost contact, they turned back, waiting at the aviary. The birds did not hesitate to land where we came down, they never landed anywhere other than close to the microlites and they showed no signs of fear, immediately starting to dig for food and respectively begging for mealworms.

Similar to the free flying Grünau birds, our hand-raised NBI proved to be sensitive to disturbance, either from unfamiliar people coming too close, from dogs, cats, birds of prey or some vehicles. Thus, it regularly happened that they were startled and flew away and soon landed again, either on, or closely to, a foster parent, or on the wing of a microlight. Birds were never attracted to people other than their human relatives.

Migration to the Tuscany was not planned for the first season, due to logistical and financial reasons. However, on August 18th we conducted a 'mini-migration' 50 km along the planned route for the next year. From there we brought the birds via car to an enclosure of the Alpenzoo Innsbruck, where they stay over winter.

Further program

The eleven birds of the generation 2002 (G02) are in an aviary of the Alpenzoo Innsbruck. The foster parents, in particular A. Reiter, keep close social contact. In April 2003 we will bring these birds back to the airfield in Scharnstein, where the three foster parents will intensify the social contact. In May we will once again start with the local feeding flights.

In parallel we will raise 12–14 birds from the 2003 generation (G03). For the birds from the G02 we will build an artificial (wooden) cliff. The G03 will be raised in an adjacent indoor enclosure. Both, the cliff and the indoor enclosure, are open to a common aviary. Thus, as soon as the birds from G03 start to move, they will, step by step, be able to socialise with the birds from the G02.

In July, soon after fledging of the G03 birds, we will start flying with both generations. We will regularly lure the birds to a ruin of a medieval castle close to Scharnstein, where we will also place artificial cliffs for up to 35 individuals. This ruin should become the roosting (and breeding) place for the colony after the return migration in spring 2004.

About the middle of August we will start with the migration (the definite date will depend on the weather conditions). Before migration, a veterinary check-up, in accordance with that of the Spanish project (M. Quevedo), will be done with all the birds.

The total length of the route is about 1100 km, subdivided into 11 sections of about 100 km. The average speed will be about 50–55 kmh, resulting in about two hours of flight per day. The course of the route and the daily intervals are based on experiences with the Grünau and Scharnstein birds as well as on data of other bird species. It follows striking landmarks (valleys, rivers, coastlines) and corresponds extensively with frequent migration routes of several species (Berthold, 1996, 2002).

Three of the stopovers (3/6/9; see the graph) are on private, protected areas with suitable feeding habitats. These places will be equipped with the same artificial cliffs used in Scharnstein. There we will take a break, for at least one day to habituate the

birds to the areas. This way we will be able to increase the probability that the birds will use these locations as roosting places during the return migration (during the return migration, the daily distance is usually much longer than during autumn migration, Berthold 2002). The artificial cliffs will remain at that locations over the year.

For the other stopovers we will use private, grassy airfields, where we will build temporary, tent-like night roosts, which the birds are already familiar with. Including two days of rest, the migration will last for at least 14 days, suitable weather provided.

The planned migration route:
0: Breeding area Scharnstein, Almtal (airfield and ruin);
1: First stop-over Trieben, Styria (airfield);
2: Second stop-over Mayerhofen; Carinthia (airfield);
3: Third stop-over Rosegg, Carinthia (private meadow);
4: Fourth stop-over Fagagna, Friuli (airfield);
5: Fifth stop-over S. Donà di Piave, Venecia (private meadow);
6: Sixt stop-over Spiaggia Romea, Po-Delta, Emilia Romagna (private meadow);
7: Seventh stop-over Medicina, Emilia Romagna (airfield);
8: Eight airfield Borg San Lorenzo, Tuscany (airfield);
9: Ninth stop-over Cavriglia, Tuscany (airfield);
10: Tenth stop-over Santa Rita, Tuscany (airfield);
Wintering area:
11: Upper Albegna Valley, Natura2000 Monte Labbro – Alta Valle dell'Albegna;
12: WWF Nature Reserve Laguna di Orbetello;
13: Parco della Maremma.

Our wintering place will be in the south Tuscany. The landing place is close to the WWF Nature Reserve *Bosco di Rocconi* (130 ha), which is, together with two other nature reserves, part of the Natura2000 area *Monte Labbro - Alta Valle dell'Albegna* (6.127 ha). The lower parts of the Natura2000 area (500m–700m MSL) along the river Albegna are meadows, grazed by sheep year round.

The region was also one of the last breeding places of the Egyptian vulture (*Neophron percnopterus*) in Tuscany. A breeding and reintroduction project by the WWF Tuscany is in progress. That project is placed in the recovery centre for wild animals of Semproniano (GR). A close relationship to this group is of interest, because (1) of extensive ecological and historical overlap of the two species in Europe, (2) because public awareness in the region for faunistic projects is already high due to the public relations of the group and (3) because of their personal support and the availability of their facilities (refrigerator, kitchen, veterinary care, etc.).

Numerous cliffs along the river are suitable roosting places also for the NBI. However, due to an easier management of the birds, artificial roosts, already familiar to the birds, will be built with an aviary in the front. The birds are free flying, but the aviary allows us to enclose them, if necessary. At least two foster parents and one pilot will be permanently with the birds. We plan regular flights to suitable habitats in a radius of up to 15 km, similar to the local flights in Upper Austria.

A second artificial roosting place of the same kind will be established 25 km west at the coast in the WWF Nature reserve Laguna di Orbetello. This allows extension of the home range of the birds and to change location during harsh weather periods. From the Laguna di Orbetello two other nature reserves are in a radius of 10 km (Parco naturale della Maremma, WWF Nature reserve Lago di Burano).

Basically, it is up to the birds whether they migrate back in spring 2003 or if they stay in the Tuscany until they reach sexual maturity (as it is known from the eastern population of the NBI). If the birds stay in Tuscany, permanent monitoring and care of the birds is guaranteed by our team and the locals.

However, we will try to motivate them to migrate back after the first winter. At the beginning of the return-migration season (end of March), the human foster parents depart from one day to the next, leaving the birds alone for the first time. We assume that this will be a strong stimuli for them to leave the area (this is also an experience gained during other migration projects with microlites with different bird species). Alternatively, we will start the return migration together with the birds. We will have to leave open which option to use until spring.

Filling the gaps of knowledge due to a successful release

The main focus of our research should be in line with the suggestions by the IAGNBI, focusing on feeding ecology and habitat use, stability of the migration tradition, interaction with other animal species and humans, predator avoidance and parasitic burdens, demography and (in later times) breeding success. Research will be done in close co-operation with the KLF.

All birds are equipped with individual leg rings and radio transmitters (fixed on the tail feathers). One of two receivers is fixed on a microlight, allowing a fast and efficient search for the birds.

During migration energetic expenditure will be controlled via weight-control and via blood samples. In addition daily faecal samples will be collected to analyse for Testosterone and Corticosterone metabolites (by EIA, method well established; Tuckova 1999; Pfeffer et al. 2002).

Developing a methodological and geographical 'reintroduction scenario'

If the program develops along these lines, raising of a third group in 2004 is planned, to get a more stable population size (35-40 birds) and to increase the genetic variability. This model-colony should than be monitored for the coming years.

Based on the outcomes of the Almtal projects as well as of other projects a reintroduction scenario should be developed, in accordance with the advise of the IAGNBI and the IUCN/SSC Reintroduction Specialist Group recommendations.

In cases where the project has to be stopped due to any reason, locations with suitable spacious aviaries are available. Thus, the migration experiment can be terminated any time and the birds taken to aviaries.

However, if the colony develops appropriately, our project can be turned into a re-introduction program. Further migrating colonies can be established (e.g.

Burghausen, Rosegg, Salzburg) and linked with the Scharnstein colony, all of them migrating along the same route to the South.

In conclusion, both groups of free-flying NBI, in Scharnstein and Grünau, have caused no conflicts with local groups. On the contrary, the birds are objects of identification and pride of the local communities. Also, the medial interest for the project is very high. The highlight for this year will be a 50 min documentary of our southern migration, co-produced by three European TV-Stations.

Acknowledgements

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Financial support came from the founding members of the Förderverein Konrad Lorenz Research Station Grünau; Zoo Vienna; Alpenzoo Innsbruck; Wildpark Rosegg; Cumberland Wildpark Grünau as well as from the following institutions: Verein für Tier und Naturschutz in Österreich, WOLF Systembau, Österreichischer Wildgehegeverband, Deutscher Wildgehegeverband e.V., Konrad Lorenz Institut Altenberg; Verbandes der Deutschen Zoodirektoren, Grünes Kreuz Österreich. Support also came from the Flugplatz (airport) Scharnstein, and the communities of Scharnstein and Grünau.

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5 A study of different releasing techniques for a captive population of Northern Bald Ibis (*Geronticus eremita*) in the region of La Janda (Cadiz, Southern Spain)

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Background

The Northern Bald Ibis has declined dramatically over the past 50 years and is classified as critically endangered (Collar et al. 1994) the highest threat category according to IUCN criteria (BirdLife 2000). With about 250 birds remaining in the wild (Bowden et al. 2001), the Souss-Massa region near Agadir (SW Morocco) holds the last known breeding population of the Northern Bald Ibis (*Geronticus eremita*). The species has disappeared from the European Alps more than 400 years ago and from Turkey in 1989 (Akçakaya *et al.* 1992), (apart from a semicaptive population found at Birecik). Occasional records from Yemen and Eritrea suggest that an isolated population might be found in that area but this may be confirmed. In April 2002 a small colony was discovered in Syria (Serra et al. 2002).Hunting, direct persecution by humans, lost of foraging areas and pesticide poisoning (especially in the Turkey population the last decades) are the main reasons for this decline (Cramp & Simmons 1977, Hirsch 1977).

In 1999, an 'International workshop on a strategy for the rehabilitation of the Northern Bald Ibis' hold in Agadir (Morocco, 8-12 March) remarked the necessity of performing studies on releasing techniques to attain a non-migratory and viable population of this species in another area. In cooperation with IUCN/SSC Reintroduction Specialist Group, the workshop developed specific guidelines for release/reintroduction

program assuming that reintroduction is perhaps the main strategy to avoid extinction. In order to ensure the international co-operation, it was decided to create the International Advisory Group for Northern Bald Ibis (IAGNBI) that is working since then.

Main objective

The “Proyecto eremita” aims to evaluate the efficacy of different releasing techniques in La Janda area, Southern Spain, a climatically suitable habitat for the species. The success of this study will be assessed by the establishment of a viable, self-sustained population in this area. Previous attempts (Austria, Israel and Turkey) were unsuccessful (Mendelssohn 1994, Thaler et al. 1992) due to a number of reasons (adverse weather, lack of foraging areas, etc). In this project, we will analyse different techniques (with up to 3 groups of animals reared under different conditions) using birds from the captive stock of the European Endangered species Programme (Christiane Böhm EEP co-ordinator) mainly from ZooBotánico Jerez and following the specific guidelines for release of Northern Bald Ibis based on the IUCN/SSC Reintroduction Specialist Group recommendations. At the end of the project the results will be evaluated before to capture the birds. Regular contact will be maintained with the IAGNBI.

Specific objectives

1 To perform an area survey. The selected area should have suitable foraging grounds, availability of nesting places (i.e. seashore cliffs) and absence or minimum potential risks (use of pesticides, predators, human disturbance, etc.). Consequences of the release on this area will also be considered.

2 To implement different methods of releasing Northern Bald Ibis. Some of them using Cattle egrets (*Bubulcus ibis*) as “guide birds”. To achieve husbandry and hand-rearing of nestlings under different conditions in captivity (see below).

3 The monitoring of released bird by observation as well as radio-telemetry using terrestrial and satellite radio-transmitters.

4 To release approximately 42 (between 30 – 40) birds per year (the exact number has to be discussed yet).

5 Divulgation campaign with two main components: awareness on the status of the species and activation of ecotourism in the area.

6 Communications.

7 To organise an International Workshop (IAGNBI) for the species to be hold in Jerez in 2005.

8 Trapping and capture of birds.

General methods

Study area

Sierra El Retin (South-western Cádiz province) is a mountain area used by Spanish Navy as a training camp. This area presents clear benefits for the species:

1 seashore cliffs at “Parque Natural Pinar de la Breña y Acantilados de Barbate” where a large colony of Cattle Egrets (*Bubulcus ibis*) is now breeding;
2 abundant foraging areas surrounding the releasing site. In recent times, La Janda (a large wetland area) was drained and now pastures and agriculture fields are available allowing the birds to feed all the year around;
3 due to the military use, the access of unauthorised personnel to the area is restricted; and
4 climate is very good with mild winters and hot and dry summers. Dominant eastern winds provide favourable humidity conditions during the severe summer drought. All these conditions are similar to that found in the current Moroccan population.

Origin and selection of the specimens

Animals used in this project will come from the captive stock of the European Endangered Species Program (Christiane Böhm EEP coordinator) although mainly from ZooBotánico Jerez. Our population (N=50 to date February 2003) is operating since 1991. At the enclosure, all the animals are individually marked (metal and plastic rings), the social structure is stable and parental relationship is well established. In addition, it contains 5 out of 7 blood lines, which are known to have in captivity. If necessary, specimens from other EEP captive populations could be used according to the EEP-coordinator.

Management **conditions**

A total of 4 aviaries, each: 6 m (length) x 6 m (wide) x 4 m (high), 5x5 cm mesh, constructed of wire mesh on a metal framework with natural ground and one attached flying cage (18 x 4 m) will be built as enclosures. The back walls being a natural or artificial cliff; preferably oriented to northwest to avoid strong sun and wind exposure. Shelter, nesting ledges and platforms will be provide in the upper part of each aviary. On the ground a pond will be placed in the middle to allow drinking water and bathing. An external fence equipped with a “electric shepherd” will try to keep predators out of the enclosure.

The food, provided twice a day, will consists of a mixed diet which included minced chicken with bones, calf heart and commercial food for insectivorous birds with multivitamins added. During the breeding season (February – July), mice, migratory locust (*Locusta migratoria*) and mealworms (*Tenebrio molitor*) will also complete the diet. Prior to the release of the birds, life preys such as crickets, locust, snails and mice will be use to favour foraging learning.

Veterinary procedures

Those procedures will be based on the “Veterinary Protocol in the Reintroduction of Northern Bald Ibis (*Geronticus eremita*)”, Kirkwood J.K & Quevedo M.A. 1999.

Birds coming from ZooBotánico Jerez have been under veterinary surveillance since 1991 offering appropriate conditions for this project. This captive population have been closely monitored since then and can be consider “in quarantine” over such a long period of time.

The aviaries built will be cleaned and carefully checked for possible foreign material which could be ingested and cause illness.

There will be established surveillance of released birds to monitor for any signs of disease or mortality during the project. Dead birds will be thoroughly analysed (necropsy).

Methodology and releasing technique proposal:
The definitive releasing techniques are not established yet. We would like to discuss our proposal during the IAGNBI in Austria. Tentative methods and composition of birds to have in each aviary are as follows:

Aviary 1: A total of 9 Northern Bald Ibis (NBI) and 9 Cattle Egret (CE) chicks will be hand-raised to the fledging state (Thaler et al. 1992; Pegoraro and Thaler 1994; Kotrschal 2001). Later, food will be dropped on the nest and finally, on the aviary floor. Dead (at the beginning) and late, live prey will be provided. These socially human imprinted birds will be released together. The idea is that CE (a behaviourally flexible species) act as guiders of NBI in searching for food, roosting places and breeding sites at *La Janda* area.

Also a group of 9 hand-raised NBI will be released (following the experience of Thaler, Pegoraro and Kotrschal) in order to compare these two hand-raising methods.

Aviary 2: It will contain 6 NBI pairs. During the reproductive season, while the breeding pairs nourish their offspring, two pairs with two fledglings and one female with one fledgling will be released, leaving the male in the aviary. These birds will be moved to the flying cage A two weeks prior to releasing.

Aviary 3: A total of 6 NBI pairs. During the reproductive season, while the breeding pairs nourish their offspring, two pairs with two fledglings and one male with one fledgling will be released, leaving the female in the aviary. These birds will be moved to the flying cage A two weeks prior to releasing.

Aviary 4: A mixed group of 6 NBI pairs and 4 pairs of CE will stay together during the whole project. We hope that this group act as a reference point for released animals to favour site-attachment. Their offspring could be used as released birds if needed.

Flying cage A: birds from aviary 2 and 3 (4 pairs with 4 fledglings, 2 single females with fledglings and 2 single males with fledglings). These will stay for 2 weeks prior to releasing.

Flying cage B: holding 12 fledglings during one year to be released the next season to minimize juvenile dispersal.

Previous experience of hand-raising NBI and CE in captivity
An experience on hand-raising a mixed group of 4 NBI and 6 CE was carried out last breeding season (April – July 2002) at ZooBotánico Jerez. These birds were hand-raised in captivity to assess the effects and consequences yielded from this experiment. The result of this experience was promising. There was neither abnormal behaviour nor aggression between species and were successfully integrated into the NBI captive population. At present, these birds are kept in the NBI aviary at ZooBotánico Jerez to study relationship and sexual behaviour, especially next breeding season (2004).

It is planned to repeat the experience this year (2003) although with some modification: hand-raising a group of NBI and a group of CE in visual contact but separated groups.

Monitoring
All the birds will be individually marked using standard aluminium ring plus a plastic colour ring with an alphanumeric code. Both terrestrial and satellite radio-transmitters will be used in some birds. Monitoring will start with the first released birds.

Trapping and capture of birds
It is planned to capture the birds using different trapping methods once the project has finished: Bireçik´s technique (aviary), capture-cages, gun-nets, etc.

Planning
1st year: March 2003 to March 2004.
- Habitat survey (field study). It has already started in *La Janda* area.
- Selection of the sites where to locate the aviaries.
- Diffusion and education campaigns, starting autumn 2003.

2nd year: March 2004 to March 2005.
- Diffusion campaigns.
- Building of aviaries and observatory.
- Transfer and adaptation of birds to the aviaries.
- First releases, tracking and monitoring. Behavioural studies.
- Evaluation of releasing methods.

3rd year: March 2005 to March 2006.
- Diffusion campaigns
- Release of birds and tracking. Behavioural studies.
- Evaluation of releasing methods.
- International workshop of the Northern Bald Ibis in Jerez (June or July 2005?).

4th year: March 2006 to March 2007.
- Diffusion campaigns
- Release and tracking. Behavioural studies.
- Evaluation of releasing methods.

5th year: March 2007 to March 2008.

- Diffusion campaigns
- Release and tracking. Behavioural studies.
- Evaluation of results. Reports writing.
- Capture of birds.
- Demolition of infrastructures made for the study.

Expected results

To improve the knowledge of the species and to prepare an effective technique for releasing NBI from captive populations in order to establish a resident, stable, self-sustained and genetically viable population in the wild if it is necessary. We bear in main other indirect benefits such as economical development in the area, an increase of public awareness on endangered species conservation and increase coordination among the different sectors associated to the conservation of this species. Finally, we would like to stress that we are very confident about the results as other related species such as Eurasian spoonbill (*Platalea leucorodia*) and Glossy ibis (*Plegadis falcinellus*) have experienced an increment in southern Spain. Furthermore, other species with a similar foraging behaviour (e.g. White Stork *Ciconia ciconia* and Cattle Egret *Bubulcus ibis*) maintain relative high number of individuals in the area all the year around. In addition, ZooBotánico of Jerez has a broad experience in reproducing and rearing captive Northern Bald Ibis. In fact, our enclosure contains one of the biggest colonies for the species in captivity in with a remarkably sanitary control and high reproductive success every year. Furthermore, our veterinary (Dr. Miguel A. Quevedo) is a member of the IAGNBI. Our ZooBotánico also benefits from a Rehabilitation Centre of Wildlife (CRAS) for the local fauna, which is working since 1981. Finally, we have a great success on recovery and reintroduction of other colonial species of birds in the wild, e.g. Eurasian spoonbills (*Platalea leucorodia*) EAZA News,19, 1997 and Avocets (*Recurvirostra avosseta*) EAZA news,41, 2003.

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6 Proposed release programme in Northern Morocco

We have invited a contribution on the progress of this project, but nothing has been forthcoming to date. We understand that birds are held in-situ at Mezguitem, Teza, northern Morocco, and that there are no immediate plans for a release.

7 Veterinary aspects of Northern Bald Ibis in captivity

Miguel A Quevedo

7.1 Update of results of a mortality survey of captive adult Northern Bald Ibis held in captivity

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Background

During the international workshop, “Strategy for the Rehabilitation of the Northern Bald Ibis” held in Agadir, Morocco from 8-12 March 1999 the workshop participants identified gaps in knowledge. Some of these gaps relate to veterinary issues relevant to captive and/or wild Northern Bald Ibises.

Veterinary needs regarding captive population:

- Compile a list of diseases (infectious and non-infectious) and medical problems affecting Northern Bald Ibises.
- Determine causes and final diagnosis of death through detailed post-mortem examinations.
- Establish which pathogens cause disease-related problems and chronic infections over long time-periods without producing clinical signs (carrier state).

In the wild:

- Determine which natural diseases affect the wild population.
- Study potential pathogenic agents (bacteria, virus, fungi, parasites) isolated from wild healthy Northern bald ibises, and identify indigenous infectious agents.
- Establish causes of mortality.
- Determine normal parasite burden.
- Assess impact of microbial flora of healthy, introduced captive-bred Northern bald ibis on the wild population.

One of my tasks as veterinarian on the IAGNBI committee is to compile all available information regarding diseases, clinical problems and causes of mortality in captive Northern Bald Ibis.

Methods

The below questionnaire to survey mortality of adult birds was sent to all Northern Bald Ibis EEP participants in 1999. It was decided not to include mortality of chicks, unless pathological causes were diagnosed.

Mortality survey form of the Northen bald ibis (*Geronticus eremita*)

Please return this form to: mangel@viautil.com

INSTITUTION: CONTACT PERSON:

FAX/EMAIL: DATE:

Arks identification number	Date of birth	Date of arrival	Sex	Clinical symptoms prior to death	Date of death	Cause of death	post-mortem findings

Unfortunately the response was not as comprehensive as I had hoped and a few problems were encountered:

Only 18 of the (then) 42 EEP Institutions responded in 1999. The survey was sent again in 2000 and 2002 to EEP members participants that had not responded to the previous questionnaires, and after three requests a total of 24 institutions had replied.

Thanks are given to the 24 institutions that responded to this survey, including: Basel, Bern, Edinburgh, Erfurt, Goldau, KLF and Univ.Vienna, Heidelberg, Jerez, DWCT-Jersey, Lisbon, Tama, Walsrode, Alpenzoo, Zurich, Moscow, Helsinki, Duisburg, Tierpark Berlin, Stuttgart, Parco Zoo Punta Verde, Mulhouse, Muséum de Besancon, Antwerp and Leipzig. I am very grateful to all respondents for their time and consideration.

Results

From 1999 to 2003, 24 of the now 45 EEP Institutions responded (53.3%).

- Only 185 (65.1 %) of the total 276 analysed specimens were useable for the purposes of the study.
- The responses were classified according to the cause of death given. The following results were obtained:

Cause of death	**n**	**% of total**
Euthanasia	36	19.4%
Trauma	35	18.9 %
Sepsis	20	10.8 %
Foreign body ingestion	15	8.1%
Enteritis	14	7.5%
Renal disorder	11	5.9%
Cardiac failure	9	4.8%
Pneumonia	8	4.3%
Avian tuberculosis	5	2.7%
Senil degeneration	4	2.1%
Linfoproliferative process	3	1.6%
Staphilococcosis	3	1.6%
Salmonellosis	3	1.6%
Clostridiois	2	1.0%
Erysipela infection	2	1.0%
Aspergilosis	2	1.0%
Adverse reaction Levamisol	2	1.0%
Hepatitis	2	1.0%
Starved	2	1.0%
Visceral gout	2	1.0%
Acute bleeding	1	0.5%
Ruptured of the aorta	1	0.5%
Cirrhosis	1	0.5%
Colibacilosis	1	0.5%
Fibrosarcoma	1	0.5%
Reason clear	**185**	**65.1 %**
Reasons unclear	**99**	**34.8 %**
Total	**284**	

Discussion

More than one-third of the reports had to be omitted from the analysis. In some cases the cause of death was not clear or specific enough, or multiple causes were diagnosed. In some other cases the type of lesion was identified in the post-mortem report (eg. enteritis, liquid in lung, degenerative hepatosis) but the cause of death was not given. More detail is given below for some of the more remarkable results obtained:

Euthanasia
Euthanasia was the most common cause of mortality (19.4 %). The reasons for euthanasia were mainly irreversible disorders such as:

Chronic skin lesions: 40 % (see report below: Skin problems in Northern bald Ibis). Because many Northern bald ibis suffer from skin problems in captivity, it was suggested to investigate this issue into more detail. It is likely that the survey underestimated incidence of skin problems as skin problems may also have occurred with specimens that died of other causes.

Fracture of mandible or beak	26.6 %
Bumblefoot	13.3 %
Elderly bird	3.3 %
Epidermoid cyst	3.3 %
Frostbite	3.3 %
Foot problem (undetermined)	3.3 %
Severe Injury on wing	3.3 %
Feather disorder	3.3 %

Trauma
Trauma was the second highest cause of mortality (18.9 %), and was mainly due to accidents, e.g. flying into the mesh or other part of the aviary, as a result of disturbance. Some reports included the following information: predator got into aviary, leg hanging from the mesh, flew into hard object, dislocation of mid-neck, hemoperitoneum, liver rupture, contortion of whole body, killed by other bald ibis.

Sepsis
Generalised infection or septicemia constituted 20 (10.8 %) of the death causes. It was not clear whether bacterial infections were the primary cause of disease or secondary to another concurrent process. Some of the bacteria isolated were: *E. coli, Aeromonas* and *Staphylococcus.*

Foreign body ingestion
One of the more common causes of death (8.1 %) is clearly associated with management in zoos. Northern Bald Ibises have the capability to find and swallow pieces of tree branches and metal objects (wires, nails) especially in new or reconstructed aviaries. Once these foreign bodies are ingested, they can cause obstruction or perforation of the stomach wall, producing perforate gastritis and eventually peritonitis.

Enteritis
Digestive disorders due to enteritis were found in 7.5 % of the reports. Some of these disorders were directly related to infectious enteritis. *Clostridium perfringens, E. coli, and Pseudomonas* were among bacteria found. In other cases only the lesion itself was found: hemorragic enteritis or pseudomemnbranous enteritis but no cause was identified.

Renal disorder
Renal disorders constituted 5.9 % of the total cause of mortality. The lesions found were: glomerulonefrosis, glomerulonefritis, nephropathy, tubulonephrosis and nodular abscess

Cardiac failure
In total, 4.8 % of deaths were related to some degree of cardiovascular disorder, including heart failure, rupture of aorta, endocarditis valvularis, miocardosis, ad hidropericardia.

Linfoproliferative process
Three cases of suspected avian leucosis were seen in one institution. No other case of linfoproliferative process in this species has been described in the consulted bibliography.

Adverse reaction to levamisol
Levamisol was administered to the whole group of birds kept in one institution as a de-worming procedure. The dose given was 40 mg once P.O. Two of the 25 birds treated died the day after the treatment (8 %). Adverse effect of levamisol (intoxication) was the cause of death. The use of this drug for parasite treatment in Northern Bald Ibis is not recommended.

Conclusions
I received valuable information regarding the heath status and pathology of Northern Bald Ibis in captivity during the past four years. This species is susceptible to problems seen in other avian species in captivity within the order Ciconiiformes, especially within the family Threskiornithidae. No relevant disease specifically affecting Northern Bald Ibis was identified in this survey. There were no deaths related to parasitic disease (internal or external).

The results from 276 analysed specimens, although only 185 (65.1 %) were useable, provide a good source of information regarding those gasp in knowledge related to veterinary aspects of NBI in captivity, including:

- List of diseases (infectious and non-infectious) and medical problems affecting Northern Bald Ibis. Within the more remarkable infectious diseases are: avian tuberculosis, erysipelas, salmonellosis, staphilococcosis, colibacilosis and clostridiois. Neither Chlamydiosis nor mycoplasmosis were seen in this survey as cause of death. Aspergillosis was the cause of death in 2 cases, but it can be related to secondary problem or immune-compromised birds. Evidence of viral disease was poorly seen. Avian leucosis due to virus was suspected but not proven. The skin problem remains under investigation as it may be associated with a viral disease. Other avian viral diseases were not detected, such as: paramyxovirus (PMV1, PMV3), avian influenza and avian pox.

- It is recommended that causes and final diagnose of death be determined through a detailed post-mortem examination, especially where infectious and contagious diseases are suspected (avian tuberculosis, skin problems, etc.).

- We need to establish which pathogens cause disease-related problems and those persisting infections over long periods producing no clinical signs (carrier state), such as avian tuberculosis, erysipelas, salmonellosis or virus disease.

7.2 Skin problems in Northern Bald Ibis

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Introduction

A survey of mortality in captive Northern Bald Ibis was carried out from 1999 to 2003. This survey, made for adult birds (it was decided not to include mortality of chicks unless pathological causes were diagnosed), was sent to all EEP members holding this species. Only 24 (53.3 %) of the 45 EEP Institutions responded. The information or the cause of death was often uncertain or a detailed port-mortem study was not always performed. Some causes of death were not specific or multiple causes were diagnosed
Therefore only 185 (65.1 %) of 276 analysed specimens were useable for the purposes of the study.

Euthanasia was the most common cause of mortality; 32 (21.1%) were euthanasied. Reasons for euthanasia were mainly irreversible disorders such as chronic skin lesions (40%); fracture of mandible or beak (26.6%); bumblefoot (3.3%); elderly bird (3.3%); epidermoid cyst (3.3%); frostbite (3.3%); foot problems (including bumblefoot) (3.3%); severe injury on wing (3.3%); feather disorder (3.3%).

Because many Northern Bald Ibises suffer from skin problems in captivity, it was suggested in the last EEP meeting at Barcelona (2002) to investigate this issue in more detail. The first step therefore would be to further investigate prevalence of skin problems in Northern Bald Ibises kept under captive conditions. It is likely that cases were underestimated in the mortality study because the ibises normally do not die of skin problems but of other causes such as hepatitis or sepsis. The next step would be to find out how many living Northern Bald Ibises suffer from skin problems. In order to get a more detailed idea of what actually may cause skin problem it is suggested to sample these birds in specific body regions (for a description see below). Those samples can either be sent to Miguel A. Quevedo or should be sent to another institution, which is able to test for viral infections. Inclusion bodies were found in specimens included in the mortality survey, but it was not then possible to associate the inclusion bodies with a specific viral disease. This can now be achieved by PCR and by a dedicated virologist. It would be helpful if each institution would send some sample also to Miguel A. Quevedo for a double check up.

Northern Bald Ibis (*Geronticus eremita*) Necropsy Protocol for any suspect case of skin problem

A thorough necropsy should be performed on Northern Bald Ibis which die at institutions housing this species. In addition to the institution's regular necropsy protocol, the following protocol should be performed.

Collect a small section of skin (affected and unaffected) as well as all major tissues (heart, lung, liver, proventriculus, ventriculus, intestine, kidney, spleen, adrenal, muscle and brain) and any tissue with obvious gross lesions in 10% buffered formaline.

Include description of the gross findings, body weight in grams of the carcase, important clinical history previous to death.

Send it to Miguel A. Quevedo, ZooBotánico Jerez, c/.Taxdirt sn, Jerez 11404, Cádiz, Spain.

2 sections of affected skin, 2 sections of healthy skin, section of liver, spleen and kidney should be frozen at –30 to –70 degrees ºC (if possible) for future viral isolation or another infectious agent.

The most important area so far know to look for inclusion bodies (IB) is the area around the feather quill and the adjacent skin. IBs were especially found in feathers that looked thicker and abnormal.

The above protocol is part of a research project. There is no charge for any of the above work, but we really appreciate if the participant institutions could collaborate covering the transport costs for sending the samples.

8 Wildlife translocations and disease risks

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Introduction

During recent decades, the rate of species extinctions has increased greatly and there has been a concurrent increasing trend of using captive breeding, with a view to eventual reintroduction, to help counter these increasing extinction rates.

Although important consideration has often been given to matters such as the maintenance of genetic diversity in such captive breeding programs, until recently little regard has been given to threats posed by infectious diseases. Parasites (the causative agents of infectious disease) are, however, becoming increasingly recognised as important factors to the success, or otherwise, of conservation programs for endangered species. For example, infectious disease is not only capable of nullifying the potential benefits of captive breeding programs, but, when translocations are carried out, may actually result in such programs having an overall negative effect on wildlife conservation.

Definitions

Here, I use the word "parasite" in its broadest sense, i.e. to include viral, bacterial, fungal, protozoan and metazoan parasites. The term "translocation" is used here to describe any assisted animal movement, including introduction, reintroduction, restocking and rehabilitation.

Disease risks of translocations

It is now known that parasites have an important role in the maintenance of biodiversity by influencing the species complement within established ecosystems and that the effects of a disease on one species may have an impact on other species via direct or indirect interactions (Daszak et al. 2000). Although the mechanisms involved are poorly understood, the possible effects of parasites on community structures within ecosystems should not be overlooked when wildlife translocation programs are being developed. For example, if alien parasites are introduced with translocated animals, this may have broad, long-term and unforeseeable effects on the recipient ecosystem even if the parasites are benign to the animals being translocated. Conversely, naive animals may be released into an area where certain potentially pathogenic parasites are endemic. In this case, in addition to the potential for the translocated animals being adversely affected, the introduction of new hosts for the extant parasites may influence the existing host-parasite relationships with other species in the area.

Translocated animals can import new (or alien) parasites, which can result in undesirable consequences to the target species (either the animals translocated or animals of the same species already resident in the area), to other species already established at the site of translocation, or to both of these. This risk may be increased if the animals being introduced have been kept in captivity for a period prior to their release because animals in captivity are at risk of infection with parasites which are foreign to either 1) that particular species, 2) the area of the animal's origin, 3) the area of the animal's destination, or 4) a combination of these. In general, these risks are increased the longer an animal is kept in captivity and the further away from its natural habitat an animal is housed. Also, there are good behavioural and genetic reasons for minimising the time animals destined for reintroduction are kept in captivity (e.g. see Frankham et al. 1986). Good practice dictates that the following guidelines (from Cunningham 1996) are followed as closely as possible by captive breeding and release programs in order to minimise disease risks from the translocation of captive animals to the wild:

- Maintain the animals in captivity as near to the site of capture/release as possible (preferably in the country/region of origin).

- Maintain the animals in captivity for as short a period as possible.
- Prevent contact (either direct or indirect) between the animals in question and those from a different source or of a different species.
- Keep and handle the animals under hygienic conditions in order to minimise the risk of parasites being passed to them.
- Take precautions to avoid the transfer of parasites from feedstuffs to the animals.

Although it may appear to be desirable for animals in captivity to be kept parasite-free, this is not necessarily the case provided the parasites they harbour are those they would be exposed to in their natural habitat. In fact there are good genetic and ecological reasons for the maintenance of such a parasite burden in captive stock, although some control measures may be required in order to prevent possible deleterious effects augmented by captivity.

In addition to ensuring that all criteria are met in the IUCN guidelines for wildlife translocations (IUCN 1998), when formulating animal translocation programs the following points should be considered in order to reduce associated disease risks: 1) If no diseases are recorded for the species in question, it does not follow that this species is not susceptible to disease. 2) It is not only adult animals that carry, or are susceptible to, pathogenic organisms. 3) Clinically healthy animals should not be regarded as being parasite free per se. 4) Therefore the same care and conditions should be applied to all animals and to all stages of the life-cycle although the methods used for the detection of parasites will depend on the species involved, the stage of the life-cycle and the methodology of the reintroduction program itself. 5) The translocation of animals to areas devoid of related species is helpful in decreasing the risk of interspecific transmission of disease. 6) If risk assessment and reduction is not possible, the program should only be continued if the conservation risk of not doing so were to be so great as to justify it. It is of paramount importance that the introduction of parasites into an area that is naive for that parasite is avoided. Similar practice is generally accepted for the introduction of other alien (usually vertebrate or plant) species to naive habitats.

Before carrying out a wildlife translocation, the disease risks should be assessed and precautions should be taken to minimise these risks (e.g. see Cunningham 1996, Woodford 2001). The benefits of the intervention must be carefully weighed against possible adverse effects of accidental parasite introduction before deciding whether or not such an intervention can be justified. Regular reviews following the commencement of release programs may be required in order to monitor both the health of the translocated animals and any changes in the parasite status of extant species. Often it will not be possible for a risk assessment and reduction exercise to be carried out for wildlife translocation programs, for example because of a lack of funding or expertise. Because of the potentially disastrous consequences of the introduction of alien parasites, translocation programs (particularly those involving animals sourced from captivity) should only be conducted if the conservation priority is judged great enough to outweigh the potential risks. As both the conservation significance of an animal translocation program and the interpretation of a risk assessment exercise can be subjective, such a judgement should be made by an outside specialist body, such as the appropriate Specialist Groups of the International Union for the Conservation of Nature and Natural Resources.

Summary
The translocation and release of animals as part of conservation programs can seriously compromise conservation efforts via the co-introduction of parasites, or via disturbances of the existing parasite-host ecology of the region. These threats are not merely academic and should be thoroughly and adequately addressed before any attempts at translocation are commenced.

References
Cunningham, A.A. (1996) Disease risks of wildlife translocations. Conservation Biology. 10: 349-353.

Daszak, P., Cunningham, A.A. & Hyatt, A.D. (2000) Emerging Infectious Diseases of Wildlife: Threats to Biodiversity and Human Health. Science. 287: 443-449.

Frankham, R., H. Hemmer, O.A. Ryder, E.G. Cothran, M.E., Soule, N.D. Murray, and M. Snyder. 1986. Selection in captive populations. Zoo Biology 5: 127-138.

IUCN (1998) Guidelines for re-introductions. IUCN/SSC Reintroduction Specialist Group, Gland, Switzerland & Cambridge, U.K. 10pp.

Woodford, M. (2001) Quarantine and health screening protocols for wildlife prior to translocation and release into the wild. Office International des Epizooties, Veterinary Specialist Group/SSC, IUCN, Care for the Wild International and the European Association of Zoo and Wildlife Veterinarians. Paris, France. 104 pp.

9 The IUCN Re-introduction Specialist Group moves towards facilitating the development of taxon-specific re-introduction guidelines

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The need for some form of IUCN assistance and coordination for wildlife translocation projects became apparent in the late 1980s with the increasing use of re-introductions as a wildlife conservation management tool. Growing numbers of re-introduction projects worldwide and demand by re-introduction practitioners for suitable guidelines led to the formation of the IUCN/SSC Re-introduction Specialist Group (RSG) as a thematic specialist group of the Species Survival Commission (SSC) by 1988.

IUCN Position Statement on Translocation of Living Organisms

In 1987 the IUCN developed the *IUCN Position Statement on the Translocation of Living organisms* (IUCN, 1987). This position statement acknowledged that translocation is a powerful tool in the management of the natural environment and when properly used offers great benefits to natural biological systems and to humans, but if misused has the potential to cause enormous damage. The dangers of introducing animals outside their historical range were particularly highlighted.

IUCN Guidelines for Re-introductions

Although the translocation position statement helped to raise awareness of the pros and cons of deliberate and mediated movements of animals, it was subsequently felt that there was need for more specific guidelines to consider the issues involved in translocations for species restoration purposes. Despite being widely used by conservationists, the definition, process and techniques for re-introductions were surprisingly not well defined. An international task force was established to draft more detailed guidelines, a process which culminated in the development of the *IUCN Guidelines for Re-introductions*, a general policy document covering both animals and plants. This key document was finalized in 1995 and became official IUCN policy after an exhaustive international review process. The guidelines are currently available as printed booklets in English, French, Spanish, Russian, Chinese and Arabic (IUCN, 1998). Following their worldwide distribution the guidelines have been adopted by many countries, for example in the Seychelles, and by regional bodies such as the European Union (EU), to ensure that re-introduction projects are conceived and run according to an internationally accepted set of standards. A

consequent trend is that the RSG is now approached less frequently in the beginning stages of re-introduction projects, but becomes more involved in the advanced stages to assist re-introduction practitioners in developing detailed re-introduction proposals and projects.

Species and Taxon Specific Guidelines

While the development of the general *IUCN Guidelines for Re-introduction* provided valuable guidance on many of the generic issues concerning re-introductions, the focus of re-introduction projects worldwide encompasses a growing number of taxa. It has become evident that the unique challenges facing the re-introduction of say, an endemic passerine in Hawaii, may differ markedly from those facing re-introductions of mammalian carnivores, fish, invertebrates, or plants. This diversity of projects has highlighted the need for more detailed and specific guidelines. As more species -specific re-introductions take place, understanding of the correlates of re-introduction success or failure improves, and well-documented project outcomes can be collated as examples of "best-practice" for a particular species or taxon. These best-practice lessons can be combined within the existing framework of the general *IUCN Guidelines for Re-introduction*, to form species or taxon-based guidelines.

Guidelines for Nonhuman Primate Re-introductions

There are many primates facing extinction and one common conservation action is to restore wild populations. There are numerous projects worldwide which aim to re-introduce primates into the wild. Primate re-introduction projects are very contentious as highly-intelligent mammals such as primates are difficult candidates for re-introduction. These guidelines, finalized in 2002, were developed to assist primate re-introduction practitioners by providing them with best-practice approaches based on past attempts and lessons learned.

Guidelines for African elephant Re-introductions

The RSG is also in the process of developing guidelines for African elephant re-introductions in conjunction with the IUCN/SSC African Elephant Specialist Group (AfESG). There is an increase in the number and scope of African elephant translocation projects, with some attempts having been successful, whereas others have not. These guidelines will be designed to assist African wildlife authorities to make informed decisions about re-introductions as a tool for establishing, building or maintaining a viable, self-sustaining population of African elephants in the wild, and thereby promoting the long-term conservation of Africa's elephants throughout their range. This co-operation between two specialist groups of the Species Survival Commission (SSC) is also encouraged in the current SSC Strategic Plan.

Conclusion

The RSG held a Strategic Planning Workshop during March 2002 to define the RSG strategy for the next 3 to 5 years within the framework of the IUCN/SSC Strategic Plan (2001-2010). There are 3 main objectives in the SSC Strategic Plan; the 1st objective states that: "*Decisions and policies affecting biodiversity [are] influenced by sound interdisciplinary information*". The SSC output for this objective is "*1.3: Status of key taxonomic groups assessed*"; the RSG contribution to this output is "*produce taxon specific re-introduction guidelines*". The RSG now has a clearly defined organizational structure with 7 Regional Chairs and 6 Taxonomic Section Chairs. With this structure in place the RSG is now well placed to assist re-introduction practitioners worldwide in developing species- or taxon-specific guidelines.

10. Recent publications on Northern Bald Ibis

10.1 Some publications and proceedings related to Northern Bald Ibis that have appeared since 2000, with abstracts where available.

Bowden, C.G.R., Aghnaj, A., Smith, K.W. & Ribi, M. (2003, in press). The status and recent breeding performance of the last known wild population of northern bald ibis* Geronticus eremita*, on the Atlantic coast of Morocco. *Ibis.*

Abstract
The last known wild population of the Northern Bald Ibis breeds on the Atlantic coast of Morocco in the Agadir region. This paper describes the numbers of breeding pairs over the last two decades, the recent breeding performance, the causes of egg and chicks losses and their conservation implications.

Since 1980 there has been no overall decline in numbers with, over the last five years, 59-74 pairs breeding and a peak pre-breeding population of around 220 birds. In contrast with the now extinct Northern Bald Ibis populations in Turkey and elsewhere in Morocco, the birds are present in the Agadir region throughout the year and do not appear to migrate from the area outside the breeding season. Breeding performance is highly variable from one year to the next but does not appear to be related to rainfall in the vicinity of the colonies as has been reported elsewhere. It is suggested that coastal fogs in this region may buffer the adverse impacts of low rainfall and may in part account for the year round residency of the birds.

The main causes of breeding failures have been loss of eggs to predators and, most importantly, poor chick survival as a result of starvation and predation. Conservation action to date has focused on reducing the negative influences on breeding success but it is recognised that for such a long lived bird adult survival is also likely to be an important limiting factor on the population size.

Bozkurt EU, Duzler A, Ozgel O, et al. (2002) Morphometric and morphological features of the bones of the wing in bald ibis INDIAN VET J 79 (5): 470-476 MAY 2002

Dursun N, Duzler A, Bozkurt EU, et al. (2002) Macro-anatomical investigations on sternum in bald ibis INDIAN VET J 79 (2): 160-165 FEB 2002

Dutton CJ, Allchurch AF, Cooper JE (2002) Comparison of hematologic and biochemical reference ranges between captive populations of northern bald ibises (Geronticus eremita) *J WILDLIFE DIS 38 (3): 583-588 JUL 2002*

Abstract
Hematologic and biochemical reference ranges for two captive populations of northern bald ibises (Geronticus eremita) were compared. The first consisted of 11 birds at an in-situ breeding colony in Birecik, southern Turkey. The second consisted

of 27 birds housed at the Durrell Wildlife Conservation Trust in Jersey, British Channel Isles (UK). Blood samples were collected in February 1992 by basilic venipuncture under manual restraint. Birecik birds had higher packed cell volumes and red blood counts but lower white blood cell and lymphocyte counts than Jersey birds. Birecik birds also had higher total protein, albumin, total globulin, calcium, phosphorus, blood urea nitrogen, and total bilirubin values; higher albumin to globulin ratios; but lower uric acid values and calcium to phosphorus ratios than Jersey birds. Finally, Birecik birds had higher lactate dehydrogenase but lower gamma glutamyl transferase values than Jersey birds. Male Jersey birds had higher calcium and alkaline phosphatase values, but lower white blood cell and heterophil counts than female Jersey birds. The apparent differences between the two populations are not thought to be biologically significant and may be related to diet and state of hydration.

Ozgel O, Duzler A, Bozkurt EU (2002) Macro-anatomical investigations on ossa cinguli membri thoracici in Bald ibis INDIAN VET J 79 (7): 700-707 JUL 2002

Pegoraro K, Foger M, Parson W (2001) Mitochondrial DNA sequence evidence for close relationship of Bald Ibis, Geronticus calvus, and Waldrapp Ibis, G-eremita OSTRICH 72 (3-4): 215-216 SEP 2001

Pegoraro K, Foger M, Parson W (2001) First evidence of mtDNA sequence differences between Northern Bald Ibises (Geronticus eremita) of Moroccan and Turkish origin J ORNITHOL 142 (4): 425-428 OCT 2001

Abstract
We examined two segments of the mitochondrial genome of Moroccan and Turkish Bald Ibises. One point mutation was consistently discovered in a 307 bp portion of the cytochrome b gene which was population specific. This is the first indication of a genetic differentiation between the two populations. The consequences of this finding for the conservation of the highly endangered bird are discussed. In future captive breeding and releasing programmes, only birds of known origin should be used.

Rice P.M., Aghnaj A., Bowden C.G.R., Smith K.W., Fox H.R. & Moore H.M., (2002) The landscape ecology of the Northern Bald Ibis Geronticus eremita in the Souss-Massa National Park, southern Morocco, in Chamberlain D. & Wilson A. (eds), Avian Landscape Ecology: pure and applied issues in the large-scale ecology of birds, Proceedings of the eleventh annual IALE(UK) conference, held at University of East Anglia, 10 th - 13 th September 2002, pp 264-272.

Abstract
The Souss-Massa National Park in southern Morocco supports the majority of the last remaining breeding population of the critically threatened Northern Bald Ibis Geronticus eremita. As a contribution towards management planning this paper identifies good quality Northern Bald Ibis feeding habitat in the Park, using, landscape mapping and classification as a basis for feeding habitat suitability modelling. The results demonstrate that feeding habitat can be accurately predicted and mapped at the landscape scale, landscape ecology contributing significantly to

the identification of the vegetation and land use characteristics of 'good' steppe feeding habitat and within the Park. The results presented here clarify Northern Bald Ibis feeding habitat requirements in the Park both in terms of its quality and distribution and represent an important step towards identifying priority areas for conservation and the targeting of resources.

Serra, G (2003) The discovery of Northern Bald Ibis in Syria. World Birdwatch 25 (1):10-13.

Tintner A, Kotrschal K (2002) Early social influence on nestling development in Waldrapp ibis (Geronticus eremita) ZOO BIOL 21 (5): 467-480 2002

Abstract
The Waldrapp ibis is critically endangered; hence specific knowledge is needed to support the management of the last birds in the wild, and to prepare for reintroduction projects. In this study we attempted to test the effects of raising an ibis as a single chick from hatching to the age of 3 weeks, as compared to raising it together with nestmates, on development and juvenile socialization. In times of food shortage, interference competition between nestlings may cause quick starvation of all but the largest chick. In the context of establishing a free-flying, semi-tame colony of Waldrapp ibis at the Konrad Lorenz Research Station in Grunau, Austria, 12 zoo-bred hatchlings were experimentally hand-raised under ad libitum food conditions. Seven individuals were placed into three nests in visual and acoustical contact with each other to mimic a colony situation. Five others were raised in isolation their first 21 days after hatching and then were united with the sibling-raised individuals in a colony-like situation. After hatching, isolated chicks showed high frequencies of distress calls; they begged and ate less, put on less weight, and were less active than the socially-housed chicks, and fledged an average of 6 days later. As the groups did not significantly differ in excreted corticosterone metabolites, we assume that the lack of social stimulation, rather than stress, caused the observed effects in the single-raised chicks. After unification, individuals of both groups tended to stay apart from each other. Formerly single-housed birds mainly interacted dyadically among themselves, whereas the sibling-raised birds tended to have more varied contacts with colony members of different ages. The potential applications of these results to conservation and management are discussed. (C) 2002 Wiley-Liss, Inc.

10.2 Reports and ongoing work related to Northern Bald Ibis

Mark Hofling, (Regional Studbook keeper & AZA Population Manager for Waldrapp for North America, WCS)
Analysis and breeding recommendations: Waldrapp Ibis Geronticus eremita, Population management plan (draft, for North American captive population) Wildlife Conservation Society/Bronx Zoo, New York. 2003 Pp27

Cunningham (2001) Investigation of disease threats to the Northern Bald Ibis Geronticus eremita in Morocco. Andrew Cunningham, Zoological Society of

London. Report to Royal Society for the Protection of Birds and Souss-Massa National Park. 2001 pp29

Ramnath, KM (2002) A behavoiural study of feeding enrichment of the Waldrapp ibis (geronticus eremita) colony at Edinburgh Zoo and a comparison with the London Zoo colony. *Kristel-Marie Ramnath, MSc dissertation, Institute of Ecology & Resource Management, University of Edinburgh. 2002 pp53*

Bowden, C. & Tavares, J. (2001). Bireçik, South-eastern Turkey: An update on the situation of the semi-wild Northern Bald Ibis Geronticus eremita population. Summary of a visit 18-20 December 2000. RSPB unpublished report, RSPB, Sandy, UK.

Bowden, CGR, Serra G, Budieri, A & Al Jbour, S (2002) Report on a visit by BirdLife International in response to the recent discovery of breeding Northern Bald Ibis in the Palmyra region of Syria. RSPB unpublished report, RSPB, Sandy, UK pp10

Ozbagdatli, N. (2001). The current situation of the Northern Bald Ibis, south-eastern Turkey. A report on the status of the population from observations between May and July of 2001. Unpublished report to DHKD, Ankara, Turkey.

Tavares J, Bowden C, Cunningham A & Taylor B (2003) Conclusions and recommendations of a technical visit to Birecik Kelaynak Breeding Station, 22-23 October 2002. *RSPB unpublished report, RSPB, Sandy, UK.*

10.3 Some publications and proceedings related to Southern Bald Ibis *Geronticus calvus*

Kopij G (2001) Feeding ecology of the Southern Bald Ibis, *Geronticus calvus*, in the Free State, South Africa OSTRICH 72 (3-4): 193-198 SEP 2001

Abstract
The feeding ecology of the Southern Bald Ibis, *Geronticus calvus*, was studied in the Free State Province, South Africa, during two breeding seasons in 1994 and 1996. Fields of harvested maize, burnt grass and overgrazed pastures are the main feeding habitats of the birds in this region throughout the breeding season. The ibises forage mainly in flocks ranging from 2 to 24 birds ((x) over bar = 5), often in association with cattle and other animals. Analysis of stomach contents, pellet contents and food remnants revealed that larvae of Busseolo fusca (Lepidoptera: Noctuidae) and imagos of Coleoptera constitute the staple food. These larvae were collected from maize stalks trampled by cattle, while Coleoptera were collected mainly from dung, grass clumps and from the ground in pastures. A considerable amount of inorganic matter, such as pieces of glass, porcelain, plastic, metal, buttons and gravel, was also found.

Kopij G, Kok OB, Nuttall RJ (2000) Breeding cycle of the Southern Bald Ibis, *Geronticus* calvus OSTRICH 71 (3-4): 393-399 SEP 2000

Abstract
The breeding cycle of the Southern Bald Ibis, *Geronticus calvus*, was studied at a colony In the eastern Free State. Birds were paired before breeding commenced and nest building began regularly two weeks before the first eggs were laid. Nesting material was collected chiefly by the male. Incubation started with the first egg and lasted 26-32 days. Both sexes incubated, the female usually in the morning, the mole around noon, and both sexes in the afternoon. Hatching is asynchronous with intervals between eggs ranging from one id four days. Both parents participate in rearing the young; the female broods more often, while the mole brings the bulk of the food for the nestlings that were fed 3-4 times a day. Strong competition for food between nestlings war recorded. Nestlings remain in nests for at least 35 days.

News items

1 Have Northern Bald Ibis gone from Algeria?

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As one of the activities of the Algerian National Agency for the Conservation of the Nature, which has as one of its goals the survey and follow-up of threatened wild animal species, we attempted to visit and find out more about the last sites where nesting Northern Bald Ibis (*Geronticus eremita)* were known from in Algeria.

A visit to the site was made in the South West region, about 20 km South of El Bayadh in May 2002, where sadly we confirmed that the breeding cliff is not currently used. Other species of bird such as the Lanner Falcon Falco biarmicus, the Brown-necked Raven Corvus ruficollis, the Rock Dove Columbia livia and the Rock Martin Ptynoprogne fuligula were using the cliff.

The immediate surroundings of the site once considered as natural steppe, are now newly converted to agricultural land.

Some information from L.BAHMANE (a former forester, specialist of the wildlife of the region) shows that the beginning of the decline of the bald ibis population started from 1984 when twenty individuals were there, but declined to 6 or 7 by 1986 and 1987.

Up until now, we do not have reliable information to explain the disappearance of this colony from this site.

We are currently prospecting other potential sites, where unconfirmed reports suggest that 3 individuals were seen in 1996, in the region of Labiodh Sidi Chikh situated about 100 km to the south of the former colony.

2 Checking whether Northern Bald Ibis could occur in Somalia

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As a result of searches for the species in Yemen, the Yemen Ornithological Society provoked the publication of an article in 1996 in ‘The Yemen Times’ newspaper, complete with a colour illustration of the bird. An unconfirmed report was received of a colony in Somalia as a result of this. There is only one published record of the species from Somalia, back in 1920, but the recent news from Syria shows that this does not necessarily rule out the possibility of the existence of a remote colony. Owing to political instability and difficulty of access to the area in question, it has not

yet been possible for ornithologists to verify or refute this story. It is hoped that this can be rectified once the situation is sufficiently stable to allow a visit.

3 Proposal to build artificial nest cliff on a barrage wall for Southern Bald Ibises

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The development of dam construction in South Africa has lead to an unusual idea to construct the dam wall complete with nesting cavities suitable for Southern Bald Ibis. The artificial 'cliff' would be a replacement for a current breeding site of the species, which will be flooded by the project. It would be one of a wider suite of conservation mitigation measures, which could be a useful trial for other potential sites that lack a suitable nesting cliff, and perhaps even be relevant to the closely related Northern Bald Ibis, which uses very similar nest sites.

4 Tunisia as a potential release site for Northern Bald Ibis?

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The possibility of a reintroduction was examined for Tunisia, but following a detailed literature search, the lack of historical evidence for the occurence of Northern Bald Ibis in Tunisia means that the idea has now been dropped.

4 Student and other projects currently underway on captive Northern Bald Ibis:

4.1 An Investigation and Evaluation on the Nutrient Intake and Output of the Waldrapp Ibis (Geronticus eremita)

Ross Brown, HND Animal Management, Sparsholt College, Hampshire, UK

Aim: To collect faecal samples and carry out diet analysis to compare what they are eating with what they are excreting, to find out the nutritional intake. The work will be carried out at three zoos: Dublin, Marwell and Cotswold Wildlife Park, in Ireland and UK.

4.2 Space utilisation by Northern Bald Ibis within their enclosures, to review optimal design of aviaries

Amelie Malgras, MSc Conservation Biology, Manchester Metropolitan University, Manchester, UK

Aim: To study whether Northern Bald Ibis use all space available to them, and any intra- and inter-specific hierarchies (when other species held in the same enclosure) that might influence space utilisation. The work will be carried out at Chester Zoo, UK.

4.3 Testing ways to reduce the incidence of 'Bumblefoot' in captive Northern Bald Ibis

Helen Ashby, BSc Animal Behaviour, Anglia Polytechnic University, Cambridge, UK.

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Aim: To investigate methods of preventing the development of Bumblefoot in a captive colony of seven Northern Bald Ibis at Tilgate Nature Centre, Sussex.
I intend to concentrate on trying to increase the feeding times/activity levels of these birds by using novel ways of displaying their food such as foraging boxes, sac feeding and feeding of carcasses (poultry chicks).

4.4 Calibration of prey remains found in northern bald ibis faeces to aid a study of the diet in wild birds.

Widade Oubrou, Research coordinator for Souss-Massa National Park, Eaux et Forets, BP 107, Inezgane, Agadir, Morocco

Following earlier work by Derek Gruar of RSPB, the aim of this work is to further calibrate the numbers of prey fragments relative to feeds of know food items to a captive bird. It appears that some fragments pass through much more readily than others, which could otherwise lead to misinterpreting diet analysis results without such a calibration study.
The work will be carried out at Temara Zoo, Rabat, Morocco.

4.5 Feeding ecology of the Grünau free-flying Northern bald ibis

Margit Kiernbauer, MSc student University of Graz

Theresia Markut, MSc student, University of Vienna

During spring and summer, 25 freely foraging birds are observed by Margit Kiernbauer and several practivum students at the meadows around the village Grünau/Austria and food items and scrounging interactions are recorded. At the same time Theresia Markut, another masters student samples quantitatively

earthworms and arthropods from the meadows used by our birds. No supplemental food is provided to the birds during the observation period. Every evening, the non-breeders among these birds return to their night roost, an aviary in the Cumberland wildpark Grünau. There, the breeding pairs have their nests. In these breeding pairs, partners alternate in foraging excursions to the Grünau meadows, approx. 5 km North of the aviary.

4.6 Cooperation of pair partners of the Grünau free-flying Northern bald ibis

In 2002 the free-flying Northern bald ibis of the Konrad Lorenz Forschungsstelle, Grünau, Austria started to breed. 21 birds produced 9 nests and finally, 4 fledged young. One incubating female was lost during a foraging excursion, probably to a bird of prey. After a series of changes between pair partners, the colony produced only 2 nests 2003. Starting with 2002 we monitored the cooperation between partners over incubation and feeding the chicks. Preliminary results resemble those reported for the Southern bald ibis (Kopij et al. 2000, see below).

4.7 Social challenge and sex steroids in the Grünau free-flying Northern bald ibis

Enrico Sorato, PhD student. University of Padova

A pilot project 2002 revealed a remarkable symmetry between pair partners in excreted sex steroids, notably testosterone (determined from faeces, by EIA) during the sexual and parental phases of the year. This coincides with behavioral and morphological monomorphy of the sexes. This year, Enrico Sorato is investigating this. Questions are, whether and to what degree, social challenges increase testosterone excretion in the two sexes and whether there are payoffs in terms of the cellular immune response. One of the payoffs of increased testosterone levels may be reflected by this years failure to build a nest and lay eggs despite courtship and copulations in the newly formed couples.

4.8 Teaching the Northern bald ibis a new migration route

The free flying Northern bald ibis of the Konrad Lorenz Forschungsstelle have revealed that this species can exist and find plenty of food for themselves and their chicks in the extensive agricultural areas North of the Alps. However, in winter birds need to migrate South. Yearlings still show the tendency to migrate and will generally leave in fall, if not locked into the aviary (own results from 1997 and 1998). Hence, towards reintroduction, this hurdle has to be overcome. In 2002, it could be shown by J. Fritz and coworkers, that 11 hand-raised Northern bald ibis indeed followed ultralight planes and that fly routes could be established that way. In August 2003, the Alps shall be crossed with these and 10 newly raised birds into a suitable wintering area at the coast of W Italy, approx. 100 km North of Rome (for more information see www.waldrappteam.at).

5 Link web sites with more information

http://www.univie.ac.at/zoology/nbs/gruenau

http://www.waldrappteam.at

www.rspb.org.uk (put Bald Ibis in search on home page)

www.birdlife.org.uk

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Likewise, if you have information that you think would be of interest to IAGNBI or others, we would be delighted to hear from you.