Birds in Zoos in England: An Assessment of Welfare, Conservation and Education in 2013



Report by Craig Redmond Commissioned by the Captive Animals' Protection Society This report has been researched and written by Craig Redmond on behalf of the Captive Animals' Protection Society.

Craig Redmond is an independent animal rights consultant who was previously CAPS' Campaigns Director, having worked at the charity for over a decade. He has extensive knowledge of the zoo industry and has coordinated previous investigations and research projects into UK zoos. In addition, he has several years' active involvement in programmes to protect migratory birds from illegal hunting across the Mediterranean.

The Captive Animals' Protection Society (CAPS) is a UK-based charity leading the campaign to end the use of animals in entertainment.

Through a combination of undercover investigations, research, campaigns, political lobbying and education, CAPS aims to stop the exploitation of animals in entertainment, particularly in zoos, circuses and the exotic pet trade.

The charity's evidence-based campaigns and strong ethical basis ensure we can make a significant difference to the lives of animals in ending their exploitation.

Working for a world without cages, CAPS encourages a more compassionate attitude and relationship between humans and other animals.

The Captive Animals' Protection Society is a registered charity and receives no government funding. Registered number: 1124436

We wish we could fly, We wish we could hear the tiniest of sounds And swoop gracefully and swiftly To the most definite of conclusions.

The wind and wing's secret is this;

We do fly, We do hear the tiniest of sounds. We do arc and swoop, with ultimate grace To the most definite of conclusions.

> Jont, Mexico City, August 2005 (Quoted in Nozedar, 2006)

Cover photo: Tethered Rüppell's griffon vulture (*Gyps rueppellii*) All photos: Craig Redmond

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Executive Summary

The welfare of birds in zoos has, until now, been a fairly neglected issue. This is despite decades of debate about the ethics of captivity, and research on specific species, mostly mammals (particularly cetaceans, elephants and wide-ranging carnivores).

This study was commissioned by the Captive Animals' Protection Society in an attempt to redress this balance and provide some perspective and evidence on growing areas of concern, such as the restriction on birds' abilities to fly through management practices of zoos (i.e. pinioning and tethering). Welfare, conservation and education were the main areas to be addressed in this study.

A random sampling of licensed zoos in England provided a list of 20 zoos for which analysis on a number of factors was conducted in order to provide a greater understanding of issues.

Key findings include:

28% of sampled zoos with a dispensation (which reduces the level of conservation and education requirements they have to meet under zoo licensing requirements) should not have a dispensation.

Of the 10 most common species in zoos, only one is a threatened species; 7 are classed as Least Concern.

More than half of the 81 enclosures assessed in detail by the study author and a bird behaviourist were overcrowded (54%) and not environmentally varied (62%). The majority lacked enrichment (91%), appropriate substrate (63%) or species-appropriate features (87%). Even perches were lacking in number (in 78% of enclosures). 82% of enclosures did not have appropriate bathing or swimming facilities.

The majority of enclosures (68%) fail to meet minimum recommended sizes that would allow birds to take several wingflaps or strides.

Several birds with injuries or abnormal behaviours were observed; most were likely caused by the conditions the birds are confined in.

Mortality rates for birds in zoos would appear high. Further research is required and licensing authorities and zoo inspectors need to start questioning zoos when they believe mortality rates are higher than expected.

Flight restrictions of varying kinds are probably the biggest welfare problem facing birds in zoos, yet they are also one of the least discussed. These restrictions include surgical mutilations (e.g. pinioning) which permanently disable a bird and prevent them from ever flying again, mainly used on waterfowl, storks, cranes and flamingos. Two of the sampled zoos pinion all of their birds.

In sampled zoos which tether birds of prey, up to half of all birds were restricted in this way. Zoos claim such birds are flown every day but this study shows this to be highly unlikely and even when birds are flown in displays it is just for a few minutes. Smaller owl species, which are widely seen as unsuited to this restraint, were seen to be tethered at some zoos visited. 62% of birds in zoos which tethered were not provided with shelter and water.

Overall, 63% of all birds in zoos that use flight restriction methods were either pinioned, wing clipped or tethered – over 2,600 birds in total.

Zoos are failing in terms of conservation, including in their legal requirements, and there is little information published by the individual zoos to show what, if anything they do to serve conservation. Over 80% of the individual birds in the sampled zoos are not of threatened species and there appears to be minimal involvement in co-ordinated breeding programmes and even less in actually reintroducing species to their natural habitats.

Likewise, education standards were poor. 12% of signs on enclosures did not identify the species correctly and over half (58%) of zoo websites did not give detailed information about their birds.

Presentations and talks provide the perfect opportunity to really educate an audience about a particular species, their behaviours, biology and habitats, as well as the threats they face in the wild and what people can do to support conservation efforts. Yet, less than a third of zoos offer either a presentation or a talk involving/about birds and none gave any detailed information on conservation despite sometimes directly discussing threatened species.

Finally, the ethics of zoos is discussed, with it being seen as infringing on the basic needs of animals to confine them for the purposes for which they are kept in zoos.

Chapter 1 Introduction

The Captive Animals' Protection Society and other organisations concerned about the captivity of animals in zoos and the ethical, welfare, conservation and other issues arising from this, have previously conducted various research projects and investigations to address these concerns. In 2012 CAPS published a detailed study on the zoo licensing system in England (Casamitjana, 2012) and in 2004 published the only in-depth report into conditions in UK aquariums (Casamitjana, 2004).

So far, the welfare of birds in UK zoos has not received the same level of attention as other animals and as a result of discussions with other organisations and bird experts in early 2012, CAPS decided to conduct an initial study on the topic.

Although this study follows a well-designed methodology and thorough research, CAPS requested that this not be strictly a 'scientific' report; rather it is meant to provide areas of discussion, a brief analysis of conditions in a small sample of UK zoos and highlight further areas of research for future projects.

Following on from those discussions between CAPS and others about the welfare implications for birds in zoos, a number of key issues were highlighted for research. Those selected for final inclusion in this study were:

- Mutilations and physical restrictions such as pinioning, wing-clipping and tethering
- Enclosure suitability
- Use of birds in public displays (welfare and education problems)
- Whether captive breeding of birds in zoos serves any conservation purpose
- Whether the display of birds in zoos serves any education purpose

1.1 Legal definition of zoo

The European Commission Zoos Directive (Directive 1999/22/EC) requires EU Member States to regulate zoos in accordance with its provisions. The Directive is transposed into national legislation in England by means of the Zoo Licensing Act 1981 (Amendment) (England and Wales) Regulations 2002. A zoo is defined under the Act as:

"An establishment where wild animals [...] are kept for exhibition to the public otherwise than for purposes of a circus [...] and otherwise than in a pet shop [...]. The Act applies to any zoo to which members of the public have access, with or without charge for admission, on seven days or more in any period of 12 consecutive months. Under the EC Zoos Directive, zoos may be exempted from the requirements of the Directive on the grounds that they do not exhibit a significant number of animals or species to the public."

(DEFRA, 2012a)

1.2 Methodology

A variety of different research methods were used, including visits to randomly sampled zoos.

1.2.1 Sampling of zoos

Part of this study examines a number of randomly selected zoos. Animal Health (a department of DEFRA – Department of Environment, Food and Rural Affairs) produces a list of licensed zoos in England. At the time of starting this study, the most current publicly-available list was dated 2011 and was published on DEFRA's

website (DEFRA, 2012c). This is the only official list of zoos anywhere in the UK as no such lists exist for Wales or Scotland.

The list puts each establishment into one of the following categories:

- Bird of Prey
- Other Bird
- General Mixed
- Reptile/Amphibian
- Farm Park
- Aquarium
- Invertebrate
- Other

280 zoos are included in the 2011 Animal Health list. 76 (27%) of those are bird zoos: 40 are classed as 'Bird of Prey' and are generally falconry centres or other collections specialising in displaying birds of prey; 36 are classed as 'Other Bird' and consist of Wildfowl and Wetland Trust establishments, council-owned aviaries in parks and other collections specialising in birds other than birds of prey (although Animal Health does not explain how it categorises 'Other Bird' zoos).

In line with CAPS' previous study on zoo licensing (Casamitjana, 2012), the main section of this study examines only zoos in England, based on the official Animal Health list. In order to ensure that zoos with few or no birds were not selected for this study, only zoos classed as 'bird of prey', 'other bird' and 'general mixed' were used for the basis of a random sampling.

Of the 280 zoos on the Animal Health list: 40 are classed as 'Bird of Prey' 36 are classed as 'Other Bird' 83 are classed as 'General Mixed'

Using these categories give a maximum total number of 159 zoos to sample from.

1.2.2 Number of zoos to assess

Twenty zoos were chosen for which closer examination of standards and practices would be conducted. Whilst it is recognised that this is a fairly small sample number for which to then try and make comparisons to other, non-selected zoos, the purpose of this report was to provide an initial analysis of standards for birds in UK zoos and will form the basis of future research.

1.2.3 Random sampling

An Excel spreadsheet was compiled using the data from the 2011 Animal Health list of zoos in England – name of zoo, dispensation status, licensing authority and category of zoo. Zoos that did not fit into one of the categories of 'Bird of Prey', 'Other Bird' or 'General Mixed' were excluded.

The 159 zoos were all given a unique code to replace their actual name so that they could not be identified. Using Excel's random sampling function, each was also given a sampling code and the function used to randomly sort all the zoos. The first 20 zoos were then selected from this list.

As these 20 selected zoos would be ones visited as part of this study it was then necessary to confirm that they met criteria such as actually having birds and still being open to the public (as the Animal Health list published in 2011).

Where any of the zoos chosen during the random sampling were not seen as suitable for the study, the next one in the list was chosen to replace it. This was either where the zoo had closed down (or would not be open to the public during the period in which visits would take place) or where the zoo had fewer than ten birds.

Four of the 20 selected zoos were considered not appropriate and were then replaced by the next ones in the randomly sampled list. The reasons for replacing these are explained in Table 1.

1.2.4 Data compilation:

Once 20 zoos had been selected which met the criteria, requests were made under the Freedom of Information Act 2000 (by CAPS on behalf of the study author), to local authorities licensing those zoos, for the following information:

- 1. All zoo inspection reports (and pre-inspection audits) for the period January 2006 to the current date (May 2012)
- 2. Copies of all stocklists for the same period. Where stocklists are not held for previous years, the latest was requested
- 3. Copies of all correspondence between the zoo and the local authority for the same period

As this initial information was collected several months before the study started, in September 2012 additional FoI requests were made to local authorities for copies of reports relating to any inspections conducted in 2012.

Once obtained, data was put into Excel spreadsheets to allow analysis and comparison.

Additional information on birds held at each selected zoo was also collected from its website, e.g. species, numbers, housing, map of zoo, map/pictures of bird enclosures, details of any public display of birds, educational materials related to birds

1.2.5 Zoo visits

During the drafting of the methodology, it was intended to put together a protocol to use for the assessment of welfare standards for birds in all of the zoos included in the study.

It was soon realised that what was being put together was similar to those already produced by the Born Free Foundation for their assessments of zoos in 20 EU Member States (BFF, 2011). Those protocols have now been frequently and extensively used by BFF; as such, they are appropriate, with some amendments, for CAPS' study.

In order to complete these protocols, during visits to zoos sampled for this study, we:

- a) Filmed every bird enclosure in accordance with the protocol's checklist (e.g. each bird, all housing, information signs) to ensure consistency
- b) Filmed at least one of each type of public performance involving birds
- c) Obtained all free and paid-for printed literature about the birds at the zoo, including guidebook
- d) Filmed and/or photographed every information sign relating to birds in order to assess their content against predetermined aspects relating to the quality of educational information

Certain aspects of the analysis of this information (welfare analysis of enclosures) then involved the participation of Greg Glendell, a bird behaviourist and welfare expert.

All zoo visits were conducted in October 2012. However, it was not feasible to visit one of the selected zoos (BPN-137) at this time: this zoo was geographically isolated from all of the others and was in an area of

England particular affected by the floods caused by heavy rain during the autumn and winter period. The zoo was eventually visited in January 2013.

1.3 Selected Zoos

The table below shows details relating to the 20 zoos randomly selected for visits for this study. As with previous CAPS studies of UK zoos, the name of the zoo has been replaced with a unique code. This assists in focusing attention on the issues raised, applicable to zoos in general, and not specifically on those individual zoos visited.

Zoo code	Type of collection	Local authority	Replaces an originally selected
		owned?	zoo?
BPF-59	Bird of Prey	Ν	No
BPK-126	Bird of Prey	N	No
BPG-20	Bird of Prey	N	Yes – closed during period of
			study
BPN-137	Bird of Prey	Ν	No
GMB-131	General Mixed	N	No
GMB-48	General Mixed	N	Yes – open by appointment only
GMB-85	General Mixed	Y	Yes - closed during period of visits
GMD-142	General Mixed	N	No
GMH-69	General Mixed	N	No
GMK-143	General Mixed	N	No
GML-119	General Mixed	N	No
GMN-99	General Mixed	N	No
GMS-4	General Mixed	N	No
GMT-1	General Mixed	N	No
OBB-111	Other Bird	Υ	Yes - not enough birds
OBC-101	Other Bird	Υ	No
OBM-146	Other Bird	N	No
OBS-7	Other Bird	N	No
OBW-129	Other Bird	Ν	No
OBW-3	Other Bird	Ν	No

Table 1: Zoological collections randomly selected for this study

Chart 1: Type of collections randomly selected for this study

Total: 20 Bird of Prey: 4 (20%) General Mixed: 10 (50%) Other Bird: 6 (30%)



Chart 2: Local authority owned zoos randomly selected for this study Total: 20

Local authority owned: 3 (15%) Not Local authority owned: 85%



1.3.1 Dispensation status

The Zoo Licensing Act 1981 provides for some zoos to be given a particular dispensation status depending on the number of individual animals of conservation sensitive or hazardous category. Section 14 of the Act provides the Secretary of State "with powers to relax the requirements of the Act for a small zoo or for a zoo exhibiting only a small number of different kinds of animals. Each case will be treated on its individual merits" (DEFRA 2012b).

14.1.a: A 14.1.a dispensation means that the Act shall not apply to a particular zoo and "the local authority will have no powers under the Act to inspect the zoo." However, the local authority may still carry out inspections under other legislation, such as the Health and Safety at Work Act 1974. It is for the local authority to seek the section 14.1.a direction.

14.1.b: This dispensation means that either a mid-term periodical or special inspection or both (but not an informal or licence inspection) shall not be required.

14.2: A dispensation under Section 14.2 reduces the number of inspectors required to assess that zoo's compliance with the legislation. Whilst this dispensation does not exempt zoos from any conservation or education requirements outlined in the Act, in recognition that these dispensations are applied if the size of the zoo or number of hazardous or conservation sensitive species is small, then it is recognised that these zoos tend to make a conservation/education contribution which is proportionate.

Dispensations are given to zoos on a case-by-case merit and are based in part on the number of individuals kept, and of species type. The key variable to assess is the presence of more than 50 individuals of hazardous and conservation sensitive species, both of which are defined by DEFRA (2012e):

- 'Hazardous' means any species listed in categories 1 and/or 2 of Appendix 12 of the Secretary of State's Standards of Modern Zoo Practice
- 'Conservation sensitive' means any species listed in Appendix I of CITES and/or listed in the following categories of the IUCN Red List of Threatened species (Extinct in the wild; Critically Endangered; Endangered; Vulnerable)

Zoo code	Type of collection	Dispensation status
BPF-59	Bird of Prey	14.2
BPK-126	Bird of Prey	14.2
BPG-20	Bird of Prey	14.2
BPN-137	Bird of Prey	14.2
GMB-131	General Mixed	14.2
GMB-48	General Mixed	None
GMB-85	General Mixed	14.2
GMD-142	General Mixed	None
GMH-69	General Mixed	None
GMK-143	General Mixed	14.2
GML-119	General Mixed	14.2
GMN-99	General Mixed	None
GMS-4	General Mixed	None
GMT-1	General Mixed	14.2
OBB-111	Other Bird	14.1.a
OBC-101	Other Bird	14.1.a
OBM-146	Other Bird	None
OBS-7	Other Bird	14.2
OBW-129	Other Bird	14.2
OBW-3	Other Bird	14.2

Table 2: Selected zoological collections and their dispensation status

Type of dispensation:

Type of dispensation	Number of zoos
None	6
14.1.a	2
14.1.b	0
14.2	12

Type of dispensation by zoo category:

Bird of Prey:

Type of dispensation	Number of zoos	
None	0	

14.1.a	0
14.1.b	0
14.2	4

General Mixed:

Type of dispensation	Number of zoos
None	5
14.1.a	0
14.1.b	0
14.2	5

Other Bird:

Type of dispensation	Number of zoos
None	1
14.1.a	2
14.1.b	0
14.2	3

Chart 3: Number of zoos with each type of dispensation – all zoos Total: 20 None: 30% 14.1.a: 10% 14.1.b: 0% 14.2: 60%



Chart 4: Number of Bird of Prey zoos with each type of dispensation Total: 4 None: 0% 14.1.a: 0% 14.1.b: 0% 14.2: 100%



Chart 5: Number of General Mixed zoos with each type of dispensation Total: 10

None: 50% 14.1.a: 0% 14.1.b: 0% 14.2: 50%



Chart 6: Number of Other Bird zoos with each type of dispensation Total: 6 None: 16.66% 14.1.a: 33.33% 14.1.b: 0% 14.2: 50%



1.3.2 Discussion on dispensation status for bird zoos

Dispensations are based in part on the number of individuals kept, and of species type, mainly the presence of more than 50 individuals of hazardous and conservation sensitive species.

Using the most recent stocklists for each zoo given a dispensation (in this case, either 14.1.a or 14.2) we can assess whether the dispensation status applied has been given correctly.

Table 3: Selected zoological collections and suitability of their dispensation status

(This table only shows zoos with a dispensation)

The number of individuals of hazardous (H) and conservation sensitive (CS) species are given in the table. As these figures are gathered independently of each other there will be some cross over (i.e. some individuals classed as hazardous will also be classed as conservation sensitive, such as the African grey parrot (*Psittacus erithacus*), Southern ground hornbill (*Bucorvus leadbeateri*) or Hooded vulture (*Necrosyrtes monachus*)). Therefore, the dispensation is only considered to be applied incorrectly if one of the figures (either H or CS) is above 50.

Stocklists were not provided for two zoos with dispensations, so we have based our decision on their dispensation status from data collected during our visits.

Zoo code	Type of collection	Dispensation status	Number of hazardous / conservation sensitive species	Dispensation correct?
BPF-59	Bird of Prey	14.2	2 CS 64 H	No
ВРК-126	Bird of Prey	14.2	2 CS 78 H	No
BPG-20	Bird of Prey	14.2	10 CS 112 H	No
BPN-137	Bird of Prey	14.2	0 CS 14 H (43 were at zoo at time of visit)	Yes
GMB-131	General Mixed	14.2	0 CS 29 H	Yes
GMB-85	General Mixed	14.2	5 CS	Yes

Zoo code	Type of collection	Dispensation status	Number of hazardous / conservation sensitive species	Dispensation correct?
			0 H	
GMK-143	General Mixed	14.2	1 CS 26 H	Yes
GML-119	General Mixed	14.2	10 CS 8 H	Yes
GMT-1	General Mixed	14.2	4 CS 43 H	Yes
OBB-111	Other Bird	14.1.a	0 CS 6 H	Yes
OBC-101	Other Bird	14.1.a	No stocklist	Based on visit, Yes
OBS-7	Other Bird	14.2	No stocklist	Based on visit, Yes
OBW-129	Other Bird	14.2	143 CS 7 H	No
OBW-3	Other Bird	14.2	22 CS 0 H	Yes

Table 3 shows that four (28.57%) of 14 zoos have an incorrect dispensation (14.2 when they should have none), based on the number of hazardous / conservation sensitive species they keep. One has 143 individuals of species classed as threatened, almost three times the limit allowed for its dispensation. Another has 112 hazardous birds, more than twice the limit.

Casamitjana (2012), in a study of the effectiveness of zoo licensing in England, found that 49% of licensed zoos had been assigned the wrong dispensation. For bird of prey centres (accounting for three of the four wrongly given a dispensation in Table 3, above), the figure was 69%, the highest amongst all types of zoo.

1.3.3 Official zoo membership

All licensed zoos in Europe are required to meet the same basic level of standards for animal welfare and conservation due to the EC Zoos Directive. In England this is transposed into national legislation through the Zoo Licensing Act 1981 (Amendment) (England and Wales) Regulations 2002.

Two main official zoo membership schemes exist for zoos in England:

- 1 BIAZA (the British and Irish Association of Zoos and Aquariums): "The professional body representing the best zoos and aquariums in Britain and Ireland", with over 100 members (BIAZA, 2012a).
- 2 EAZA (the European Association of Zoos and Aquaria): "Represents and links 345 member institutions in 41 countries." (EAZA, 2012a).

Membership of one or both of these trade bodies suggests that the zoo has some desire to improve standards of animal welfare and education as zoos which are members of BIAZA display signs declaring that "As a member of BIAZA, we –

- Help people to conserve the natural world
- Participate in effective co-operative conservation programmes
- Deliver the highest quality environmental education, training and research
- Achieve the highest standards of animal care and welfare"

Table 4: Selected zoological collections and their official zoo membership

Zoo code	Type of collection	Member of BIAZA?	Member of EAZA?
		•	

Zoo code	Type of collection	Member of BIAZA?	Member of EAZA?
BPF-59	Bird of Prey	Ν	Ν
BPK-126	Bird of Prey	N	N
BPG-20	Bird of Prey	Y	N
BPN-137	Bird of Prey	N	N
GMB-131	General Mixed	Ν	Ν
GMB-48	General Mixed	Y	N
GMB-85	General Mixed	Y	N
GMD-142	General Mixed	Y	Y
GMH-69	General Mixed	N	Y
GMK-143	General Mixed	N	N
GML-119	General Mixed	Y	N
GMN-99	General Mixed	N	N
GMS-4	General Mixed	N	Y
GMT-1	General Mixed	Y	N
OBB-111	Other Bird	N	N
OBC-101	Other Bird	N	N
OBM-146	Other Bird	Y	N
OBS-7	Other Bird	Ν	Ν
OBW-129	Other Bird	Y	Ν
OBW-3	Other Bird	N	Y

Chart 7: Selected zoos and their membership of trade bodies

Total: 20 Member of either BIAZA or EAZA: 11 (55%) Not a member of either BIAZA or EAZA: 9 (45%)



Chart 8: Selected Bird of Prey zoos and their membership of trade bodies Total: 4 Member of either BIAZA or EAZA: 1 (25%)

Not a member of BIAZA or EAZA: 3 (75%)



Chart 9: Selected General Mixed zoos and their membership of trade bodies Total: 10

Member of either BIAZA or EAZA: 7 (70%) Not a member of BIAZA or EAZA: 3 (30%)



Chart 10: Selected Other Bird zoos and their membership of trade bodies Total: 6

Member of either BIAZA or EAZA: 3 (50%) Not a member of BIAZA or EAZA: 3 (50%)



(NB: Membership of BIAZA and EAZA was examined in August 2012. Zoos may have been members before or since this date)

1.4 Analysis of all 'bird zoos' in England

The 2011 Animal Health list of zoos in England includes two categories relating to bird collections: Bird of Prey and Other Bird. The following tables list the dispensation status of each zoo (as per the Animal Health list) and their membership of both of BIAZA and EAZA for:

- 1. All 40 Bird of Prey zoos in the 2011 Animal Health list
- 2. All 36 Other Bird zoos in the 2011 Animal Health list

Zoo code	Dispensation status	Member of BIAZA?	Member of EAZA?
BPB-57	14.2	N	N
BPB-117	14.2	N	N
BPB-47	14.2	N	N
BPB-62	14.2	N	N
BPC-26	14.2	N	N
BPC-65	14.2	Y	N
BPC-30	14.2	N	N
BPC-39	14.2	N	N
BPD-132	14.2	N	N
BPE-17	14.2	N	N
BPE-149	14.2	N	N
BPF-14	14.2	N	N
BPF-59	14.2	Ν	Ν
BPF-60	14.2	N	N
BPF-130	14.2	N	N
BPG-20	14.2	Υ	N
BPH-134	14.2	Υ	Y
BPH-91	14.2	N	N
BPH-42	14.2	Ν	Ν
BPH-68	14.2	Ν	Ν
BPI-56	14.2	Y	Ν

Table 5: All 'bird of prey' zoological collections in England, their dispensation status a	ind official zoo
membership	

Zoo code	Dispensation status	Member of BIAZA?	Member of EAZA?
BPI-73	14.2	N	N
BPK-100	14.2	Ν	N
BPK-126	14.2	Ν	Ν
BPK-102	14.2	Y	Ν
BPL-54	14.2	N	N
BPL-92	14.2	N	N
BPL-63	14.2	N	N
BPM-61	14.2	N	N
BPN-137	14.2	N	N
BPO-29	14.2	N	N
BPP-21	14.2	N	N
BPR-70	14.2	Y	N
BPS-35	14.2	Ν	Ν
BPS-90	14.2	Ν	Ν
BPT-120	14.2	N	N
GMT-89	14.2	N	N
BPW-64	14.2	Ν	Ν
BPW-147	14.2	Y	Ν
BPY-40	14.2	Ν	Ν

(NB: Some of these zoos, taken from the 2011 Animal Health list, may have since closed down)

Dispensation status

All 40 zoos classed as Bird of Prey have, according to the 2011 Animal Health list, a 14.2 dispensation

Chart 11: Dispensation status of Bird of Prey zoos

Total: 40 None: 0% 14.1a: 0% 14.1.b: 0% 14.2: 100%



Trade body membership:

Member of either BIAZA or EAZA: 7

Member of BIAZA only: 6

Member of EAZA only: 0

Member of both BIAZA and EAZA: 1

Not a member of BIAZA or EAZA: 33

(NB: Membership of BIAZA and EAZA was examined in September 2012. Zoos may have been members before or since this date)

Chart 12: Bird of Prey zoos and their membership of trade bodies Total: 40 Member of either BIAZA or EAZA: 7 (17.5%) Not a member of either BIAZA or EAZA: 33 (82.5%)



Table 6: All Other Bird zoological collections in England, their dispensation status and official zoo membership

Zoo code	Dispensation status	Member of BIAZA?	Member of EAZA?
OBA-122	14.1.a	N	N
OBA-2	None	Υ	Ν
OBA-8	14.1.a	Ν	Ν
OBA-105	14.1.a	Ν	Ν
OBA-88	14.2	Ν	Ν
OBB-87	14.2	Υ	Ν
OBB-141	14.2	Ν	Ν
OBB-38	14.2	Y	Y
OBB-125	None	N	Y
OBB-111	14.1.a	N	N
OBB-109	14.2	N	N
OBC-9	14.1.a	N	N
OBC-101	14.1.a	Ν	Ν
OBH-80	None	Υ	Ν

Zoo code	Dispensation status	Member of BIAZA?	Member of EAZA?
OBH-157	14.1.a	N	N
OBL-158	14.1.a	Ν	Ν
OBL-81	None	Υ	Ν
OBM-146	None	Υ	Ν
OBM-107	14.1.a	Ν	Ν
OBM-31	14.1.a	Ν	Ν
OBN-51	14.2	Ν	Ν
OBP-34	14.2	N	N
OBP-94	14.2	N	N
OBP-98	14.2	Υ	N
OBP-127	14.2	N	N
OBS-75	14.2	Y	Ν
OBS-128	None	Υ	Ν
OBS-7	14.2	N	N
OBS-82	14.1.a	N	N
OBT-66	14.2	N	N
OBV-24	14.1.a	N	N
OBW-3	14.2	N	Y
OBW-129	14.2	Υ	N
OBW-25	14.1.a	N	Ν
OBW-76	14.1.a	N	Ν
OBW-37	14.2	Ν	Ν

(NB: Some of these zoos, taken from the 2011 Animal Health list, may have since closed down)

Dispensation status:

Chart 13: Dispensation status of Other Bird zoos

Total: 36 None: 6 (16.66%) 14.1.a: 14 (38.88%) 14.1.b: 0 (0%) 14.2: 16 (44.44%)



Trade body membership:

Member of either BIAZA or EAZA: 12

Member of BIAZA only: 9

Member of EAZA only: 2

Member of both BIAZA and EAZA: 1

Not a member of BIAZA or EAZA: 24

(NB: Membership of BIAZA and EAZA was examined in September 2012. Zoos may have been members before or since this date)

Chart 14: Other Bird zoos and their membership of trade bodies Total: 36 Member of either BIAZA or EAZA: 12 (33.33%) Not a member of BIAZA or EAZA: 24 (66.66%)



All Bird of Prey and Other Bird zoological collections in England, combined, and their official zoo trade body membership:

Member of either BIAZA or EAZA: 19

Member of BIAZA only: 15

Member of EAZA only: 2

Member of both BIAZA and EAZA: 2

Not a member of BIAZA or EAZA: 57

Chart 15: All bird zoos and their membership of trade bodies (1) Total: 76 Member of either BIAZA or EAZA: 19 (25%) Not a member of BIAZA or EAZA: 57 (75%)



Chart 16: All bird zoos and their membership of trade bodies (2) Total: 76

Member of both BIAZA and EAZA: 2 (2.63%) Not a member of both BIAZA and EAZA: 74 (97.37%)



1.5 Analysis of zoo stocklists

The Department of Environment, Food and Rural Affairs (DEFRA), the government body which oversees zoo licensing, produces a set of "standards with respect to the management of zoos and the animals in them", known as the Secretary of State's Standards of Modern Zoo Practice (DEFRA, 2012a). This document is also referred to as SSSMZP for brevity.

The SSSMZP requires all licensed zoos to keep and maintain records "of all individually recognisable animals and groups of animals in the zoo. Where possible, animals should be individually identifiable" (Section 9.1). Section 9.5 also requires "an annual stock record of all animals" to be kept and "a copy must be forwarded to the local authority no later than 1 April of the year following that to which it relates." It also provides an example of how the stocklist should be set out, "in a multi-column format as follows, or should be similar to those that are produced by ZIMS or ARKS."

(ZIMS (Zoological Information Management System) and ARKS (Animal Record Keeping System) are animal data and record keeping information systems used by zoos).

Common	Scientific	Group at	Arrived	Born	Died	Departed	Group at
Name	Name	1.1.2011					31.12.2011
White-	Grus vipio	2.1.1	0.2.1	0.0.2	1.0.0	0.1.0	1.2.3
naped							
Crane							

(2.1.1 refers to the number of males, females and unsexed individuals: i.e. 2 males, 1 female, 1 unsexed).

Stocklists for each of the 20 zoos sampled in this study were requested from the zoos' licensing authorities as part of the Freedom of Information Act enquiries. The table below shows whether a stocklist was provided, the date of the most recent stocklist provided and the level of its content.

Although visits were conducted to all of the twenty zoos randomly selected for this study, and all enclosures and birds were recorded during the visits, the stocklists have been used for analysis in this section of species and conservation status rather than using the data collected during the visits. This is because it was not always possible to see all of the birds in each zoo (e.g. some would have been in indoor housing which could not be observed, or in off-show areas), so it was not always possible to accurately record the number of individuals; also, enclosures were sometimes mislabelled or had no labels at all. So, using annual stocklists helps provide for a clearer comparison.

Zoo code	Date of most recent stocklist provided	Does stocklist meet SSSMZP requirements?	Scientific names included?	Data on births and deaths?
BPF-59	2012	Yes	Yes	Yes
BPK-126	2012	Yes	Yes	Yes
BPG-20	2012	Yes	Yes	Yes
BPN-137	2011	No	No	No
GMB-131	2012	Yes	Yes	Yes
GMB-48	2012	Yes	Yes	Yes
GMB-85	2012	No	No	No
GMD-142	2011	Yes	Yes	Yes
GMH-69	2012	Yes	Yes	Yes
GMK-143	2012	Yes	Yes	Yes
GML-119	2012	Yes	Yes	Yes
GMN-99	2012	Yes	Yes	Yes
GMS-4	2012	Yes	Yes	Yes
GMT-1	2011	Yes	Yes	Yes
OBB-111	No stocklist due to 4.1.a dispensation	N/A	N/A	N/A
OBC-101	No stocklist due to	N/A	N/A	N/A
	4.1.a dispensation			
OBM-146	2012	No	No	Yes
OBS-7	2012	No	No	Yes
OBW-129	2012	No	No	Yes
OBW-3	2011	Yes	Yes	Yes

Table 7: Stocklist data for the 20 sampled zoos

NB: The stocklists for BPN-137 was handwritten. It used only common names (no scientific names) and gave only the overall number of birds for each species (i.e not broken down by sex).

Chart 17: Stocklists meeting SSSMZP requirements:

Zoos: 18 (as OBB-111 and OBC-101have 14.1.a dispensation) Number of zoos using stocklist meeting SSSMZP requirements: 13 (72.22%) Number of zoos using stocklist <u>not</u> meeting SSSMZP requirements: 5 (27.78%)



Chart 18: Stocklists and use of scientific names:

Zoos: 18 (as OBB-111 and OBC-101have 14.1.a dispensation) Scientific name listed in stocklist: 13 (72.22%) Scientific name not listed in stocklist: 5 (27.78%)



Chart 19: Stocklists and content relating to births and deaths:

Zoos: 18 (as OBB-111 and OBC-101have 14.1.a dispensation) Data on births and deaths listed in stocklist: 16 (88.89%) Data on births and deaths not listed in stocklist: 2 (11.11%)



1.5.1 Species of birds in selected zoos

Data in stocklists recording the species of birds in each of the 18 selected zoos (zoos OBB-111 and OBC-101 have 14.1.a dispensations so are not required to submit stocklists) were used to compile an Excel spreadsheet to assess the commonality of species across all collections. In this database birds were classed according to their taxonomic order and family, based on the system used by the IUCN Red List¹.

Bird classification is a science that appears to be in a state of continual flux and this report does not seek to provide discussion on these changes. There are many different taxonomic checklists and a certain amount of 'taxonomic uncertainty' (Tobias et al, 2010). For the purpose of this report, we have used the IUCN Red List website (www.iucnredlist.org) to ascertain taxonomic (order and family) as well as the conservation status of each species contained in all stocklists.

Perrins (2003) puts the total number of species of birds to be almost 10,000, in 172 families and 29 orders; 60% of those are in the Order Passeriformes (perching birds).

Further detail on conservation status is provided in Chapter 6.2. Threatened species are classed as any species with one of the following conservation status: Vulnerable, Endangered, Critically Endangered.

Species (common	Species (scientific	Number of	Number of zoos	Conservation
name)	name)	individuals	holding species	status
Mandarin duck	Aix galericulata	157	5	LC (Least
				Concern)
Wood duck	Aix sponsa	109	2	LC (Least
				Concern)
Marbled teal	Marmaronetta	118	3	VU (Vulnerable)
	angustirostris			
Domestic chicken	Gallus gallus	115	6	Domestic
	domesticus			
Red-crested pochard	Netta rufina	114	3	LC (Least
				Concern)
Chilean flamingo	Phoenicopterus	112	3	NT (Near

Table 8: Ten most common species of birds in 18 selected zoos (by number of individuals)

¹ The IUCN Red List uses a combination of taxonomic frameworks. Details can be found here: <u>http://www.iucnredlist.org/technical-documents/information-sources-and-guality#std_nomenclature</u>

Species (common	Species (scientific	Number of	Number of zoos	Conservation
name)	name)	individuals	holding species	status
	chilensis			Threatened)
European eider	Somateria	101	3	LC (Least
	mollissima			Concern)
Greater flamingo	Phoenicopterus	100	2	LC (Least
	roseus			Concern)
Sharp-winged teal	Anas flavirostris	97	2	LC (Least
				Concern)
European goldeneye	Bucephala clangula	85	2	LC (Least
				Concern)

Table 9: Ten most common species of birds in 18 selected zoos (by number of zoos holding them)

Species (common	Species (scientific	Number of zoos	Number of	Conservation
name)	name)	holding species	individuals	status
Eurasian eagle owl	Bubo bubo	9	17	LC (Least Concern)
Barn owl	Tyto alba	8	25	LC (Least Concern)
Snowy owl	Bubo scandiaca	8	16	LC (Least Concern)
Domestic chicken	Gallus gallus	6	115	Domestic
	domesticus			
Common buzzard	Buteo buteo	7	13	LC (Least Concern)
Great grey owl	Strix nebulosa	6	12	LC (Least Concern)
Mandarin duck	Aix galericulata	5	157	LC (Least Concern)
Harris hawk	Parabuteo	5	38	LC (Least Concern)
	unicinctus			
Little egret	Egretta garzetta	5	33	LC (Least Concern)
White Stork	Ciconia ciconia	5	28	LC (Least Concern)

Table 10: Species of birds in 18 selected zoos (by number of individuals)

Order	Examples of species	Number of individuals	Number of species
Anseriformes	Waterfowl (ducks, geese, swans)	2336	112
Passeriformes	Perching birds (e.g. finch, raven)	408	64
Galliformes	Gamebirds (e.g. pheasant)	365	37
Falconiformes	Diurnal birds of prey (e.g. kestrel)	263	52
Psittaciformes	Parrots	253	43
Phoenicopteriformes	Flamingos	236	3
Ciconiiformes	Herons, storks and relatives	182	13
Strigiformes	Owls	155	30
Sphenisciformes	Penguins	89	3
Columbiformes	Pigeons and doves	87	19
Gruiformes	Cranes, rails and relatives	45	14
Struthioniformes	Ratites (e.g. ostrich, emu)	36	4
Charadriiformes	Shorebirds (e.g. lapwing,	29	7

Order	Examples of species	Number of individuals	Number of species
	curlew)		
Piciformes	Woodpeckers, toucans	27	7
	and relatives		
Coliiformes	Mousebirds	20	9
Cuculiformes	Cuckoos and relatives	25	11
Coraciiformes	Kingfishers and relatives	11	3
Pelecaniformes	Pelicans and relatives	7	3
Total		4574	434

Anseriformes are waterfowl, comprised of two families: the Anhimidae (the screamers of South America) and the Anatidae, made up of all the other waterfowl species – ducks, geese and swans (Tudge, 2009).

These species are well represented in zoos as they are easier to keep in large numbers.

The Order Passeriformes, often referred to as 'passerines', makes up around 60% of all living birds, with 6,000 species or so grouped into about 80 families (Tudge, 2009). Passerines are also known as perching birds as their unique feet, with a long and strong hallux (hind toe), and arrangements of muscles and tendons in their legs, means they can wrap their feet around a twig and stay perched (Tudge, 2009), although Perrins (2003) refers to this term as "hardly helpful when one looks at the many non-passerines that perch".

Table 11: Three top families of Passeriformes in 18 selected zoos

Order Passeriformes	Examples of species	Number of individuals	Number of species
Sturnidae	Starlings and Mynas	75	9
Timaliidae	Babblers and Laughing-	41	7
	thrushes		
Turdidae	Thrushes, Chats &	15	3
	Flycatchers		

Further analysis of stocklist data can be found in Chapter 6 on conservation.

1.6 Chapter discussion: Introduction

Of the 20 zoos selected for this study, 60% of them have a 14.2 dispensation. Of those, 28.57% should not have one as they have too many hazardous or conservation sensitive species. One has 143 individuals of species classed as threatened, another 112 hazardous birds; the limit is set at 50. Other research by CAPS of zoos in England has found bird of prey centres most likely to have a wrong dispensation. It would appear that zoo inspectors and local authorities may make assumptions that this type of zoo should not be subjected to the full requirements of zoo licensing legislation irrespective of the number of birds they house as it is also shown here that all bird of prey centres licensed in England have a 14.2 dispensation.

Half of zoos classified as 'other bird' collections and 'general mixed', sampled for this study, also have the same 14.2 dispensation.

Analysis of the most common species held in the selected zoos shows that 70% have a conservation status as 'least concern', one is a domestic species and only one (10%) is a threatened (Vulnerable) species. 90% of the most common species (categorised by numbers of zoos holding them) are classed as 'least concern' and the remainder is a domestic species. This is despite the commonly held belief that zoos focus their resources on threatened species.

Chapter 2 Enclosures

2.1 Introduction

Enclosures are clearly critical to the welfare of any captive animal as they are the place in which they spend most, if not all, of their lives.

Hosey, Melfi and Pankhurst (2009) believe that there are three principal stakeholders who need to be considered when designing zoo enclosures:

- 1. The animals: to ensure their welfare needs are met
- 2. The keepers: so that they can adequately care for the animals
- 3. Zoo visitors: who want to enjoy their visit and who zoos want to educate

Enclosure design, even the layout of zoos, has changed enormously over time. Animal 'exhibits' used to be arranged by taxon, such as Monkey House or Aviaries. Later, animals were arranged according to their geographical origins – Africa, Asia or Australia, for example. More recently, zoos began to arrange exhibits by ecologic themes such as rainforest, desert or savannah (Fiby, 2008). This wide range of design and layout can still be seen in UK zoos today.

With these changes went a change in terminology (not all of it backed up with action), so that zoos began to claim that animal housings were not enclosures but 'naturalistic habitats'. 'Landscape immersion' "attempts to place visitors inside the habitat landscape by extending the complexity of the animal's environment into areas where visitors walk, stand or sit" (Bierlein, 2003). Architect and zoo designer Monika Fiby states (2008):

"A 'naturalistic exhibit' emulates a natural animal habitat in a convincing way. For a scientist, a habitat is the environment in which an animal normally lives. Animals normally do not live in exhibits. Nevertheless it has become common practice to call enclosures habitats when they are meant to emulate the conditions of the natural habitat."

She adds that the "evolution of empathy [towards animals] can be read from the design of animal exhibits".

'Barren' enclosures are considered to be those with few, if any, objects or furnishings. As these contents increase, so does the 'complexity' of the enclosure. "Enclosure complexity, as a concept, is thought to provide the appropriate physical and psychological stimuli necessary to provide captive animals with the opportunity to express 'wild' behaviours" (Hosey, Melfi and Pankhurst, 2009).

The type of housing (e.g. less space) can influence the body mass and flying behaviour of some birds, leading to obesity, described as "a common problem in captive birds and [...] associated with detrimental health effects and a shortened lifespan" (Gebhardt-Henrich & Steiger, 2006). Researchers have found that "despite 200 years of domestication, female budgerigars do not seem to be adapted to ad libitum feeding and consume more food than the optimal amount", even outside of the breeding season (Gebhardt-Henrich & Steiger, 2006).

Birds in zoos may require a variety of environments and furnishings within their enclosure: shade from the heat; warmth from the cold; shelter; a variety of perches (thickness, height and placement within the enclosure); bathing and/or swimming facilities; substrates that can be kept clean but also encourage natural movements and behaviours such as foraging; areas to escape from disturbance by visitors or aggression from other birds.

The enclosure barrier is the material used to prevent the captive birds from escaping and unwanted animals (including people) from entering. It is essential that the materials used are correct to provide an effective barrier that also does not pose a risk of injury to the birds (e.g. sharp edges, mesh wide enough for bird's head or wings to become trapped).

In the same way that it is not appropriate to provide different species of mammals with the same type of enclosure, so different species of birds require various types of enclosures and furnishings. Each enclosure should be designed for a species-specific purpose.

"Ideally, animals can choose their exposure to sunlight, wind and rain. An animal exhibit should have shelters, perches, vegetation and water bodies to provide various microclimates. Depending on the animal's natural behaviours, the exhibit should also provide a variety of substrates and natural objects. The appropriateness of artificial objects depends on the theme and the intended message of the exhibit. Changing and exchanging objects and exhibit elements allows exploration in a confined space which is a fundamental animal behaviour. Exhibit design should allow such changes." Fiby (2008)

To meet the welfare needs of an animal in captivity, the complexity of an enclosure needs to be combined with an appropriate size to ensure that natural behaviours can be expressed rather than restricted. Those behaviours required to limit stress, such as distancing and comforting behaviours, are seen to be particularly important (Hosey, Melfi and Pankhurst, 2009). The issue of enclosure size is discussed later.

An animal's enclosure is not just relevant to the welfare of the individuals confined. As education is held to be a major responsibility of the modern zoo, enclosure design has an impact on the visitor's experience:

"Many will judge the merit, health, and wholeness of our institutions on the basis of what they see, hear and otherwise experience during a relatively short visit. Though they tend to respond most immediately to an animal's appearance and behaviour rather than the setting, an animal's surroundings can have a profound impact on our visitors' emotions and the meanings they construct. Architectures of confinement, symbols of human dominance, and views of people surrounding animals may distract the visitor's attention and reinforce the psychological relationship between humans as captors and animals as captives."

John Bierlein, Manager of Planning and Interpretive Exhibits, Woodland Park Zoo, Seattle, USA (2003)

2.2 Legal requirements

The Secretary of State's Standards of Modern Zoo Practice (DEFRA, 2012a) sets out requirements for zoos to meet animal welfare needs focussed around five principles based on the 'Five Freedoms' originally drawn up for commercially farmed animals by the Farm Animal Welfare Committee in 1965.

These Freedoms are:

- 1. Freedom from Hunger and Thirst by ready access to fresh water and a diet to maintain full health and vigour
- 2. Freedom from Discomfort by providing an appropriate environment including shelter and a comfortable resting area
- 3. Freedom from Pain, Injury or Disease by prevention or rapid diagnosis and treatment
- 4. Freedom to Express Normal Behaviour by providing sufficient space, proper facilities and company of the animal's own kind
- 5. Freedom from Fear and Distress by ensuring conditions and treatment which avoid mental suffering

The SSSMZP lays out these requirements as follows:

1 Provision of food and water

Both food and water are basic needs. The method of food presentation, the frequency of feeds and the nutritional balance must be taken into account. Food should be presented in a manner and frequency commensurate with the natural behaviour of the species, as well as its nutritional requirements, which may vary according to season.

2 Provision of a suitable environment

An environment consistent with species requirements must be provided. This should include shade and shelter from rain, heat and cold as appropriate. For example, animals that dig and root must be provided with suitable substrates, and climbers with appropriate three-dimensional environments. A balance must be struck between hygiene and the species' biological requirements.

3 Provision of animal healthcare

- Injury: the provision of an enclosure designed to minimise the risk of injury is required. The design should allow animals to get away from each other. In mixed species' exhibits, care should be taken that one species cannot injure another. Enclosures should be designed to minimise the risk of predators entering the exhibit.
- Disease: curative and preventive veterinary medicine should be provided. Every effort must be made to provide a correct diet and suitably hygienic environment from which pathogens are excluded or controlled.

4 Provision of an opportunity to express most normal behaviour

Animals should be allowed the opportunity to express most normal behaviour, taking into account current enrichment and husbandry guidelines.

5 Provision of protection from fear and distress

- Particular areas to look at are: group composition, sex ratios and numbers of animals in an enclosure and space and furniture in both indoor and outdoor areas. Zoo animals are often confined for long periods in indoor areas and the group composition should reflect this situation.
- Enclosure design should provide areas of escape from other animals and the public.
- Animals often benefit from mixed species environments. However, inter-species conflict can cause stress and this needs to be monitored, recorded and reviewed, including safety from potential predators.

The Five Freedoms provide some level of minimum standards, and if considered unmet can lead to a zoo licence being revoked (Kagan and Veasey, 2010). However, there has been criticism that they can restrict the promotion of higher standards, because "minimum standards can sometimes be viewed as a benchmark towards which to aim, rather than a standard beyond which to go. In addition, they aim to prevent observed changes in those indices that are associated with poor welfare (for example, the presence of stereotypes or weight loss), rather than aiming to promote signs of good welfare (such as the expression of behavioural diversity, or psychological well-being)" (Hosey, Melfi and Pankhurst, 2009).

2.3 Welfare analysis of enclosures in sampled zoos

This study sought to assess enclosures for a representative sample of birds in the selected zoos for the ability to meet the individuals' welfare needs.

Each enclosure at all sampled zoos was entered into an Excel spreadsheet and assigned a random number using Excel's random number function.

In total, 385 separate enclosures were recorded for all 20 zoos (an average of 19.25 per zoo).

It was decided to exclude two zoos from this analysis. Zoos OBM-146 and OBW-129 both specialise in waterfowl, all of whom are pinioned and most kept in open enclosures. Pinioned birds are not able to display

all of their natural behavioural repertoire (one of the issues assessed in the enclosure analysis) and these enclosures are not comparable with enclosures in the other 18 zoos. Tethered birds are also not included here.

Removing these zoos left a total of 268 enclosures in the remaining 18 zoos (an average of 14.89 per zoo).

As it was not possible to do a full welfare analysis of such a large number of enclosures, a maximum of five enclosures for each zoo was sampled; the ones to analyse in detail were chosen using the random sampling function in Excel. Where a zoo had less than five enclosures, all enclosures for that zoo were chosen.

This resulted in 81 enclosures (21.04% of all enclosures in 20 zoos) being selected for full analysis based on the welfare protocols drafted at the start of the study. This analysis was conducted using video footage, photographs and notes taken at the time of each visit.

The total number of birds in each enclosure was not always clear, either because some were utilising indoor areas / shelters / nestboxes or because there were large numbers of small birds such as finches. Data gathered from zoo visits on individual numbers of birds was entered into the Excel spreadsheet for each enclosure; where an accurate figure could not be obtained during the visit, data from the most recent stocklist for that zoo was used. These data show that 433 birds were housed in the 81 enclosures, an average of 5 birds per enclosure.

To ensure a thorough examination of the welfare issues surrounding each enclosure, analysis was conducted by the study author in conjunction with a bird behaviourist, Greg Glendell, BSc (Hons). Greg has been an advocate for bird welfare since the 1980s and has run his companion parrot consultancy for 13 years. He has written several books on companion bird care and writes for the UK's veterinary press as well as running training courses in bird welfare for bird owners and animal welfare staff. Much of his work is by referral from specialist avian vets.

This analysis assesses 28 aspects of the suitability of each enclosure for the birds it holds and the physical and behavioural condition of the individuals. An Excel spreadsheet with all questions was used to enter data based on the assessments of the study author and bird behaviourist. Given the large amount of data compiled, the table below shows this as combined results for all 18 zoos.



Barren enclosure for Common buzzard (Buteo buteo)

One aim of this analysis was to also attempt to discover to what level zoos are meeting the Five Freedoms for each animal. Being based entirely on a visual observation of each enclosure has its limitations, such as no access to records on each individual bird. Full assessment of physical and behavioural welfare requires detailed physical handling and long-term observations of an animal, something not possible in this study.

We had originally intended to include an assessment of food provided for birds

(e.g. whether the type and quantity of food was appropriate, presented

hygienically, etc.) but this was not possible. Not all birds had food in their enclosures at the time of our visit (particularly birds of prey) and in many cases food was provided in containers placed in a position where it was not possible to see.

Table 12: Welfare analysis of enclosures in 18 zoos

Looking at each of the animals in the enclosure:

	Question	Does this relate to Five	Total number enclosures as	Total number of enclosures assessed		Yes		No			Comments
		Freedoms?	Enclosures	Individual birds	Enclosures	Individual birds	Enclosures	Individual birds	Enclosures	Individual birds	
1	Do all birds appear healthy and free from visible signs of injury or disease?		81	433	68	416 (This includes 57 birds from an aviary which had injured birds)	8	10	5	7	See Table 14 for examples of birds with injuries
2	Do any birds display stereotypic behaviour?	Freedom to Express Normal Behaviour	81	433	2	2	76	426	3	5	See Table 16 for examples of birds displaying abnormal behaviours
3	Do any of the birds appear to self- mutilate or show other abnormal behaviours?	Freedom to Express Normal Behaviour	81	433	4	5	74	423	3	5	See Table 16 for examples of birds displaying abnormal behaviours 3 others displayed threat or fear
4	If in a social group, was aggression observed?	Freedom from Fear and Distress	45	397	2	7	43	390	0	0	36 enclosures had solitary birds so not included NB: One bird in an aviary of 60 birds showed injuries through an aggressive cagemate. As the number of aggressors is not know, only 2 birds have been included

					in the 'yes' column
					for this case

Looking at water and public feeding:

	Question	Does this relate to Five	Total number of enclosures assessed		Yes	No			Don't know		Comments
		Freedoms?	Enclosures	Individual birds	Enclosures	Individual birds	Enclosures	Individual birds	Enclosures	Individual birds	
5	Do the birds have access to clean water for drinking at all times? (Drinking water not for bathing etc.)	Freedom from Hunger and Thirst	81	433	43	308	22	74	16	51	Reasons for No: Often because water bowl under perch (so easily fouled) or otherwise dirty
6	Is public feeding allowed?		81	433	16	119	65	314	0	0	
7	If so, is it supervised by staff?		16	119	1	20	15	99	0	0	Can lead to feeding unsuitable or dangerous food / items

Looking at the enclosure:

	Question	Does this relate to Five	Total number of enclosures assessed		Yes	No			Don't know		Comments
		Freedoms?	Enclosures	Individual birds	Enclosures	Individual birds	Enclosures	Individual birds	Enclosures	Individua I birds	
8	Is the enclosure large enough to permit the bird to express its full repertoire of normal locomotive movements (such as flying or walking/running at speed, swimming)?	Freedom to Express Normal Behaviour	81	433	14	228	67	205	0	0	One enclosure with 2 species was only suitable for one of them Another enclosure with 8 birds was only suitable for 4
9	Is the enclosure large enough for birds to sufficiently distance/hide themselves from the visitor?	Freedom from Fear and Distress	81	433	22	247	59	186	0	0	
10	Is the enclosure large enough for birds to sufficiently distance themselves from aggressive cage companions?	Freedom from Fear and Distress	44	396	8	194	30	177	6	25	Don't know: Couldn't see how many birds due to indoor areas Birds housed individually are not
	Question	Does this relate to Five	Total number assessed	of enclosures	Yes		No		Don't know		Comments
----	--	---	--------------------------	---------------------	--	---------------------	--	---------------------	------------	----------------------	----------------------
		Freedoms?	Enclosures	Individual birds	Enclosures	Individual birds	Enclosures	Individual birds	Enclosures	Individua I birds	
										1	included
11	Is the enclosure overcrowded?	Freedom from Discomfort	45	397	11	216	27	146	6	34	
12	Does the substrate allow species- typical movements and behaviours (such as burrowing, foraging, running, swimming, diving etc.)?	Freedom to Express Normal Behaviour	81	433	18	161	63	272	0	0	
13	Is the enclosure environmentally varied (with shade areas, pools, etc. - not uniform throughout)?	Freedom to Express Normal Behaviour	81	433	13	162	68	271	0	0	
14	Does the enclosure contain a variety of usable, species-appropriate permanent features and furnishings?	Freedom to Express Normal Behaviour	81	433	11	55	70	378	0	0	
15	If 14 is Yes, does the enclosure contain sufficient quantity to allow the birds to use them at the same time?	Freedom to Express Normal Behaviour	11	55	9	40	1	2	1	13	
16	If 14 is Yes, are they in good condition (not worn, damaged, rotten)?	Freedom to Express Normal Behaviour	11	55	9	40	1	2	1	13	
17	Are there shelters in the enclosure?	Freedom from Discomfort	81	433	69 (Includes birds with indoor access – 23 enc's, 193 birds; Enc's that provide shelter from elements – 14 encs, 15 birds; whole aviary indoors – 2 enc's, 6	398	12 (Includes shelter not completed – 1 enc, 1 bird; shelter too low down to use – 1 enc, 2 birds	35	0	0	See note below table

	Question	Does this relate to Five	Total number assessed	of enclosures	Yes		No		Don't know		Comments
		Freedoms?	Enclosures	Individual birds	Enclosures	Individual birds	Enclosures	Individual birds	Enclosures	Individua I birds	
-					birds)						
18	If 17 is Yes, do the shelters appear to offer protection from the elements (e.g. sun, rain, snow, wind, heat, humidity)?	Freedom from Discomfort	69	398	56	374	13	24	0	0	
19	If 17 is Yes, can the shelters accommodate all birds at the same time if necessary (so that dominant animals cannot monopolise shelters)?	Freedom from Discomfort	56	374	38	167	15	202	3	5	
20	Could interaction / proximity with animals in adjacent or nearby enclosures produce excessive stress?	Freedom from Fear and Distress	80	373	7	16	73	357	0	0	Problems often occurred because of lack of visual barriers between enclosures. In two cases Eagle owls were housed next to rabbits in a petting area and Barn owls next to rats and mice
21	Are there any behavioural or occupational enrichment items or techniques present in the enclosure? (e.g. feeding devices, toys etc.)	Freedom to Express Normal Behaviour	81	433	5	39	76	394	0	0	
22	Are climate extremes properly mitigated? Is there adequate provision for warmth / cooling even in the coldest / hottest weather? (E.g. heat lamps)	Freedom from Discomfort; Freedom from Pain, Injury or Disease	81	433	5	21	51	126	25	286	Some need protection from heat as well as cold Don't know: couldn't see inside indoor areas
23	Is there an appropriate pond for swimming / bathing etc. provided for species requiring it? Appropriate in terms of size, depth, safety etc	Freedom to Express Normal Behaviour	79	424	8	64	70	349	1	11	Birds who don't need water for bathing (e.g. galliformes and ratites) are not included
24	Is the enclosure of a clean and hygienic standard (e.g. not a build- up of excrement?)	Freedom from Pain, Injury or Disease	81	433	71	340	10	93	0	0	
25	If in an aviary, is the mesh of a gauge		78	398	65	280	13	118	0	0	Three enclosures

	Question	Does this relate to Five	Total number assessed	of enclosures	Yes		No		Don't know		Comments
		Freedoms?	Enclosures	Individual birds	Enclosures	Individual birds	Enclosures	Individual birds	Enclosures	Individua I birds	
	appropriate										had fences rather than mesh so are not included
26	Is the hole size of the mesh of an appropriate size to prevent escape or injury of birds and intrusion of unwanted animals (e.g. stoats)	Freedom from Pain, Injury or Disease	78	398	30	130	47	256	1	12	
27	Are perches of appropriate material and size for the birds	Freedom from Discomfort; Freedom to Express Normal Behaviour	75	385	41	218	33	163	1	4	Also often at wrong heights or were in enclosures even for non-arboreal bits
28	Are sufficient number of perches provided for all birds	Freedom from Discomfort	73	380	20	79	52	297	1	4	

Notes:

Question 1: Birds are adapted to hide any signs of illness, so seeing any animal 'appear' normal and healthy does not confirm that they are so. If a bird actually appears to be ill, then she is likely to be very sick indeed.

Question 17: Shelter can mean various things and this was qualified in the analysis: e.g. a closed box into which the bird can enter (such as a nest box) or an open-fronted area with a roof and sides to protect the bird from rain, wind, sun, etc.

Question 22: Mitigating climatic extremes does not only mean protecting tropical birds from the cold by the provision of heat lamps. Some species, such as Snowy owls, are susceptible to over-heating.

Question 25: The gauge size (thickness of wire used) is especially important for birds who have powerful crushing forces in the beaks, e.g. parrots, as they can easily break out of (or damage) thin wire.

Question 26: It is probably impossible to prevent mice having access to any outdoor enclosure, so it was assessed whether larger rodents and stoats, squirrels etc. could gain entry as well as not being big enough so that birds are injured (e.g. trapping heads or wings)

Taking the figures from Table 12, above, reveals the following:







Comments from bird behaviourist Greg Glendell following the welfare analysis of the enclosures

1. General points

Standards vary between zoos and there are still many zoos whose whole practice is clearly unprofessional. Such places have filthy, unkempt enclosures. Staff appear to have little knowledge for the birds in their care. Birds are frequently bored and appear listless, habituated to apathy which is instigated by poor husbandry.

2. Reviewing the pictures and videos of the various zoos visited, some common themes are clearly apparent. The main issues relate to:

- Inadequate space for the birds (small enclosures)
- Little or no environmental enrichment
- Use of wrong types of mesh for enclosures

Provision of space

Most species of birds fly, and flying is part of their daily activities. Many aviaries are not sufficiently large enough to allow anything more than very short periods of flight; flights of a few seconds only. Some aviaries are too small to encourage any flight at all. Birds will not be able to get adequate exercise and maintain fitness unless they can fly for reasonable periods throughout the day.

Lack of environmental enrichment

Enclosures are often poorly furnished, lacking a range of substrates and perches suitable for the species housed. Some stereotypical behaviours, including route tracing, were seen. Such conditions are highly stressful to birds. The animals should be provided with facilities which replicate the environments they are adapted to in the wild, but frequently, enclosures fail to provide this.

Wire mesh used

There are health and welfare issues associated with the type of covering used to clad the birds' aviaries. The mesh used should ensure the birds within are confined safely so that risks of injuries to them are minimised. The mesh should also ensure other wild animals cannot enter the aviaries, eat the occupants' food, harm them, or be harmed by them, or exchange diseases between occupants and wild birds and other animals.

It is common to see large hole mesh used in many aviaries. This allows a range of wild animals including rats and squirrels to freely enter the aviaries. Other species, including many wild birds and predatory mammals such as stoats can also enter. Birds should never be housed in flights whose mesh hole size is

so large that the birds can poke their head through it; this poses a serious risk of death should birds fly in panic and hit the wire.

Where mesh is of the wrong material, such as plastic, this poses a risk of occupants becoming entangled and consequently injured or killed, or escaping. Where enclosure walls join each other, there is often a failure to provide a double-walled barrier of mesh to prevent occupants fighting with those in the adjoining flight. Again this poses a risk of serious injury or death to the birds [see note below].

The gauge size (thickness of wire used) is especially important for birds who have powerful crushing forces in the beaks, e.g.



Enclosure for pair of Eurasian eagle owls (Bubo bubo)

parrots, as they can easily break out of (or damage) thin wire. Birds with powerful feet who fly at the wire repeatedly (larger raptors) may also damage any fine wire, but cannot damage thicker wire. Damaged wire can cause injuries to them; some birds may be able to escape if they make a hole large enough for this. Where holes are made, larger birds/other animals can then get in.

In general, the maximum mesh hole size should not be greater than 2.5cms (e.g. one-inch square wire). This will prevent adult rats, stoats, squirrels and most wild birds from entering the flight.

Study author's note: At one zoo, the lack of a sufficient barrier between adjoining enclosures resulted in prolonged aggression from a Striated caracara (*Phalcoboenus australis*) towards the neighbouring African spotted eagle owl (*Bubo africanus*). Staff seemed either oblivious or used to this and did nothing to prevent it. The caracara was more likely to be injured as he knocked against the barrier in his attempt to reach his neighbour.

2.4 Enclosure size

Given the large number of enclosures and wide variety of species in the 20 zoos visited for this study, a simple method of assessing whether enclosures provided adequate space was required.

Studies of enclosure size for mammals in zoos have often relied on comparing enclosures to the species' home range in the wild (e.g. Casamitjana, 2003; Clubb & Mason, 2003). The fact that so many avian species migrate each autumn (in the region of 10 billion individuals according to some estimates (Tudge, 2009)) makes such a comparison more difficult.

The Global Federation of Animal Sanctuaries (GFAS) was founded in 2007 by a number of animal protection organisations which recognised "the need for global animal-specific standards and operational standards for sanctuaries" (GFAS, 2012). GFAS documents aid sanctuaries in meeting the highest standards of welfare for animals in their care. One such document is 'Standards for Animal Care of Arboreal/Perching Birds' (GFAS, 2011), which covers parrots, finches, canaries, corvids, hornbills, woodpeckers and miscellaneous passerine species.



It recognises that enclosure size will vary greatly, dependent on the species, but provides a useful general formula: "In order to allow each bird to take several wingflaps or strides, minimum enclosure length should equal ten times the wingspan or stride of the largest bird(s) housed." These standards were arrived at by a consensus of various avian sanctuary directors.

Whilst long debate could be had about whether 'several wingflaps or strides' really does provide adequate space for any bird in captivity, these are likely to be the highest

Aviary for a Crested caracara (Caracara cheriway)

standards currently available with regard to space for captive birds.

Although many species held in zoos visited for this study are not of the species covered directly in the GFAS document, we have used the formula as a measurement for all enclosures recorded in all twenty zoos. We believe that this provides a basic, if controversial, method of measuring the suitability of enclosure sizes for captive birds. While there are other minimum standards available for a variety of species (e.g. those produce by Taxon Advisory Groups), it would not be possible, within the constraints of this study, to compile and assess all of these standards against every enclosure in twenty zoos. Additionally, it is not always clear what these

zoo-industry-based standards are based on (convenience rather than the needs of animals?). So, we have used the GFAS formula as a 'rule of thumb'.

During visits to all twenty zoos, each enclosure was filmed and an estimation of size was made and compared to the GFAS formula.

Only physical enclosures are included in this analysis; those birds kept tethered are not included in these data.

Zoo code	Number of enclosures	Number of enclosures meeting standards	Number of enclosures <u>not</u> meeting standards	Species for whom enclosures did <u>not</u> meet standards	Percentage of enclosures meeting standards
BPF-59	25	0	25	Birds of prey	0%
BPK-126	34	0	34	Birds of prey	0%
BPG-20	31	1	30	Birds of prey	3.23%
BPN-137	31	0	31	Birds of prey	0%
GMB-131	11	4	7	Birds of prey	36.36%
GMB-48	91	23	68	Mostly parrots, birds of prey, pheasants	25.27%
GMB-85	5	4	1	Lovebirds	80%
GMD-142	12	8	4	Lorys, flamingos, 2 mixed exhibits	66.67%
GMH-69	33	11	22	Included some birds of prey and parrots	33.33%
GMK-143	15	1	14	Birds of prey	6.67%
GML-119	13	6	7	Pheasants (although some appeared to have access to a larger area)	46.15%
GMN-99	15	11	4	Birds of prey	73.33%
GMS-4	8	8	0		100%
GMT-1	18	3	15	All birds other than golden eagle, emu, rhea	16.67%
OBB-111	18	3	15	Included some pheasants	16.67%
OBC-101	1	1	0		100%
OBM-146	31	31	0		100%
OBS-7	7	1	6	Mostly birds of prey	14.23%
OBW-129	13	13	0		100%
OBW-3	10	4	6	Mostly pigeons and doves	40%
Total	422	133	289		31.52%

Table 13: Number of enclosures which meet GFAS standards of being of a size equivalent to 10 timeswingspan or stride of birds

Birds mostly likely to be in enclosures not meeting minimum size standards are birds of prey.

Chart 35: Percentage of zoo enclosures meeting GFAS standards

Total number of enclosures: 422

Number meeting GFAS standards: 133 Number not meeting GFAS standards: 289

Percentage meeting GFAS standards: 31.52% Percentage not meeting GFAS standards: 68.48%



2.5 Chapter discussion: Enclosures

This analysis reveals enclosures for birds in zoos to be of a poor standard, lacking in many basic provisions.

Although birds, in the main, were healthy and provided with clean water (although not in 17% of enclosures), more than half of aviaries were overcrowded (54%) and not environmentally varied (62%).

The majority of enclosures lacked enrichment (91%), appropriate substrate (63%) or species-appropriate features (87%). Even perches were lacking in number (in 78% of enclosures). 82% of enclosures did not have appropriate bathing or swimming facilities and it was not unusual to see birds trying to bathe in containers far too small to properly do so. They do not meet the varied nature suggested by zoo architect Monika Fiby (see



Striated caracara (*Phalcoboenus australis*) attempting to bathe in small bowl of water

2.1)

The majority of enclosures (68%) fail to meet minimum recommended sizes that would allow birds to take several wingflaps or strides.

From the evidence available, it would appear that enclosures, in the main, are not designed for the species they actually hold. There seems to be a 'one size fits all' attitude when it comes to the type of aviaries zoos use. This is particularly obvious when a row of identical aviaries (size, substrate,

vegetation, etc) houses different species with varying requirements.

This 'one size fits all' scenario may well be the case in other countries too. Parker (2006), in a study of New Zealand zoos exhibiting the native Kea parrot (*Nestor notabilis*), found that only one zoo out of 16 held the birds in an enclosure purpose built for the species. Nine of the zoos (56%) used standard bird aviaries and three (19%) used modified enclosures not even originally designed for birds.

Chapter 3 Other welfare issues

3.1 Injuries

During visits to all zoos, any birds with obvious injuries were noted.

Table 14: Injuries to birds in sampled zoos

Zoo	Species	Number of birds effected	Type of injury	Did zoo provide comment on injury?
ВРК-126	Northern goshawk (Accipiter gentilis)	1	Poor feather condition on head and tail tip possibly caused by crashing into mesh. Very nervous bird who shouldn't be on public view	No
BPK-126	Common buzzard (<i>Buteo buteo</i>)	1	Flying into mesh. Injured wing. Couldn't fly but was crashing against enclosure fence. Probably an injured bird brought to zoo. Frustrated behaviour response towards people. Shouldn't be on display.	No
BPG-20	Little owl (Athene noctua)	1	Cere* was bleeding; probably caused by flying into enclosure wire. Bird appeared sick and distressed at people and shouldn't be on display.	No
GMB-131	Common kestrel (Falco tinnunculus)	1	Injury to cere*, caused by bird flying into netting; leg also looked injured. Shouldn't be on display as injured and frightened of people.	No
GMB-48	White woodpecker (<i>Melanerpes</i> <i>candidus</i>)	1	Skin infection – missing feathers, sore skin (possibly additional trauma caused by rubbing irritated skin)	No
GMH-69	White stork (Ciconia ciconia)	1	Injury to neck	No
GMH-69	Black stork (<i>Ciconia</i> nigra)	1	Appeared unwell; fluffed up plumage, slow blinking rate	No
GMN-99	Harris hawk (Parabuteo unicinctus)	1	Bird appeared to have previous damage to cere*	No
OBC-101	Cockatiel (Nymphicus hollandicus) Budgerigar	1	Completely bald head; toe appeared to have been broken	See Note 1
	(Melopsittacus undulates)	1	Splayed legs; laboured breathing. Bird appeared to be sick enough to be put to sleep	No

Zoo	Species	Number of birds effected	Type of injury	Did zoo provide comment on injury?
	Pigeon			
		1	Difficulty walking	No
OBW-3	Snowy-crowned robin chat (<i>Cossypha</i> <i>niveicapilla</i>)	1	Bald neck	No



Cockatiel (*Nymphicus hollandicus*) with bald head, caused by birds pecking each other

* Cere: The soft, fleshy patch at the base of the upper mandible of the bill of some bird species, particularly birds of prey and parrots. It protects the bird's nares, which allows the bird to breathe.

Note 1: Although there were no staff at this small zoo (aviary in a park) and no information signs about the birds having injuries, veterinary inspection reports from 2011 and 2012 make reference to injuries on cockatiels.

The 2011 report noted that "a large proportion of the cockatiels [...] have symmetric dorsal feather loss on the top of their heads and back of their necks – several birds have a completely bald head and neck which may be a problem in the coldest winter months." The vet believed the injuries were caused by birds pecking at each other, "a sign of stress", likely caused by "a lack of appropriate sites to nest (this has also been pointed out in previous veterinary inspections)". The vet felt it necessary to remind the local authority, which operated the zoo, of its responsibilities under the Animal Welfare Act as well as the Zoo Licensing Act.

The report of the 2012 inspection notes that there was less evidence of head feather pecking, "with only two very bald heads now".

During the visit for this study some

aggression was observed between cockatiels.

At the very least, it should be considered bad practice to fail to provide comment on birds' injuries. If the situation began before the bird came to the zoo, and if the zoo is actively trying to positively change the birds' behaviour, then it can only be seen to be in the zoo's best interest to inform visitors of the situation.

3.2 Abnormal behaviour



Common kestrel (Falco tinnunculus) with injury to cere

Abnormal behaviours relating to animals in zoos have been described as behaviour lacking in function and

which may be harmful to the animal, as a response to some aspect of the captive environment (Hosey, Melfi and Pankhurst, 2009). Examples include: abnormal aggressiveness, stereotyped motor reactions, selfmutilation and apathy. Abnormal behaviours have been classified as qualitative (different in form, e.g. stereotypies, self-biting) and quantitative ("animal shows elevated or depressed levels of a behaviour that is otherwise normal", e.g. hyperaggression, inactivity) (Hosey, Melfi and Pankhurst, 2009).

(Normal displays of threat or fear towards people standing at enclosures is not covered here but was observed in several cases. In some of these, small enclosures prevented birds from adequately moving away from the cause – i.e. person – leading them to perform a visual or vocal threat or fear display. Flight distances vary and for some birds, such as passerines, escaping into vegetation may be sufficient for them to feel as though they have escaped; others require greater distance or height (Caro, 2005)).

Self-mutilation

Feather picking, the picking at, and removal of, the birds own feathers, can be most commonly seen in captive Psittaciformes, particularly cockatoos, African grey parrots and macaws, yet has never been observed in the wild (Schmid, Doher & Steiger, 2006). There are a variety of causal factors, but observations of parrots kept as companion animals reveals the condition to be more common in lone (caged) companion birds as opposed to aviary birds who have the company of their own kind (Glendell, 2008) and in wild-caught birds compared to hand-reared parrots (Schmid, Doher & Steiger, 2006).

Nervous repetitive habits

Schmid, Doher & Steiger (2006), in a study of African grey parrots kept as companion animals, described some parrots with abnormal gestures "such as nodding, scratching or shaking their heads, shaking their feet in the air in front of them and gnawing their claws", which "looked like displacement activities, were performed excessively frequently and were usually carried out in specific situations, in which the birds obviously felt oppressed or nervous".

Although these behaviours were considered not be stereotypic, they "might have been a very early stage of development of stereotypic behaviour and may become stereotypic over a certain period of time".

Stereotypic behaviour

Stereotypic behaviour has been described as "probably the most common abnormal behaviour in captive animals" (Garner, Mason & Smith, 2003) and has received most attention from researchers. It is a heavily repetitive type of behaviour that is invariant and appears to serve no function (Garner 2007) and is generally associated with animals housed in inappropriate environments, particularly in relation to space and complexity (Meehan, Garner & Mench, 2004). Environments which cause or increase stereotypic behaviours are likely to decrease welfare (Mason et al, 2007).

Other causal factors have been identified as restricted physical space (a cause of route tracing), lack of naturalistic foraging (causing oral stereotypies), frustrated access to food and aggression (causing pacing) (Garner, Mason & Smith, 2003).

Stereotypies in captive animals resemble those of humans with autism and some mental health issues, as well as patients with unmedicated chronic schizophrenia (Garner, Meehan & Mench, 2003).

The prevention, or constraint, of a highly motivated behaviour is often seen as the cause of a stereotypy. 'Ritualisation' of the behaviour is followed by 'establishment', where stereotypies may become more difficult to reverse (Meehan, Garner & Mench, 2004) and become fixed to the extent that such behaviour may continue even after the cause has been removed (e.g. the environment is modified). As such, the behaviour "may thus not necessarily indicate currently compromised welfare but rather provide information about the animal's history" (Kalmar, Janssens & Moons, 2010). Swaisgood and Shepherdson (2005) refer to such stereotypies as being 'scars' from "previous suboptimal environments".

Where stereotypies become more frequently performed and occupy more time, the behavioural change is termed 'escalation' (Meehan, Garner & Mench, 2004).

Meehan and Mench (2006) classify parrot stereotypies into three main categories:

- 1 Locomotor: e.g. route tracing, pacing, corner flipping
- 2 Oral: e.g. spot pecking, sham chewing, bar biting, tongue rolling
- 3 Object directed: repetitive, invariant manipulation of objects

Studies of avian species, particularly parrots, has shown that stereotypic behaviour is often caused by limited foraging opportunities (causing oral stereotypies), insufficient opportunity for locomotion (i.e. lack of space and physical complexity, causing locomotor stereotypies) and lack of social contact with conspecifics (Meehan, Garner & Mench, 2004).

Behaviour	Description			
Locomotor stereotypies	Locomotor stereotypies involve the repetition of an identical pattern of movement. The pattern of foot and body movements is identical on each repetition of the behaviour. This pattern had to be repeated two or more times for the bout of behaviour to be classified as a stereotypy			
Pacing	The parrot walked back and forth across the perch, turning around upon reaching either end of the perch. Alternatively, the parrot faced the front of the cage and side stepped from one end of the perch to the other. Pacing can be performed along the entire length of the perch or just for a few steps			
Perch Circles	The parrot walked the length of the perch, climbed up the sidewall of the cage, climbed across the top of the cage, down the opposite sidewall to the perch, completing a vertical circle across top of cage and down sidewall			
Corner Flips	The parrot turned in small circles in a top corner of the cage			
Route Trace	The parrot walked and/or climbed a repeated identical route around the cage			
Oral stereotypies	Oral stereotypies involve the repetition of an identical pattern of oral movements. Oral stereotypies also may be performed in an identical location in the cage. This pattern had to be repeated two or more times for the bout of behaviour to be classified as a stereotypy			
Wire Chewing	The parrot gnawed repeatedly on the wire bars of the cage. While gnawing, individual parrots may pull violently on the wire, making a snapping sound. These movements involve identical body postures or identical locations within the cage			
Sham Chewing	The parrot made chewing movements with nothing in its mouth			
Food Manipulation	The parrot picked up a food item (usually a pellet) in the mouth. The food item is not chewed, but is instead turned around in the mouth repetitively			
Dribbling	The parrot dropped and picked up an object repeatedly—usually with beak while on perch			

Table 15: Descriptions of behaviours classified as locomotor and oral stereotypies in parrots (Taken fromMeehan, Garner & Mench, 2004)

Such stereotypies have been studied in other avian species (e.g. red-winged tinamou, (de Azevedo & Faggioli, 2001); songbirds (Garner, Meehan & Mench, 2003)).

Spot picking

This abnormal behaviour is displayed when a bird repeatedly, and with no apparent reason, touches the tip or side of the bill to a particular spot, either an object or a body part (Engebretson, 2006). Laboratory studies in the 1960s revealed an association between spot picking and feeding conditions, suggesting that it is a frustrated natural foraging behaviour which was reduced when the birds (canaries) were required to 'work for food' (Keiper, 1969).

Route tracing

This has been described as similar to pacing behaviour seen in captive mammals (Sargent & Keiper 1967), whereby a bird follows a precise and invariable route within their enclosure (Engebretson, 2006). Amazon parrots may place their feet in exactly the same location each time they repeat a circuit (Mason, 2006). Restricted physical space is one causal factor (Garner, Mason & Smith, 2003). Lewis et al (2006) report that wild-caught birds (Blue jays) spent far more time route-tracing than hand-reared birds did (but were much less prone to spot picking)

Recognising and dealing with abnormal behaviours is not only important for the welfare of the affected animals. Zoos claim to – and have a legal responsibility to – provide an educational value, and seek to "convey credible conservation education messages to the public" (WAZA, 2005). This is negatively impacted on if visitors see animals whose welfare is compromised and are displaying abnormal behaviours.

Further, such behaviours impact on any research carried out at zoos into species' natural behaviours and any conservation value of potentially releasing captive animals into the wild. Mason et al (2007) ask "exactly what has been conserved, if natural behaviour patterns are lost and/or replaced with captivity-induced ones; May and Lyles [...] coined the phrase 'living Latin binomials' for captive individuals that genetically represent particular wild species but behaviourally have little of their phenotype".

3.3 Assessment of abnormal behaviours at 20 zoos

Zoo	Species	Number of birds affected	Abnormal behaviour	Did zoo provide comment on
				behaviour?
BPG-20	Raven (Corvus corax)	1	Spot picking	No
GMB-48	Patagonian conure	1	Bald chest	No. See Note 1
	(Cyanoliseus			
	patagonus)			
GMB-48	Citron-crested	1	Bald chest	No.
	cockatoo (<i>Cacatua</i>			
	sulphurea			
	citrinocristata)			
GMK-143	Moluccan cockatoo	1	Extensive chewing	No. See Note 2
	(Cacatua		to aviary support	
	moluccensis)		post	
GMK-143	Blue & Gold macaw	2	Chewing wooden	No
	(Ara ararauna)		furniture	
GML-119	Red-billed blue magpie	1	Route tracing	No
	(Urocissa			
	erythrorhyncha)			
GML-119	Himalayan Monal	1	Route tracing	No
	(Lophophorus			
	impejanus)			
GMN-99	White headed	1	Tearing at netted	No

Table 16: Abnormal behaviours observed during visits to sampled zoos

Ζοο	Species	Number of birds affected	Abnormal behaviour	Did zoo provide comment on behaviour?
	vulture (Trigonoceps occipitalis)		roof	
GMT-1	Citron-crested cockatoo (<i>Cacatua</i> <i>sulphurea</i> <i>citrinocristata</i>) & White cockatoo (<i>Cacatua alba</i>)	2	Chewed up wooden shelter entrance and post	No
OBB-111	Swinhoe's pheasant (<i>Lophura swinhoii</i>)	1	Route tracing	No

Note 1: We questioned a keeper about the bald chest on the Patagonian conure. He said that the bird came to the zoo in that condition five years previously. He did not indicate what, if anything, the zoo was doing to try and improve the situation which the keeper insinuated was due to behavioural problems. See section below on abnormal behaviour for more information.

Note 2: This could also be dangerous as the bird appears to be chewing on a poisonous (pressure treated) timber post (see picture below).



Moluccan cockatoo (*Cacatua moluccensis*) with chewed support post

Citron-crested cockatoo (Cacatua sulphurea citrinocristata) with bald chest

The bald chests noted on the Patagonian conure and Citron-crested cockatoo at zoo GMB-48 are likely to be caused by self-mutilation, as described above. A keeper confirmed this for the first bird.

The cockatoos at two zoos who had been observed causing damage to wooden furniture and fixings by chewing (extensively as in the case of the support post on one aviary) are likely to be experiencing a lack of stimulation/enrichment.

This is also probably the cause of the frustrated behaviour of the White headed vulture observed tearing at the netted roof for a prolonged period of time.

During the analysis of enclosures (see Chapter 2.3), the bird behaviourist noted a number of enclosures which were so inadequate in size and opportunities to express normal behaviours that they could lead to problems such as stereotypic behaviours.

(Although apathy, or other non-performance of natural behaviours can be an indication of welfare problems, this study was not able to conduct enough monitoring of individual birds to include this in analysis of abnormal behaviours above).

3.4 Animal welfare assessment based on zoo inspection reports

A 2012 study by Draper and Harris reviewed animal welfare in British zoos by analysing the reports of government-appointed inspectors from 192 zoos between 2005 and 2008. Within this, the researchers looked at animal welfare performance in each of the eight types of zoo categorised by DEFRA (e.g. Bird of Prey, Other Bird, Aquarium, General Mixed) and provided figures showing the mean ranks for substandard assessments for each section by type of zoo.

Whilst the category Farm Park performed worse overall, the two categories of bird zoos did not do well. Overall, Other Bird was scored third worse out of eight and Bird of Prey as fourth.

Bird of Prey zoos did particularly badly in the section 'provision of an opportunity to express most normal behaviour' and Other Bird zoos did very badly in four out of five welfare sections (provision of food and water; provision of suitable environment; provision of animal health care; provision of protection from fear and distress).

3.5 Mortality rates at sampled zoos

Using the stocklists for each zoo obtained under the Freedom of Information Act, data was obtained on the number of birds who had died during the twelve month period that the stocklist covered. By comparing this against the number of birds at the start of the year (plus the number of birds born during the year), the annual mortality rate (percentage of the population dying per year) could be determined.

Five zoos are not covered in this analysis: zoos OBC-101 and OBB-111 have a 14.1.a dispensation so are not required to provide stocklists; stocklists for zoos BPN-137 and GMB-85 did not contain information on deaths; the stocklist for OBS-7 was incomplete and did not include all birds held at the zoo.

Three zoos provided two columns to record deaths: deaths of birds under 30 days old and all other deaths. Stocklists provide no information on causes of death (illness, injury, natural causes, etc).

A note on mortality rates

Stocklists provide minimal information on births and deaths and this analysis combines all species of birds at each zoo rather than a species-by-species analysis. Each species will have differing levels of life expectancy which have not been accounted for here. Kohler et al (2006) note that "authoritative accounts of survivorship and length of life exist for very few species" and that "imprecision of age assignment are important hurdles to the accurate mapping of survival".

For a fuller study of mortality, access is required to the stud books or other zoo-held databases for avian species for more information than is provided by stocklist data. These data can then be used to construct life tables, such as those in studies of mortality in other animals in zoos (e.g. Clubb & Mason, 2002; Kohler et al, 2006).

Table 17: Annual mortality rates in 15 sampled zoos

Zoo code	Number of birds at start of year	Number of births during the year	Peak number of birds during year (start number + births)	Number of deaths	Percentage mortality (deaths as percentage of peak number)
BPF-59	67	0	67	Deaths < 30 days: 0 Other deaths: 2 Total deaths: 2	2.99%
BPK-126	78	7	85	Deaths < 30 days: 0 Other deaths: Total deaths: 7	8.24%
BPG-20	112	4	116	2	1.72%
GMB-131	29	6	35	0	0%
GMB-48	847	47	894	64	7.16%
GMD-142	107	7	114	34	29.82%
GMH-69	138	7	145	Deaths < 30 days: 4 Other deaths: 6 Total deaths: 10	6.90%
GMK-143	28	0	28	0	0%
GML-119	65	1	66	11	16.67%
GMN-99	115	10	125	10	8.00%
GMS-4	395	35	430	40	9.30%
GMT-1	61	4	65	6	9.23%
OBM-146	1733	418	2151	Deaths < 30 days: 137 Other deaths: 278 Total deaths: 415	19.29%
OBW-129	588	187	775	184	23.74%
OBW-3	161	121	282	75	26.60%
Total	4524	854	5378	860	15.99%

Table 17 reveals that for 15 zoos for which data exist, supplied by the zoos to the licensing authorities, on average 16% of birds die over a one year period – a total of 860 birds.

Two zoos (13.33%) had no deaths recorded on their stocklists; 11 zoos (73.33%) had mortality rates higher than 5%; 5 (33.33%) had a mortality higher than 10%. Shockingly, more than one quarter of all birds died in two zoos, with a third zoo showing only a very slightly improved mortality rate.

Over the one year period of stocklists analysed (mostly 2012), 854 birds were born and 860 died, a net loss of 6 birds.

Looking at inspection reports for zoos with an above 10% mortality rate, no inspector (either local authority or DEFRA) questions these statistics. (Although in some cases we did not have copies of reports of inspections which took place after these stocklists were compiled; if these mortality rates were common from year to year then they were not noticed or discussed during previous inspections).

One theory for these deaths not being highlighted is that inspectors take little notice of stocklists and would not be aware of large numbers of deaths unless they were informed by the zoo. Requiring stocklists to record annual mortality and providing explanations for high rates would easily enable inspectors to discuss this during inspections.

The Handbook of DEFRA's Zoos Expert Committee (Chapter 4: Animal Welfare and its assessment in zoos) provides an example of an animal welfare audit which includes a weekly review of mortality and morbidity (incidents of disease / ill health) and a quarterly outside audit of mortality (DEFRA, 2012d). The Handbook also recommends that the results of welfare audits on issues such as mortality should be reviewed by zoo inspectors. It is not known how many zoos follow these recommendations and they have not been referred to in inspection reports for the sampled zoos.

As stocklists do not provide information on causes of death it is difficult to understand the factors behind these statistics. Local authorities only provided us with previous copies of stocklists for two zoos from which to make further comparisons. In the case of zoo OBW-129 these show mortality rates in 2008 as 14.78% and in 2009 as 18.91% in addition to 26.60% mortality in the 2012 stocklist. This rising figure does not appear to have been questioned by zoo inspectors.

Three consecutive years of stocklists for zoo OBW-3 were provided but these only provided data for the day in which they were printed from the zoo's database, so do not given any data on births, deaths or changes in numbers over the year.

Species' mortality in captivity is expected to differ from that in the wild (Kohler et al, 2006). Captive animals should benefit from veterinary care, a lack of predators, and a regular supply of food. However, they may also suffer from poor adaptation to captivity or to a zoo's climate, the spread of infections caused by close confinement to others, and, for some species, higher levels of obesity.

It is difficult to make too many generalisations about mortality rates for a wide range of avian species. Life expectancy, for example, will vary widely throughout the species of birds held in the zoos sampled. However, some mortality rates here are higher than expected by vets consulted during this study.

To put these statistics into an understandable comparison, take a look at one of the most controversial methods of farming animals for food: broiler chickens. These chickens are factory farmed for their meat and selective breeding forces them to grow too fast so that millions "suffer from painful lameness due to abnormal skeletal development or bone disease, so that many have difficulty in walking or even standing" (Turner, Garcés & Smith, 2005).

One of the major criticisms of this method of breeding chickens is the high mortality rate: between 4 and 5% die before reaching the slaughterhouse (Department of Primary Industries, 2013; VIVA, 2013). Average mortality in the zoos studied in this report is more than three times this figure.

Mortality rates for intensively reared rabbits is, according to the European Food Safety Authority's Panel on Animal Health and Welfare (EFSA, 2005), "considerably higher than in other farmed animal species due to enteric and respiratory infections, and reproductive problems". They report that "on the most successful intensive closed cycle farms, parturition-to-sale losses are around 10-15% and mortality levels can be as high as 25-30%".

So, it would appear that mortality rates for birds in zoos are as high as those for farmed rabbits, on which the EFSA Scientific Panel concluded: "Because of very high morbidity and mortality rates reported, Rabbit housing, management and hygiene systems should be reviewed urgently so as to significantly reduce them".

3.6 Bone disorders in captive birds

Relevant to the comparison to high mortality and physical problems for animals raised on factory farms are the findings by Professor Alan Feduccia of the University of North Carolina (Feduccia, 1991). In a comparison of skeletons of captive birds from zoos and of 'wild' birds he found bone disorders (including arthritis and osteoporosis) in representatives of all major living groups of birds commonly housed in zoos.

Of 60 ratites (flightless birds including ostrich and emu), 24 of 29 (82.76%) captive birds had pathological bone lesions (80 lesions in total) whereas only one of 31 (3.23%) wild birds had a single lesion (probably caused by a natural injury).

These bone pathologies "resulted predominantly from inactivation of the flight or pectoral apparatus, and/or hind limbs, and therefore lack of normal activity, or disease resulting from micro-organisms [...] Still other cases involving acute osteoarthritis, degenerative joint disease, were noted."

The inability to run, or flight restrictions such as pinioning, appear to be the cause of these bone disorders. Professor Feduccia said of his findings (Nicholson-Lord, 1991):

"Birds are finely tuned metabolic machines designed for flight. In zoos they are denied the one thing all their evolution has revolved around".

3.7 Chapter discussion: Other welfare issues

Several birds with injuries or abnormal behaviours were observed at the sampled zoos, even though it was not possible to do close-up observations of every individual bird or monitor them for extensive periods of time. In most of these cases these injuries or behaviours were likely caused by the conditions the birds are confined in: damage to the cere through crashing into enclosure barriers; aggression between conspecifics; self-mutilation or route tracing caused by inappropriate housing.

In none of these cases did the zoo make visitors aware of the cause of the problems, even if, for example, a parrot was self-mutilating because of conditions he was housed in before being re-homed to the zoo. An honest approach to behavioural and physical problems would be a good starting point.

Mortality rates for birds in zoos would appear high, even compared to well publicised mortality in controversial factory farming methods; but there is little information behind the statistics available via stocklists. What is clear though is that licensing authorities and zoo inspectors need to pay more detail to these data and begin to question zoos when they believe mortality rates are higher than expected.

Chapter 4 Environmental enrichment

4.1 Introduction

Incidents of abnormal behaviours in captive birds such as apathy, stereotypies, self-mutilation and mutilation or killing of conspecifics have been clearly recorded. Yet, it appears that there has been little research on avian stereotypies specifically (Garner, Mason & Smith, 2003) and how captive conditions negatively impact on welfare, as well as little focus on environmental enrichment for avian species (King, 1999; de Azevedo & Faggioli, 2004; Shepherdson, Carlstead & Wielebnowski, 2004), particularly when compared alongside that for mammals. Despite the focus of research on "large, charismatic, and often endangered species", "it is unclear whether stereotypies are more prevalent in these species" (Swaisgood & Shepherdson, 2005).

King (1993) questions the prevalence of environmental enrichment research on mammalian rather than avian species. Bird species are far more abundant (around twice as many as species of mammals), they are possibly better represented in zoos, they are largely social species and there is extensive data on behaviours of birds in the wild: all factors that should make birds suitable subjects for research into environmental enrichment. There is no evidence to suggest that mammals are more intelligent, 'attractive' to humans or are more obviously unstimulated in a captive environment. King suggests that birds and other non-mammals are neglected in this area because they are generally smaller and lack a "close evolutionary relationship with humans".

Abnormal repetitive behaviours, such as stereotypies, can be tackled by a variety of means, including physical prevention, pharmacological treatment and environmental enrichment. The latter is the preferred approach as "it is most likely to tackle the problems underlying stereotypic behaviours, and thence to improve both welfare and behaviour with few unwanted side-effects" (Mason et al, 2007).

What is meant by 'enrichment' can vary greatly, but in zoos generally refers to elements added to an enclosure that enable the animal to carry out most of their normal behaviour/activity in a way which was not previously available. This can mean physical structures integral to the enclosure design (e.g. shelters, plants, rocks and pools), non-permanent objects (e.g. food items, balls, branches) and non-object stimuli (e.g. sounds, climatic and lighting variables) (King, 1999).

Not only does enrichment seek to benefit the well-being of the animal but, in a zoo setting, "increases the attractiveness of the animals to people" (King, 1999). For this reason, zoos are encouraged to use only enrichment elements that are 'natural' in the sense that they appear to be a natural part of the animals' environment (Ng, 2002).

Enrichment seeks to provide an environment in which animals can carry out their normal range of activities and behaviours. Non-performance of those behaviours can, in itself, be an indication of welfare problems (such as apathy). The presence of abnormal behaviours is indicative of a poor welfare state.

Any attempts to enrich enclosures obviously have to be done with full awareness of the natural behaviours and environment of the species. It should not be seen as acceptable to provide a 'one size fits all' approach. King (1999) provides examples of birds performing complex behaviours: budgerigars (*Melopsitticus undulates*) have sophisticated social behaviours on par with that reported for mammals; corvidae (the crow family) is "renowned for its playfulness, intelligence and curiosity but nonetheless it has received little environmental research attention by zoos" and psittacines (parrots) "are considered the ecological avian equivalent to primates" for their ability to solve 'object permanence tasks', "indicating the ability to assimilate and use environmental information". Much of the zoo-based enrichment research has focussed on psittacines, perhaps in part because abnormal behaviours in these birds, such as self-mutilation, are more obvious to zoo visitors as well as researchers.

Many enrichment techniques (not just for birds) focus on food, in part because feeding activities are often one of the most time consuming activities for animals in their natural environment and opportunities for exploration and foraging are more restricted in captivity, where food is commonly provided in a dish.

Studies have revealed psittacine species to forage for 4 to 6 hours per day (Kalmar, Janssens & Moons, 2010), with glossy cockatoos (*Calyptorhynchus lathami*) spending 88% of the day engaged in feeding activities (King 1999). The reduction of time spent foraging (or omission of it altogether in some cases), "reduces the diversity of the parrots' behavioural repertoire" which can lead to frustration and chronic stress, resulting in abnormal behaviours (Kalmar, Janssens & Moons, 2010).

"Therefore, prolongation of the amount of time that a bird spends acquiring its food is in most cases a very suitable enrichment activity, particularly if employment of ecologically appropriate techniques to acquire the food are required. This approach can be quite simple but successful, i.e. hanging fruit for toucans or hornbills or provisioning different food in discreet patches throughout the enclosure for psittacines" (King 1999). Parrots can be given enrichments requiring them to chew through barriers, manipulate objects through holes, sort through inedible material or open containers (Meehan, Garner & Mench, 2004).

Some success has been seen with a cone feeder for Humboldt penguins, consisting of a small football cone with a plastic fold-back lid, with an inflated tube to act as a float. The cone is placed into the pool upside down and used to "stimulate a more natural feeding technique, as the penguins gather their food under water" (McDermott, 2003). Although this is a cheap and simple enrichment device, it fails to be compatible with what King (1999) refers to as the "habitat 'immersion' concept" as it is not an element natural to the birds' environment.

Another 'non-natural' element, but again one that has shown some success, is the use of mirrors and models of conspecifics to simulate larger flocks of flamingos. The Fraser Darling Effect suggests that birds belonging to larger flocks, such as flamingos, experience an intense social stimulation that enhances the reproductive cycle (de Azevedo & Faggioli, 2004).

Physical enrichments increase the physical complexity of the cage and include "alternate perching sites, climbing or swinging opportunities, or movable objects that could be manipulated with the beak, feet, or both" (Meehan, Garner & Mench, 2004).

Feeding birds at random intervals rather than at set times each day, and making them spend time searching for it is often an effective form of enrichment (de Azevedo & Faggioli, 2001). Research has found that starlings (*Sturnus vulgaris*) preferred to search for food than eat freely available food (Inglis & Ferguson, 1986) and an increase in social behaviours were associated with the use of a variable and covered food supply in four species of parrots. Even providing foods with different colours, textures, sizes and smells can make a difference (King 1999).

King (1999) recommends further research into climatic variables, different aspects of lighting and perching. Sounds provide further possibilities, with some studies showing that the sound of a running waterfall encouraged flying activity of young Masked lovebirds (*Agapornis personata*).

Attempts by zoos to make enrichment more 'naturalistic' by its very nature provides difficulties in assessing whether enrichment is provided. While elements such as the cone feeder for penguins or mirrors in a flamingo enclosure are obvious to see, random feeding times and hidden food items are not. Therefore, zoo visitors may be unaware that a zoo is attempting to provide enrichment unless information is provided on an sign at the enclosure, in printed materials given to visitors or in talks and presentations. None of the zoos visited for this study highlighted enrichment techniques.

Enrichments rarely have 100% success in abolishing abnormal repetitive behaviours in all its 'subjects'. Swaisgood and Shepherdson (2005) report that only 53% of attempts succeed in reducing stereotypies. Mason et al (2007) state that this figure suggests "either that the enrichments being used are never quite optimal, or that by the time they are tackled, ARBs have become resistant to change". In addition, enrichment techniques need to be provided in such a way as to not cause harm to the animals; Hare et al (2008) provide numerous cases of animals being injured or killed through entrapment or ingestion of items used for enrichment including a Moluccan cockatoo (*Cacatua moluccensis*) found dead after being entangled upside down in a frayed rope used for climbing and chewing.

4.2 Assessment of enrichment at 20 zoos

Enrichment techniques are not always easy to observe and only a few were noted during the visits to zoos. Some zoos did provide substrates which encouraged natural foraging behaviours but these were not common (see Table 12 for analysis of enclosures).

Zoo	Species	Enrichment technique
GMB-48	Bearded barbet (Lybius dubius)	Tree trunk provided natural
		shelter/nesting
GMB-48	White woodpecker (Melanerpes	Tree trunk provided natural
	candidus)	shelter/nesting
GMD-142	Chilean flamingo (Phoenicopterus	Mirror (simulates larger flock size)
	chilensis)	
GMH-69	Orange-winged amazon (Amazona	Rope toys
	amazonica)	
GMH-69	Blue & Gold Macaw (Ara ararauna)	Rope toys
OBS-7	Budgerigar (<i>Melopsittacus</i>	Rope toys
	undulates)	

Table 18: Environmental enrichment observed at zoos

4.3 Chapter discussion: Environmental enrichment

Environmental enrichment may be a phrase frequently on the lips of the zoo industry, but there has been criticism that this is not so frequently directed towards avian species. Birds clearly are at risk of a wide range of physical and behavioural problems created by their restriction in zoos, more obvious in abnormal behaviour patterns such as stereotypies.

Very little environmental enrichment was obvious during visits to the sampled zoos. However, neither should it be if done in a 'naturalistic' way; methods most likely to be noticed are, by their nature, less naturalistic, such as mirrors in flamingo enclosures or rope toys for parrots.

It would be in the interest of zoos to actually alert visitors to enrichment techniques, particularly if they cannot be easily identified. However, given the poor standards of enclosures reported in this study, and the lack of provision of many basics, it would appear likely that enrichment techniques are not widespread amongst avian enclosures.

Chapter 5 Flight restriction and restraint

"The fact that birds fly – or at least are descended from ancestors who were adapted to flight – dominates all aspects of their lives." Colin Tudge. The Secret Life of Birds

5.1 Introduction

It may come as a surprise to many people that huge numbers of birds in zoos have their ability to fly deliberately restricted.

Some of the methods used are surgical procedures, resulting in permanent inability to fly (for example, pinioning, tenotomy, tenectomy, propatagium and joint ankylosis), while others are temporary measures (e.g. wing/feather clipping and vane trimming) (Degernes and Feduccia, 2001; Zhang et al, 2011).

The three most common management techniques for keeping birds in captivity (both by zoos and private keepers), other than keeping them in a confined enclosure, are pinioning, wing/feather clipping and tethering.

- Pinioning involves the surgical removal of the metacarpals, which permanently prevents flight
- Feather clipping involves cutting the primaries along the wing coverts on one wing. It is temporary and needs to be repeated as the feathers regrow
- Tethering involves tying birds of prey to a perch

Bird behaviourist Greg Glendell (2008) makes the following comments about parrots whose flight has been restricted, but this is useful to consider with any avian species:

"Birds use their ability to fly in order to escape from many fearful situations. While this escape response is the bird's most essential predator-avoidance mechanism, it is also used to avoid a range of other adverse encounters. [...] [Wing-]clipped birds will still execute this fear-induced escape-by-flight behaviour since, being a reflex action, they have little control of how it is initiated. Such birds are then at risk of crash-landing and injuring themselves.

"So, an already fearful situation is exacerbated by the bird's often painful crash-landings. Such events would not be repeated in a wild bird, since a flightless wild bird would soon be dead. These events can trigger so-called 'phobic' behaviours in parrots. Phobic birds display an apparently exaggerated fear in response to 'harmless' situations. In the author's experience, many phobic birds are flight impaired; due either to being wing-clipped or self-mutilation. Since these birds cannot employ their escape reaction their 'phobia' is likely to be reinforced each time they try to avoid some fearful event. If they do not 'escape' the problem because they cannot, and also hurt themselves when crash-landing, then pain and fear become more frequent and 'unavoidable' realities for them.

"Where phobic birds have flight restored (by imping or removal of feather stumps to initiate immediate feather re-growth) their confidence improves and their fearful reactions tend to subside."

Phobic behaviour is described by Schmid, Doher & Steiger (2006) as "a fear subject to generalisation which is out of proportion and out of context. It is a long-lasting fear (with a long recovery) which interferes with the animal's normal functions and which does not require the presence of the original trigger".



Examples of pinioning: Manchurian crane (*Grus japonensis*); Grey crowned crane (*Balearica regulorum*); Bar-headed goose (*Anser indicus*); Hawaiian goose (*Branta* sandvicensis)

The temporary flight restriction of tethering, relating to birds of prey, is discussed separately, below (5.5).

5.2 Pinioning

5.2.1 What is pinioning?

"The process of pinioning involves the cutting of one wing at the carpel joint, thereby removing the basis from which the primary feathers grow. This makes the bird permanently incapable of flight because it is lopsided" (Rees, 2011).

Birds of the following orders, kept in open enclosures, and who would likely fly off if their flight was not restricted, are most likely to be pinioned:

Anseriformes: Waterfowl (ducks, geese, swans) Ciconiiformes: Herons, storks and relatives Gruiformes: Cranes, rails and relatives Pelecaniformes: Pelicans and relatives Phoenicopteriformes: Flamingos

The 'optimum' age for pinioning used to be considered to be between 4 and 10 days (Startup, 1967), although more recent guidance suggests 2-5 days old, "when the wing is very small in proportion to the body. At this age bleeding is minimal and easily controlled and the procedure appears to cause less stress in the bird than if carried out later" (Bourne, 2010).

Pinioning of older birds requires anaesthesia; (this is a legal requirement in England if carried out on birds aged ten days or over²).

Although only one wing is usually affected, the procedure is permanent and irreversible. A pinioned bird will never be able to fly.

Veterinary guidance on pinioning describes the procedure as follows (Bourne, 2010): "The portion of the wing distal to the 'bastard-wing' or alula is amputated. [...] The portion removed is the part of the wing on which the primary flight feathers grow. In very young waterfowl (downies) the wing is very small in proportion to the body. The bird is held in one hand, with the thumb and forefinger holding the wing out and applying

² The Mutilations (Permitted Procedures) (England) Regulations 2007

pressure just proximal to the alula.

A sharp, sterile pair of scissors is used to cut through the wing just distal to the alula, and at a slight slant medially (inward) from the front to the back edge of the wing. This involves cutting through the major and minor metacarpal bones.

Pressure is maintained on the wing for a few seconds. If there is any bleeding the cut end may be touched with a styptic (e.g. silver nitrate pencil) and/or sprayed with an antibiotic/dye spray to encourage drying and disguise any blood spot."

(The bastard wing is a feathered 'thumb' at the front of the wing to increase manoeuvrability (Tudge, 2009)).

It has been reported that birds pinioned at an older age, who had been used to flying for some years prior to the mutilation, "may be psychologically affected" (Humphreys, 1973).

Peter Dickinson, an International Independent Zoo Consultant and former zoo inspector, is critical of conducting the procedure on older birds: "I am totally against pinioning of birds more than 4 days old by anyone other than a veterinary surgeon. Longer than this it becomes a true surgical procedure involving pain, shock and trauma. I would wonder as to why any bird should need to be pinioned after that age. There has obviously been some failure in captive management practices. Questions would have to be asked" (Dickinson, 2011).

The British Waterfowl Association (2004) claims that pinioning "is currently mainly carried out by lay people who are dedicated bird keepers and we see no reason for any change. The very operation involved is swiftly carried out and any slight discomfort is minimal and fleeting."

The Wildfowl and Wetlands Trust also dismiss concerns about the procedure being painful, despite the birds not being anaesthetised. Its Chief Executive told a government select committee in 2004 (EFRA Select Committee, 2004b):

"I would not say that we know that they do not feel pain, but what I will argue is that we have got 60 years experience of this and that without any fail – these are very young birds where their wings are not at all developed at this stage, two days old – the birds return immediately to normal feeding and normal behaviour and do not pay any attention to the damaged wing at all. I suspect with any mutilation there is going to be some element of pain, but it does not appear from 60 years of records of this that it is having any kind of damaging effect. It is certainly nowhere near as stressful as, say, wing clipping would be, or some of the other constraints like actual amputation of wings which happens in some countries."

"In the adult bird, shock and haemorrhage represent the two risks that are present. Shock is more likely to develop in the wild bird, such as a crane, than it is in the more domesticated ornamental duck. Haemorrhage may, on occasion, be profuse, and the brachial artery should be ligated." (Startup, 1967)

Bourne (2010) lists potential problems as:

"Brood-mates and broody hens may peck at any blood spot on the end of the pinioned wing and cause injury.

It is important to ensure no traces of blood are left on the wing if the downy is with parents, as this may lead to excessive grooming which may traumatise the site and cause further haemorrhage. Blow-flies may infect the wound, particularly in hot weather. An antibiotic/dye spray may be applied to reduce the risk of myiasis (fly-strike)."

Zhang et al (2011), state that surgical approaches such as pinioning "expose birds to the risks of accidental death or complications, such as excessive haemorrhage, osteomyelitis, myiasis, and sepsis, during anaesthesia, surgical operation, and post-operative care".

According to zoo husbandry guidelines for flamingos, "pinioning is the most common de-flighting method performed on flamingos maintained in outdoor enclosures" (AZA 2005). However, "it has been shown that

reproduction is severely hindered by pinioning, due to the male's difficulty in balancing himself during copulation." Full-wing flamingos have better balance, whereas pinioned male greater flamingos more regularly fall off when mating (although the impact of pinioning is variable amongst different species of flamingos and even individuals of the same species, and not pinioning is obviously not a guarantee of 100% fertility).

Other advantages of not pinioning flamingos other than increased fertility include reduced threat of predation and reduced food stealing by other birds entering the enclosure (AZA, 2005).

Flamingos are not the only species whose reproductive capacities are adversely affected by pinioning. Pinioned male cranes have also been observed to have difficulties keeping their balance when mating (Sawyer, 1997).

5.2.2 Why does pinioning occur?

Two main reasons are given for pinioning birds:

- 1 It allows birds to be kept in large, open enclosures rather in smaller, confined enclosures. "The difference between pinioning and not pinioning is the difference between access to, and the relative freedom, of several acres of an islet spotted lake or confinement to an aviary pond" (Dickinson, 2011).
- 2 In some countries it is against the law to allow non-native species to escape into the wild (e.g. in the UK it is a breach of the Wildlife and Countryside Act 1981).

Arguments in favour of 'defence number one' are often a mix of animal welfare claims and financial reasons. It is regularly claimed that some species can incur injuries, particularly to the head, when confined in roofed enclosures as they attempt to fly (NAWA, 2003; BWA, 2004; AZA, 2005).

Whilst it is often correct that pinioned birds are provided with much more space in open enclosures (e.g. a lake) than other birds in the same zoos in confined enclosures (e.g. a more typical zoo enclosure), zoos' unwillingness to spend more money on larger enclosures plays a factor in this.

Zoo consultant Peter Dickinson (2011) writes:

"If birds were not pinioned they would have to be kept within roofed aviaries. This could result in frequent and repeated head injuries if the birds were startled. The alternative would be the building of aviaries of exceptional size which would in most cases be cost prohibitive. At the same time it would restrict the number of species which could be maintained for breeding programmes. Roofed aviaries too would restrict the available 'floor' space and as this is the area most frequently utilised it is, I believe, better to pinion."

As will be seen later (Klausen, 2012), some within the zoo industry recognise that zoos need to be willing to spend the required amounts on providing birds a large enough enclosure (as they would with mammals) rather than rely on pinioning.

Some people consider pinioning to be a better alternative, on welfare grounds, than wing-clipping for some species, despite the former permanently depriving the bird of flight. The latter procedure has to be done on a regular basis (at least annually) as the feathers grow back and it is this regular catching, handling of birds and cutting of feathers that convinces some people to prefer pinioning (Antinoff, 2002; EFRA Select Committee, 2004b; Dickinson, 2010).

'Defence number two', preventing the release of non-native species is also regularly provided as a reason for pinioning and a reason not to rely on wing-clipping (BWA, 2004; EFRA Select Committee, 2004b).

In the UK, section 14 of the Wildlife and Countryside Act 1981 makes it illegal to allow any animal which is not ordinarily resident in Great Britain, or is listed on Schedule 9 to the Act, to escape into the wild, or to release it

into the wild. On a European level, similar measures exist under the Convention on the Conservation of European Wildlife and Natural Habitats and the EC Birds Directive (NNSS, 2012).

The major focus of attempts to prevent further problems caused by the release/escape of non-native species concerns the Ruddy duck (*Oxyura jamaicensis*), a North American species which has become established in the wild in the Western Palaearctic (Europe, North Africa, northern and central parts of the Arabian Peninsula, and part of temperate Asia) following its introduction to the Wildfowl and Wetlands Trust and other private wildfowl collections in the UK in the 1940s. The UK population was thought to be the main source of birds immigrating to Spain and mating with, and hybridising, the globally endangered White-headed duck (*Oxyura leucocephala*), threatening its extinction (Cranswick & Hall, 2010). Since the early 1990s, plans have been in place to eradicate the ruddy duck in the Western Palaearctic, leading to additional concerns about the release of other non-native bird species from zoos.

As such, many non-native species of birds are pinioned to prevent them from flying away. Although there is a legal obligation on animal keepers to prevent the introduction of non-native species, pinioning is not required by law.

5.2.3 Mutilation to keep birds in captivity

"It is only with birds that we, as a community, have accepted mutilation of an animal to keep it in captivity." This is a bold and courageous statement to be made from within the zoo industry, a rare example of lucidity. It was made by Bjarne Klausen, Vice Director of Odense Zoo, Denmark, in the Spring 2012 issue of *Zooquaria*, the EAZA (European Association of Zoos and Aquaria) magazine (Klausen, 2012).

In the article, Klausen sets out the zoo's reasons for having moved away from pinioning, which was "fairly normal practice, particularly with larger birds such as flamingos, storks and pelicans." "We felt that there may be impacts on their quality of life", he said, noting loss of birds to predation from mink and fox; much of the food being eaten by wild (i.e. free-living) birds and the subsequent risk of infection. There was also the stress caused by having to move the birds from their marsh area to their winter quarters every autumn. The zoo had "never successfully bred the flamingos, even though we had more than 50 individuals."

The zoo's solution was to build a 3,000sq metre roofed aviary to house the groups of flamingos, pink-backed pelicans, African spoonbills, abdim storks, guineafowl, cattle egrets and Nile geese.

Klausen writes:

"Unfortunately some of the birds are permanently pinioned and therefore cannot use the potential of the aviary. The pink-backed pelicans in particular show the sharp contrast between the pinioned birds and the flying birds: they are very agile flyers and seem to love to take to the air. So in our minds, there is no doubt. We will never keep pinioned birds in Odense Zoo again. We have accepted that building exhibits for large birds is as expensive as is building exhibits for large mammals and aquatic species, but as it is only with birds that we, as a community, have accepted mutilation of an animal to keep it in captivity, this is an expense that is worth it."

He sees the 'rewards' as including the first ever flamingo breeding success and the visitor's enjoyment at seeing "these big birds in flight."

Another zoo which has invested in an alternative to pinioning is South Africa's Birds of Eden, which claims to be "the world's largest free-flight bird aviary" at 50 metres high, covering 23,000 square meters of forest, 70% of it indigenous. It houses more than 3,500 birds of more than 280 species (a mix of African and non-native). Many are ex-pets who are rehabilitated (socialised as well as building up of flight muscles) before release into the aviary, or come from other zoos, including "birds such as the cranes, flamingos and some of the ducks have been subjected to the cruel practice of pinioning" (Wentzel 2007; Birds of Eden, 2012).

The issue of whether zoos should, or can, spend large amounts of money on providing more spacious enclosures for birds is worth exploring when one considers the amounts some zoos spend on new mammal exhibits, which have been dubbed "a multi-million pound industry" (Francis, Esson & Moss, 2007).

Table 19 provides some examples of mammal-centred exhibits (based on Francis, Esson & Moss, 2007). Although other species are often housed within these exhibits, including avian species, such huge amounts of money were only spent because of the focal species for which the exhibit is named, mostly great apes.

Table 19: Costs and sizes of zoo enclosures for mammals³

(Enclosure size includes visitor areas and possibly staff areas, in addition to actual animal accommodation).

Enclosure	Zoo	Cost	Year opened	Enclosure size
Congo Gorilla Forest	Bronx Zoo	US\$43 million	1999	25,900m ²
		(approx £27m)		6.4 acres
Masoala Rainforest	Zurich Zoo	US\$42 million	2003	11,000 m ²
		(approx £26m)		2.71 acres
Gorilla Kingdom	London Zoo	US\$10.4 million	2007	6,000m ²
		(£5.3m)		1.48 acres
Realm of the Red	Chester Zoo	US\$7.1 million	2007	4,920m²
Ape		(£3.7m)		1.22 acres
Spirit of the Jaguar	Chester Zoo	US\$4 million	2001	2,100 m²
		(£2m)		0.52 acres

(Zoos' expenditure on captive enclosures, such as those listed in Table 19, has come under criticism from some conservationists. Commenting on London Zoo's £5.3 million gorilla enclosure, the United Nations' chief consultant on great apes said he was uneasy at the mismatch between lavish spending at zoos and the scarcity of resources available for conserving threatened species in the wild: "Five million pounds for three gorillas when national parks are seeing that number killed every day for want of some Land Rovers and trained men and anti-poaching patrols. It must be very frustrating for the warden of a national park to see" (Elliott, 2007)).

5.2.4 Controversy of pinioning

Although pinioning has been seen as a standard management method for some avian species, it is often criticised by zoo visitors. A search of internet forums for bird watchers or zoo visitors quickly reveals concerns raised by visitors to zoos which continue to pinion birds.

'Stargazer', posting on the Birding UK forum in December 2011, commented on a visit to Slimbridge Wildfowl and Wetland Trust: "Whilst it's interesting to see birds from around the world, the knowledge that they are pinioned or clipped to make them captive puts me off. To my mind, these creatures are meant to be wild and found in their natural habitat and the knowledge that they are not upsets me. I won't visit a zoo for the same reason" (Birding UK, 2011).

³ Additional information:

^[1] Wildlife Conservation Society. Congo Gorilla Forest. ZooLex Zoo Design Organization. WAZA. <u>http://www.zoolex.org/zoolex.cgi/view.py?id=154</u>. Accessed 28.12.12

^[2] Bauert, M.R., Furrer, S.C., Zingg, R. & Steinmet, H.W. 2007. Three years of experience running the Masoala Rainforest ecosystem at Zurich Zoo, Switzerland. International Zoo Yearbook, Volume 41, Issue 1, pp 203–216, July 2007

^[3] Gorilla Kingdom - Travel trade opportunities. ZSL London Zoo. <u>http://www.zsl.org/about-us/gorilla-kingdom-travel-trade-opportunities,493,AR.html</u>. Accessed 28.12.12

^[4] Chester Zoo. Realm of the Red Ape. ZooLex Zoo Design Organization. WAZA. <u>http://www.zoolex.org/zoolexcgi/view.py?id=986</u>. Accessed 28.12.12

^[5] Chester Zoo. Spirit of the Jaguar. ZooLex Zoo Design Organization. WAZA. <u>http://www.zoolex.org/zoolex.cgi/view.py?id=864</u>. Accessed 28.12.12

A discussion on the RSPB forum the following month raised similar points, with the original poster stating that he would not visit the Wildfowl and Wetland Trust at Llanelli again due to being "very disappointed" at seeing "exotic ducks in pens [who] appeared stressed - not what I'd come to see. More like an expensive Duck Park or mini-zoo" (RSPB, 2012).

Responses to this post included:

"I have Martin Mere WWT near me. I went once or twice until I discovered they pinioned a lot of their birds. I won't go again. I don't understand why this cruel practice isn't against the law."

And: "Is that really what they do? That is horrible. Why would an organisation that is supposed to protect and preserve birds do that? Having recently added WWT membership to my RSPB membership, I'm not so sure now that it was a good idea."

In March 2012, there was comment on the Zoochat forum, where there is often detailed discussion on zoo management issues (Zoochat, 2012):

"I believe - and hope - that pinioning of birds will eventually be made illegal in the UK as has the docking of dogs' tails. It's odd that this antiquated practice has been allowed to persist unchallenged for so long. Both procedures, pinioning and tail-docking, involve amputation, which is very difficult to defend. On moral grounds alone one must come to the conclusion that pinioning (essentially the removal of the forearm) under most circumstances is unjustifiable, and that zoos should in future aim to have waterfowl, storks, cranes, flamingos, etc. in big (perhaps walk-through as at Bristol) aviaries."

"Certainly, some bird species will never do well if pinioned (storks, flamingos, cranes ... et cetera) as it interferes with an integral part of courtship. I do feel that in zoo aviculture the issue is often overlooked and pinioning and/or wing clipping is used as a simple management decision without due consideration of bird health and/or potential breeding success (or improving breeding prospects thereof). In a day and age where bird imports will eventually significantly decrease due to trade restrictions, I would assume more and more zoos may re-consider and change over to aviary exhibits and non-pinioning of birds."

Finally, in October 2012, a blogger describing a trip to the Wildfowl and Wetland Trust centre at Martin Mere, commented how, despite his support for WWT's captive breeding:

"This doesn't leave me unconcerned about the practice of pinioning wildfowl. [...] This practice is illegal in ducks kept on farms, but the WWT do it to prevent their wildfowl escaping. It does not sit easy that birds can be rendered permanently flightless, and how it impacts on their experience to be so damaged is unclear. I suppose pinioning is preferable to a repeat of the sorry tale of the Ruddy Duck, which was exterminated in recent years for expanding the gene pool available to an isolated population of the closely related White Headed Ducks in Spain, having initially escaped from, according to anecdotal evidence, another Wildfowl and Wetlands Trust exhibit in the 1980s" (LearnerBirder 2012).

5.2.5 Pinioning in zoos in England

The Secretary of State's Standards of Modern Zoo Practice, which provides government guidance on operating zoos in England, says of pinioning (Appendix 8, 8.6.7):

"Pinioning of birds is currently legal in the UK (so long as they are not on agricultural land) but should not be undertaken lightly. Collections should have an ethical policy and code of practice regarding pinioning and be prepared to defend it" (DEFRA, 2012a).

It also states (Section 3, 3.28) that specialist techniques such as pinioning waterfowl "must be kept under continual review".

Yet all of the evidence suggests that zoos simply see pinioning as a standard management tool and we have seen nothing to suggest that this is a practice kept under continual review by those zoos which conduct it. Although some information relating to zoos' practices (such as copies of DEFRA zoo inspection reports) is available under the Freedom of Information Act 2000, this does not extend to copies of minutes or other documentation produced by zoos' ethics committees. In fact, it is rarely clear from the information that is available whether zoo inspectors or the licensing authorities seek this information themselves to aid in inspections and licensing of zoos as no inspection reports for any of the zoos, or Pre-Inspection Audits, make reference to pinioning⁴.

5.2.6 Zoo industry opinions on pinioning

Given the serious welfare implications of pinioning and its widespread use within the zoo industry, it is useful to look at zoos' views on its use.

In the UK, the zoo trade body is the British and Irish Association of Zoos and Aquariums (BIAZA). Its European counterpart is the European Association of Zoos and Aquaria (EAZA). A search of both of their websites (November 2012) could find no reference whatsoever to pinioning.

The website of the World Association of Zoos and Aquariums (WAZA) mentions pinioning once (searched November 2012), but only in passing reference to a Swiss zoo that used to display some pinioned white storks.

However, both BIAZA and WAZA have position statements on flight restraint methods, and although these are not publicly available on their websites, they do set out some concerns on the issue (WAZA, 2005; BIAZA, 2012b).

Although BIAZA notes that "it is almost always necessary to at least restrict flight and in some cases to restrain flight" of birds in zoos, it "recommends that wherever possible flight restriction is used i.e. birds are maintained in large, complex, but fully enclosed aviaries that allow expression of a wide range of natural behaviours, including flight within that restricted area".

BIAZA claims that in some cases "a form of flight restraint may be more appropriate" and that a cost/benefit analysis "should be carried out in each case before any form of flight restraint is performed". This assesses the welfare of the birds and the "potential conservation value of captive populations". Flight restraint is permitted if conservation benefits outweigh welfare concerns.

The position statement includes a table to measure the cost/benefit of pinioning, feather clipping and fully enclosed aviaries.

WAZA's Code of Ethics and Animal Welfare "requires that pinioning of birds for educational or management purposes should only be undertaken when no other form of restraint is feasible. Because of the ethical, welfare, husbandry, population management and conservation breeding issues, it is the view of WAZA that appropriate scientific and veterinary reviews and investigation in to the impacts of flight restraint need to be conducted worldwide, particularly through the regional avian taxon advisory groups with a view of developing a WAZA policy on this issue" (WAZA, 2005).

The Wildfowl and Wetlands Trust (WWT) is the UK's leading wetlands conservation organisation, founded in 1946 by Sir Peter Scott. It has nine centres in the UK, six of them in England and five of which hold a zoo licence as they have captive birds. Although the WWT widely uses pinioning as a captive management procedure, there is no mention of this at all on its website (searched November 2012). Three of the WWT centres in England were visited during this study (two included in the random sampling, a third separately and

⁴ A copy of an Ethical Review Meeting for one zoo was provided by a Local Authority. Although this zoo did not keep species likely to be pinioned, it did provide a position statement supporting the practice as it believed "pinioning allows waterfowl to be kept in a better and more natural environment".

not included in results). During these visits, no information signs were seen that mentioned that pinioning took place and none of the printed materials (free or purchased) referred to it.

The study author did speak to staff at two of the WWT centres during the visits and asked them about pinioning. At one, a staff member told us that all non-native birds in open enclosures had to be pinioned by law and that every such bird at the zoo was therefore pinioned. At the other, a volunteer guide told us that the birds were 'wing clipped' and that he had needed to ask someone else this himself as he had seen birds clipped (actually pinioned) and didn't know what it was. This suggests that volunteers may not be made fully aware of the practice.

In the WWT's 'Waterfowl Management Guidelines' (Richardson, 1999), pinioning is not referred to until page four of the five page document, where under 'animal care – veterinary aspects', and after the comment "on the whole the standards as proposed would appear to cover most of the points that are applicable to waterfowl", it is simply stated: "flamingo pinioning should be carried out at two days old on the nest."

Page five explains that "Waterfowl, including flamingos, are particularly well adapted to a flightless existence, so long as adequate provision is made for their well being in all respects." It continues: "Pinioning ... is the recommended way of preventing the birds from flying. [...] As a matter of practice, this operation should not take place on individual birds that have experienced flight.

One or two species, e.g. Ringed Teal or Pygmy Geese are highly suitable aviary or tropical house birds, and in these cases keeping them fully winged under netting is a good idea. It is not essential however, and the opposite is usually true of most other waterfowl species. If you keep them fully winged in an aviary, then they will often try to fly, only to be foiled by the aviary. This can be very stressful and is not a satisfactory alternative to pinioning, as described above."

It would appear, therefore, that pinioning is the 'elephant in the room', that those keeping certain species of birds in captivity see it as an essential management tool but are unwilling to publicly acknowledge this as they presumably believe that visitors and the wider public would be concerned to know that birds were being mutilated in this way.

5.2.7 Legality of pinioning

A 2010 questionnaire regarding efforts to eradicate the Ruddy duck in Western Palaearctic countries was answered by 31 countries (Cranswick and Hall, 2010). The issue of pinioning was looked at as one part of managing the captive populations of the duck.

Twenty four countries answered the question on the legality of pinioning, with 67% stating that it was legal.

The 2010 survey found pinioning to be legal in the following countries: Austria, Belgium, Czech Republic, Denmark, France, Hungary, Iceland, Jersey, Portugal, Slovenia and Spain. It was stated that pinioning was legal in the United Kingdom but this is discussed further below.

Pinioning was reported to be illegal in: Estonia, Germany, Italy, Kazakhstan, Netherlands, Norway and Switzerland (although Germany reported that there are exceptions that could be granted in some cases).

No information was provided on why pinioning is prevented in some countries.

In the Australian state of New South Wales, specific guidance has been produced on pinioning under the Prevention of Cruelty to Animals Regulation 2012 (NSW, 2012). This allows pinioning of some species of birds (of the taxonomic Orders Anseriformes (ducks, swans, geese, screamers), Ciconiiformes (herons, ibises, storks, flamingos), Gruiformes (rails, cranes, bustards) and Galliformes (megapodes, quails, pheasants, guineafowl, guans) except pheasants older than 24 hours), as long as the owner of the bird is licensed under the Exhibited Animals Protection Act 1986 (e.g. is a zoo). However, the bird must be under 3 days of age. The Regulation's vagueness to pinioning having to be carried out in a manner that inflicts "no unnecessary pain on the bird" has been criticised by animal protection advocates opposed to pinioning (Voiceless, 2012).

5.2.8 Pinioning and the law in England

In England, animal welfare is governed by the Animal Welfare Act 2006, which prohibits any 'mutilation' being carried out on an animal. Mutilation under the Act means a procedure which involves interference with the sensitive tissues or bone structure of a 'protected animal', other than for the purpose of medical treatment.

The Mutilations (Permitted Procedures) (England) Regulations 2007, and its subsequent 2008 amendment, allow some mutilations to take place. Pinioning is classed as a 'permitted procedure' and the only reference to it states: "The procedure may not be carried out on farmed birds. An anaesthetic must be administered where the bird is aged 10 days or over." In all cases pinioning may only be carried out by a veterinary surgeon.

The Regulations note that exceptions to the prohibition on mutilations are designed "to permit procedures that are considered necessary for the overall welfare or good management of an animal".

During the parliamentary process to introduce the Animal Welfare Act, the Wildfowl and Wetlands Trust (WWT), Federation of Zoological Gardens of Great Britain and Ireland (now called BIAZA), British Waterfowl Association and Royal Society for the Protection of Birds (RSPB) all lobbied to prevent pinioning being banned.

WWT's Memorandum to the Select Committee on Environment, Food and Rural Affairs (WWT, 2004) states:

"At WWT, all captive wildfowl and flamingos are pinioned. WWT practices pinioning as a safe, permanent and humane flight restraint method to prevent non-native waterbirds escaping in to the British countryside [...]

"A pinioned bird is one which has had the metacarpal bone and the phalanges of one wing removed in order to render that bird permanently flightless. Pinioning may be deemed an act of mutilation. However, WWT [...] believes that the welfare of captive wildfowl and flamingos is not compromised when they are managed in the pinioned and flightless state. Birds are pinioned when aged under two days and do not experience significant or lasting pain or distress. 'Flightlessness' is a state all free-living wildfowl and flamingos undergo for between three to 10 weeks each year (during their annual wing moult). Furthermore, almost 60 years of experience shows WWT that pinioned wildfowl and flamingos survive, grow and reproduce well in the conservation exhibits established at WWT centres and zoos in general."

The WWT urged the government to "designate wing pinioning for certain species of birds as an exemption from the general prohibition by an order made under Clause 1 subsection (5)." It said that it was also "keen to act as a consultant [...] to any authority producing a code of practice for pinioning or for the care of captive wildfowl and flamingo species."

Martin Spray, Chief Executive of the WWT, also gave evidence in person to the Select Committee where he set out his organisation's support for the mutilation (EFRA Select Committee, 2004b):

"The issue of pinioning with regards to the Wildfowl and Wetlands Trust is that we want to actually bring people close to birds close to wildlife, particularly young children. [...] It is really trying to increase public awareness of the importance of conservation of wildlife, of wetlands and of wetland species, and wing pinioning, we believe, is the most humane, effective and safe method of actually exhibiting captive water birds, wildfowl. These are birds that are more sedentary or aquatic than many other species and are not actually particularly suitable for enclosure, for instance, in large aviaries because of their flight mechanisms, their speed and their lack of agility and manoeuvrability. So we do feel that this is the best possible way of exhibiting those birds and bringing people close to them and giving them that first-hand experience." The Federation of Zoological Gardens of Great Britain and Ireland (now called BIAZA) likewise submitted evidence to the EFRA Committee calling for pinioning to be made a permitted procedure, referring to it as a "routine management practice" (FZG, 2004).

The British Waterfowl Association (BWA), which generally represents private keepers and breeders of waterfowl, claimed that "valuable conservation projects" would "be grossly damaged" if "it became illegal to carry out pinioning except in certain licensed establishments, such as zoos" (BWA, 2004). Its reasoning for this was that "the gene pool of many species will be sadly diminished", presumably because it believed waterfowl cannot be bred in captivity unless they are pinioned.

Support for pinioning also came from the Royal Society for the Protection of Birds (RSPB) which believed that banning it "could increase the likelihood of non-native species escaping and becoming established in the wild" (RSPB, 2004).

During the Select Committee process, it appears that little evidence was provided to support claims made in defence of pinioning. The fact that this has been a long-standing way of keeping certain species in captivity appears to be the main defence. The then Minister for Nature Conservation and Fisheries, Ben Bradshaw, told the Committee (EFRA Select Committee, 2004a):

"Some of these areas are very difficult but current DEFRA veterinary opinion is that pinioning waterfowl does not result in obvious signs of distress and is important for species conservation. Further, the welfare benefits birds gain from being housed in near natural surroundings and being able to perform other normal behaviour patterns outweighs the loss of flight, which is an aspect of normal behaviour that the majority have never known as generally the operation is carried out within two or three days of life."

Henry Hoppe, Animal Welfare Bill Head of Policy at DEFRA, added: "On the issue such as pinioning, we also have to consider not only the welfare of the bird but also the possible impact on society if you do not pinion, and, in the case of pinioning, there is the risk of non-native species being released and you get into the ruddy duck syndrome; so it is a different issue to tail-docking."

Given that falconry centres fly large numbers of non-native avian species on a daily basis, some arguments in defence of pinioning become harder to justify. Although birds of prey are flown when hungry, to encourage their return to the falconer, some zoos do refer to the fact that it is the bird's decision to return. There are many examples of birds not returning at all or at least for several days. Two falconry centres visited for this study mentioned that their birds do not always return swiftly during flying displays. One commented of its White tailed sea eagle (*Haliaeetus albicilla*), "when she goes up it's 50:50 as to whether she comes back". The birds usually do return and some zoos have transmitters on their birds to locate them if they do disappear. Whilst the situation with birds of prey may be a very different to those waterfowl commonly pinioned, it does bring into question as to whether preventing the release of non-native species can continue to be used as a defence for permanently depriving a bird of their ability to fly.

5.2.9 Pinioned birds in sampled zoos

During visits to all sampled zoos, those species likely to be pinioned were recorded. Some birds could be clearly seen to be pinioned when they opened their wings. Others were recorded as likely to be pinioned based on their species and enclosure type (e.g. waterfowl or flamingos in open enclosures). Birds of the following orders, kept in open enclosures, and who would likely fly off if their flight was not restrained, were most likely to be pinioned:

Anseriformes: Waterfowl (ducks, geese, swans) Ciconiiformes: Herons, storks and relatives Gruiformes: Cranes, rails and relatives Pelecaniformes: Pelicans and relatives Phoenicopteriformes: Flamingos

Given the large numbers of waterfowl on pond areas at some of the zoos and the difficulty of accurately counting the numbers of individuals, all figures in the following table are taken from the most recent stocklists.

Table 20: Pinioning of birds in selected zoos

TIOLAL NUMBER OF DIRUS IN EACH 200 EXCLUDES DOMESLIC SPECIES	Total numb	r of birds in eac	h zoo excludes don	nestic species
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Zoo code	BIAZA member?	Total number of birds in zoo	Species pinioned	Number of individual birds pinioned	Percentage of all birds pinioned
GMB-48	Yes	762	Anseriformes Gruiformes Pelecaniformes Phoenicopteriformes Ciconiiformes	73	9.58%
GMD-142	Yes	95	Phoenicopteriformes	12	12.63%
GMH-69	No	138	Anseriformes Gruiformes Phoenicopteriformes Ciconiiformes	40	28.99%
GML-119	Yes	65	Gruiformes	4	6.15%
GMN-99	No	71	Gruiformes Ciconiiformes	6	8.45%
GMS-4	No	395	Anseriformes Phoenicopteriformes Ciconiiformes	161	40.76%
OBM-146	Yes	1732	Anseriformes Phoenicopteriformes Gruiformes	1732	100%
OBW-129	Yes	527	Anseriformes Phoenicopteriformes Ciconiiformes	527	100%
Total		3785		2555	67.50%

In conversations with staff at zoos OBM-146 and OBW-129, we were told that all birds at the zoos were pinioned.

Chart 36: Number of zoos pinioning birds

Number of zoos in study: 20 Number of zoos that pinion birds: 8 (40%)



Chart 37: Percentage of birds who are pinioned in 8 zoos

Number of birds in 8 zoos which pinion: 3785 Number of birds pinioned: 2555 (67.5%)



5.2.10 Pinioning at Wildfowl and Wetlands Trust zoos

The Wildfowl and Wetland Trust has nine centres in the UK, six of them in England. Of those in England, five appear to have captive birds (being listed as zoos by DEFRA (2012b)).

Captive birds in WWT centres tend to be largely, or totally, made up of species likely to be pinioned. Therefore, analysis of stocklists for each of their centres (as provided to the local authority in relation to their zoo licences) gives an indication of the number of individual birds subjected to pinioning by the WWT.

(Stocklists were obtained under the Freedom of Information Act and relate to 2012, other than one, for which the licensing authority could only provide a stocklist dated 2010).
Table 21: Number of birds potentially subjected to pinioning at WWT centres

WWT centre	Total number of birds potentially subjected to			
	pinioning			
Arundel	464			
London	170			
Martin Mere	1732			
Slimbridge	2798			
Washington	527			
Total	5691			

As can be seen from Table 21, over 5,500 individual birds may be subjected to pinioning at five WWT centres alone.

5.2.11 Alternatives to pinioning

If bird species currently pinioned are to be kept in captivity in the future, other methods need to be assessed.

According to flamingo husbandry guidelines produced by the Association of Zoos and Aquariums, European Association of Zoos and Aquaria and the Wildfowl and Wetlands Trust (AZA, 2005), "unfortunately, most current exhibits are open-air enclosures creating the need for the birds to be rendered flightless to prevent escape." It continues: "The recommendation is to keep flamingos full-winged and design new exhibits to accommodate a full-winged flock. Sadly, there are very few exhibits that are designed for full-winged flocks." These comments appear to contradict other statements from the WWT defending pinioning.

The AZA document notes that keeping flamingos full-winged (in roofed enclosures) "would be very educational, have considerable public appeal, and would increase the likelihood of reproduction within a flock" and lists zoos in the USA (Sacramento and San Antonio), Switzerland (Basel), Japan (Kobe) and Mexico (Xcaret) "that are successfully exhibiting full-winged birds".

Clearly, full-winged birds in enclosed exhibits do not have the opportunity to fly away. Yet some zoos keep fullwinged flamingos in open enclosures with few problems. For example, San Antonio Zoo changed their flamingo exhibit to a part open one in 1988 (it has an open front with curtains that can be lowered at night) and reportedly "the birds, in general, have shown no inclination to fly out. Only five birds have flown out of the exhibit. All of these were one or two-year-olds and were recovered. The pay-off is nearly 100% fertility in the eggs" (AZA, 2005).

The majority of flamingos at Basel Zoo are now full-winged and kept in an open outdoor enclosure. Although an occasional flamingo has left, "the losses have been very acceptable" (AZA, 2005).

'Long pinioning' is a method introduced in 1991 where four to five primary feathers are left intact in an attempt to provide better balance during copulation and therefore increase fertility (AZA, 2005). Although at least two zoos in the USA have been using this method since it was introduced, there appears to be little data to help draw significant conclusions on its effectiveness.

Chinese researchers have suggested vane manipulation as a non-permanent method of flight restriction (Zhang et al, 2011). Using this method on a female red-crowned crane, they showed that trimming the vanes of primary feathers on one wing can render birds flightless because the primaries cannot generate sufficient lift and thrust. The bird was still able to conduct courtship displays and regained normal flight capability when the modified primaries were shed and replaced by new feathers.

As "the flight capability of birds can be adjusted by altering treatment of feather numbers and area on each vane" the researchers saw this as "advantageous for helping males when mating by retaining sufficient

functional wing to allow them to balance on a female". The method is potentially applicable to other birds such as goose, bustard, stork, duck, pheasants, eagle and falcon.

The researchers concluded: "excision of barb ventral margins of primaries is a simple, safe, low-cost, non-invasive, and reversible method for flight restraint of large birds". However, it still prevents birds from flying.

"Birds are finely tuned metabolic machines designed for flight. In zoos they are denied the one thing all their evolution has revolved around". Professor Alan Feduccia, University of North Carolina (Nicholson-Lord, 1991)

5.3 Wing clipping

Wing clipping is a non-permanent method of restricting a bird's ability to fly and involves cutting the primary feathers (usually just of one wing) and is more commonly used on psittacines (parrots).

Advantages over permanent restrictions (other than flightlessness only being temporary) include reducing stress to birds, avoiding surgical risks such as pain and tissue damage and minimising cost (Zhang et al, 2011).

This procedure needs to be repeated each time the bird moults and regrows the primary feathers. In most birds this is once a year, although pet parrots kept indoors may moult more regularly. Some species of birds, such as some ducks, moult two or three times a year, although cranes only moult every other year (Startup, 1967). This is one main reason for it not being used on some species, particularly waterfowl, in zoos, where catching the birds would be complicated and cause additional stress.

The primary feathers are cut with scissors, "and should be removed at the level of the covert feathers, the small feathers covering the upper part of the flight feathers" (Startup, 1967).

If the feathers are cut too short, or a feather that is still growing is cut, profuse and prolonged bleeding from the quill may occur (Ellis and Dean, 1991).

Other potential problems from wing clipping include inconsistent flightlessness and keel trauma if a severely wing clipped bird attempts to fly and hits the ground or other surfaces. "Feather clipping also often degrades a bird's appearance and reduces its attractiveness to zoo visitors" (Zhang et al, 2011).

As with pinioning, birds who have previously experienced full flight may suffer some psychological stress when wing-clipped (Antinoff, 2002).

During visits to the 20 sampled zoos, only one bird was observed to have been wing clipped (a Grey crowned crane, *Balearica regulorum*). It is likely that more birds had been wing clipped but this difficult to observe unless birds open their wings at the time the enclosures were being monitored.

5.4 Other welfare problems

In a study of the effects of introducing mirrors and flamingo statues on the reproductive behaviour of Chilean flamingos (*Phoenicopterus chilensis*) in a Brazilian zoo, the behaviour of 'pretend flight' was recorded. This is where "the bird runs through the pool as if it is going to fly", with researchers noting: "the flamingos went to the edge of the lake and began to vocalise. Eventually, they opened their wings and began to flap them. A few seconds later, they all ran to another edge of the pool, flapping their wings and vocalising, as if they wanted to fly." With no obvious cause for this behaviour (such as disturbance or alarm), one possible explanation was "a

manifestation of migratory restlessness (characteristic of caged migratory birds)." As the flamingos were pinioned they were unable to fly (de Azevedo & Faggioli, 2004).

Migratory restlessness is also known as 'Zugunruhe', from the German words Zug (move, migration), and Unruhe (anxiety, restlessness), and relates to the urge of captive birds to migrate (Helm & Gwinner, 2006). It has been studied in a number of avian species and is believed to result from the inability of caged birds to perform normal reproductive activities (Gwinner & Czeschlik, 1978).

5.5 Tethering

5.5.1 Introduction

Just as pinioning is seen as a common management method for captive waterfowl, so tethering to a perch is commonly used with birds of prey.

Tethering is also more euphemistically known as 'weathering' and the area where birds are tethered known as a 'weathering lawn'. The term 'tethering' is used throughout this report as a more accurate description and to avoid any confusion.



Birds tethered on lawn

Tethering involves the attachment of jesses (thin leather straps) and leather anklets around the legs of the bird, connected to a leash which is then attached to a stationary perch. The method should allow the bird to move off and onto the perch (onto the ground) and give access to a bath pan. Tethered birds should be able to preen, eat, bathe and extend their wings (IAATE, 2008).

Although birds should be allowed to freely move off and onto the perch, leashes "should not be too long as forces placed on the birds legs from bating [trying to fly off] can cause damage if the length is not correct" (Hawk Board, 2011).

Where several birds are tethered, it is crucial to keep an adequate distance between each bird (at least the sum of twice the wingspan of each bird), to prevent them attacking and injuring, or even killing, each other. Equally, consideration needs to be given to which species to tether next to each other to reduce stress and intimidation. For example, "putting a kestrel immediately next to a goshawk would be very stressful for the kestrel. Similarly, tethering a Little owl next to an Eagle owl would be very unfair, and stress can kill birds. Feeding birds in view of one another can be particularly stressful both to the bird being fed and the one not being fed" (Hawk Board, 2011).



Harris's hawks (Parabuteo unicinctus) tethered close to each other

There are a wide variety of perching options, based around blocks or bows, depending on the species of the bird, their foot structure and how they normally grip a perch. Blocks are generally used for falcons, for example, as they usually perch on rocks or posts than in trees (Parry-Jones, 1994). Both can be made from a variety of materials but should be chosen to suit the individual bird.

Some type of shelter from heat or inclement weather needs to also be provided (Fox & Chick, 2007); Cromie and Nicholls (1995) consider this to be "perhaps the most fundamental design feature". Safe access to water for bathing is also required (which helps clean the feathers and regulate temperature). Table 23 shows that this is not the case in most sampled zoos.

5.5.2 Species tethered

Species most typically tethered are raptors such as hawks, eagles and falcons. The International Association of Avian Trainers and Educators (IAATE, 2008) recommends against tethering non-raptor species, such as vultures and caracaras, as they are more prone to injury.

The Hawk Board has a similar policy, believing that no owls should be tethered, particularly the small owls who are not able to hide away during daylight hours if tethered. It "strongly recommends that small owls (Tawny owl size down) are not kept tethered" and notes that the International Centre for Birds of Prey recommends that no owl species is tethered. It adds "the New World vultures have a natural habit of urinating on their legs, so putting leather jesses on them is not acceptable. In fact most of the vultures and the caracara's do much better if not tethered" (Hawk Board, 2011). The Board also notes that some species, such as harriers may not be suitable for tethering "because of their fine legs and thin skin".

In England, government zoo licensing guidance (DEFRA, 2012a) states that "owls and vultures, particularly the New World vultures should not be kept tethered" as "they can easily be trained to fly from pens and this is the preferred way to house them".

Two zoos of the 20 visited for this study tethered owls (see Table 22). Zoo OBS-7 tethered a Tawny owl (Strix

aluco) and two larger species of Eagle owls (Indian Eagle Owl (*Bubo bengalensis*) and Vermiculated Eagle Owl (*Bubo cinerascens*)).

Zoo BPF-59 tethered one species of owl larger than the Tawny owl (Great horned owl, *Bubo virginianus*), three species of owls similar in size (Spectacled owl (*Pulsatrix perspicillata*), Spotted eagle owl (*Bubo africanus*), Barn owl (*Tyto alba*)) and two species smaller than the Tawny (Scops owl (*Ptilopsis granti*), Little owl (*Athene noctua*)).

Two zoos tethered vultures but these were Old World species.



Tethered Barn owl (Tyto alba)

5.5.3 Why tether?

Tethering is conducted either to provide a closer display of the birds for zoo visitors or as a method of managing birds for flying them in free-flight programmes.

Housing birds in aviaries when they are to be flown on a regular basis brings complications. Many raptors fly extremely fast and are nervous and aggressive birds; when housed in an aviary "this flightiness and predatory nature make them particularly prone to injuring themselves and each other" (Cromie & Nicholls 1995). Birds in aviaries may also display territorially aggressive behaviour towards any person entering the enclosure to

remove the bird for flying. However, suitable aviaries should be provided for birds at times of year when they are not being flown, such as moulting (Fox & Chick, 2007).



Tethered Martial eagle (Polemaetus bellicosus)

At one zoo visited for this study (BPK-126), we witnessed a falconer removing a Harris Hawk (*Parabuteo unicinctus*) from an aviary in order to tether him on the lawn. The bird was visibly distressed at the falconer's entrance into the enclosure and attempted to escape handling. The falconer, seemingly impatient at the bird, managed to grab him by the legs and hold him upside down, the bird flapping his wings. He was removed from the enclosure in this manner before the falconer turned him upright and carried him to the tethering lawn.

The International Association of Avian Trainers and Educators (IAATE, 2008) consider tethering to be useful for those birds without access to an outdoor area in their permanent enclosures so they "can be exposed to beneficial natural elements without needing much space". However, it could be considered a breach of animal welfare law if birds' enclosures do not provide for their behavioural needs and if tethering was the only option available for the birds to be exposed to natural elements.

One zoo (GMK-143) gave the following reason for tethering in an information sign:

"These birds are predators, they kill other creatures to live and this includes other birds of prey. The tethers are not intended to stop the birds flying away, they are

intended to stop the birds hurting each other." The three birds tethered outdoors were two Lanner falcons (*Falco biarmicus*) and a Harris hawk (*Parabuteo unicinctus*).

Two zoos visited for this study did, however, express a desire to move away from tethering.

5.5.4 Training

The process of training birds to fly from the fist is known as 'manning' and involves withholding food from the bird until they accept it on the fist. Manning has been described as an "indisputably stressful time for a raptor" with the bird "subjected to bouts of acute fear" which can predispose them to stress-related diseases such as aspergillosis (Cromie & Nicholls 1995).

One of the UK's most foremost bird of prey trainers has said (Parry-Jones, 1994): "Training birds is a very traumatic experience for the bird". She recommends that on day one of training, the bird is only allowed food when she feeds from the fist; if she doesn't then the food is put back in the bag and the bird returned to her perch. "By the third, fourth or fifth day she should feed", although Parry-Jones had a bird go ten days before she fed.

"From an animal welfare perspective this manning process may sound wholly unacceptable, i.e. tying up a bird, forcing it to sit on a fist and refusing it any food other than that offered on the fist which it may be too terrified to eat. However, if a bird is to be allowed to fly free then this process is essential and on balance a bird having gone through this acute phase of fear and become properly manned will have a less frightening life than one that is not properly manned. The latter will suffer more subsequent bouts of fear and possibly pain caused by excessive bating later in life." (Cromie & Nicholls 1995)

Whilst tethering a bird during training is seen as having the advantage of reducing stress of capture in the aviary, they are usually ready to be flown loose within a month of training. The Hawk Board (2011) states: "In these more enlightened times owners often keep their fully trained and tame birds free lofted in an aviary after training, only re-tethering at retraining stage each year after moulting. Indeed it is far easier once a bird is trained and tame to keep loose in a safe enclosure than to have it tethered, and in most cases better for the birds".

Birds may be tethered for extensive periods during initial stages of training them to fly. Parry-Jones (1994) writes: "in the early stages, except for a hand-reared owl, your bird will have to be tethered until she is tame enough to come happily to the fist [...] She may also need tethering after each moult, just for a few days to remind her of the training and what is expected". She recommends that birds new to the collection should be tethered on a lawn for the first day and that "for the first couple of hours a newly tethered bird will fight the jesses, lie on the floor and generally thrash about [...] Leave the bird tethered and well alone for the first day", before putting in an aviary at end of the day. Before a bird can be housed loose rather than tethered she needs to be very tame and very easy to pick up.

Parry-Jones refers to some birds being tethered permanently, for example when a zoo has so many (she refers to 14-28) who are flown daily: "it is almost impossible to have each bird loose in an individual pen". In this instance she mentions having a purpose-built indoor area housing 16 tethered birds.

Cromie & Nicholls (1995) also reported that some UK zoos tethered birds indefinitely, either because it was believed that the birds did not need to hunt for their food or tethering was use as a "space saving device" (i.e. doing away with the need for aviaries). They considered this attitude to be "one of the most disturbing aspects of tethering" and "unacceptable".

5.5.5 Flying

Whereas pinioning of waterfowl or flamingos may go unnoticed by most zoo visitors, tethering is clear for all to see. One zoo visited (GMT-1) had a sign on an area for tethered birds, aiming to provide an explanation for this flight restriction: "This may be a sight that causes concern to some guests. Weather permitting all our birds of

prey are flown daily. Although schooled to return it is the birds choice whether to return or not."

DEFRA states that tethered birds "must be flown at least four times a week" and must not "be tethered permanently. All birds should be given the opportunity to fly or move around freely during part of the year" (although it does not clarify what is meant by 'part of the year'). The Hawk Board states that tethered birds "must be flown free on a daily basis (weather permitting)" (Hawk Board, 2011).

The Hawk Board also recommends that

"diurnal (day flying) birds of prey should not



Tethered White-tailed sea eagle (Haliaeetus albicilla)

be tethered except when flown daily, in genuine training or under veterinary treatment" (Fox & Chick, 2007).

Zoos which tether birds generally claim that all the birds are flown daily. However, this is not usually the case. It may well be that the zoo flies <u>some</u> birds every day, but that is different to <u>every</u> bird being flown <u>every</u> day. Given the large number of birds tethered (see Table 22) how likely is it that they are all flown daily? At zoo BPN-137 the falconer told us that there were 43 birds in total and they were flown "in rotation", which meant that only a small number were flown each day. She admitted that given the poor weather (cold and wet), birds were not flown daily and as a result some were gaining too much weight. Bird of prey's weight should be monitored daily and if too heavy they cannot be flown; reducing weight too much can kill a bird (Parry-Jones, 1994).

Table 39 shows that of flying displays observed during this study, birds were flown for an average of 5 minutes 41 seconds each.

5.5.6 Are birds of prey 'lazy'?

In defending tethering to concerned members of the public, the International Association of Avian Trainers and Educators (IAATE, 2008) suggests telling people the following:

"Flight is an energy depleting activity that serves specific purposes in the wild. Raptors in the wild fly to patrol territories, seek out food, secure mates, etc. When these needs are met, their time spent flying decreases. Similarly, in captivity, raptors choose to spend a majority of their time sitting on perches instead of flying."

This argument is worth considering in more detail. Cromie & Nicholls (1995) wrote:

"It could be argued that as predatory carnivorous animals most raptors would fly or run to catch food but would then sit and digest a meal for many hours until physiologically hungry enough to eat again. In other words, if not hungry most raptors sit still. Removing a bird's need to hunt could, therefore, remove its need to move about."

Several zoos visited during this study used this defence for tethering birds, going so far as to refer to birds of prey as being "lazy". A sign at zoo GMK-143 claimed: "In the wild once they have had a good meal they will stay on a perch for most of the day. Flying is not done for fun in fact it uses precious energy. [...] Birds of prey are lazy and once they have eaten in the 'wild' all they want to do is have a rest and conserve energy".

Three other zoos referred to birds of prey as "unbelievably lazy" or "incredibly lazy" during flying displays of four different species.

However, would this level of restriction be considered as acceptable for those mammal species which also rest for long periods following a successful hunt?

Lion expert Gareth Patterson⁵ thinks not. He says (*Pers. comm.*):

"It seems that birds of prey are even less suited for a captive life than even the mammals. It is wrong that it is said that birds of prey only fly to hunt. The birds also fly to defend (often vast) territory, and time is also utilised for pair-bonding, breeding, nesting etc. Also, the migrant birds of prey travel huge distances.

Lions spend periods of time resting after feeding, but like birds of prey, also spend much time patrolling and defending territory. It would not be acceptable for lions to be severely restrained in a zoo, and nor should it be for birds of prey."

It is highly likely that a zoo which physically restricted a predatory carnivorous mammal to the extent that many restrict predatory carnivorous birds would not only be subjected to complaints from visitors and zoo inspectors but may also find itself threatened with breaching the Animal Welfare Act.

⁵ Award-winning wildlife expert and author, known internationally for his efforts to greater protect the lions and elephants of Africa

5.5.7 Potential problems caused by tethering

- Injuries to legs and feet can be caused by "uneven jess length or poorly designed or fitted anklets that are too tight, too loose, or made of improper materials"
- Tangling of birds is caused by "improperly designed tethering equipment, perches [and] housing designs"
- "Poorly maintained equipment can lead to equipment failure that may result in loss, injury or death of the bird or other birds in the vicinity" (IAATE, 2008)

Tethered birds are vulnerable to attack by other wild animals, a problem noted by several falconers on on-line forums. At one zoo visited (BPG-20), a keeper told us that one of the tethered eagles was "terrified" of wild buzzards who flew overhead each day at the time that tethered birds were fed. He offered no solution to the ongoing problem.

Poor perch design is the main cause of bumble foot (a potentially disabling infected lesion), causing pressure sores which then become infected (Cromie and Nicholls, 1995). Perches should be cleaned and disinfected regularly (Fox & Chick, 2007), although this applies to all types of perching, in aviaries as well as for tethering.

Cromie and Nicholls (1995) report several other welfare problems:

"The tying of a bird, in itself, created problems such as physical trauma, mental stress and inability to evade danger or the elements. The training period is especially fraught with mental and physical stress."

"Once flying loose many raptors are prone to flying accidents due to their speed and their predatory nature which makes them prone to attacking one another, or being injured by prey".

They also note that raptors may be able to suffer from boredom, loneliness (particularly the gregarious species), or grief (perhaps following the loss of a mate). Despite this, they add that "there would appear to be little in the literature regarding environmental enrichment for raptors *per se*".

Cromie and Nicholls (1995) add that "further research needs to be carried out into the physiological effects of tethering. Systems for reducing the problems of tethering need to be devised or introduced more widely with appropriate education. Management techniques require further development with emphasis on allowing flying birds to be kept loose".

However, on a positive side, they state that the closeness a trainer has with a bird allows them to obtain a better understanding of the birds needs and to recognise health problems. "Such health problems in birds loose in an aviary which are never handled (and possibly not looked at as much) may not be subject to such immediate diagnosis. Moreover, the physiological fitness of a bird flown free regularly is far greater than that of a bird maintained in an aviary."

5.5.8 Housing birds of prey



Although some birds of prey are housed in traditional aviaries, those used for flying displays and who spend large parts of the day tethered outdoors are usually housed in mews. In addition to the difficulties of catching birds in larger aviaries, described above, birds can injure themselves (break

feathers and injure feet, wings and beaks) by hanging on the wire of the enclosure (Martin, 2012).

There are two types of mews: traditional mews and free-loft. The former usually has partitioned spaces to separate tethered birds and they will spend the day tethered outdoors. Free-loft mews provide more space and birds can fly free within the chamber.

Housing raptors in free-lofting mews can result in similar problems to traditional aviaries, with birds becoming nervous or aggressive and difficult to catch and handle (Martin, 2012).

5.5.9 Hooding



Hooded Lanner falcon (Falco biarmicus)

Above: Mews for raptors; Below: Close-up of Peregrine/Lanner falcon tethered



Some falcons and hawks are fitted with a hood made of leather which prevents them from seeing anything (such as other birds flying) and acts to calm the bird. As with perches, there is a wide variety of designs.

If not fitted correctly, hoods can cause injuries such as (Ash, 2012):

- The cere can be bruised if the gape part of the hood dies not fit properly (across the bird's mouth opening)
- Rubbing of the hood can irritate the eye
- Rubbing of the chinstrap against the mandible can create raw areas and wounds

During visits to the zoos for this study, only one bird was hooded prior to being flown in a display, a Lanner falcon (*Falco biarmicus*) at zoo GMT-1.

5.5.10 Specialist needs of birds of prey

Cromie and Nicholls (1995), in their study of welfare and conservation aspects of keeping birds of prey in captivity in the UK, concluded that the keeping of raptors requires special care and skills over and above those required for the keeping of other captive birds.

Platt, Bird & Bardo (2007) provide a further explanation for this, noting that although birds of prey "have been held in captivity for thousands of years by many cultures, it was not until the 20th century that they were bred in captivity and manipulated in the manner of domestic species". Only 15 species appear to have bred in captivity by the 1950s, and 22 by 1965, with none of these being part of an organised or sustained programme. The researchers point out that it was the diminishing numbers of raptors due to pesticides such as DDT which provided the catalyst to "overcome the challenges of consistently breeding these highly aggressive birds".

The UK saw a growth in number of specialist bird of prey centres in the 1990s (Cromie and Nicholls 1995), spurred on by advances in captive breeding and, according to Parry-Jones, Nicholls & Farmer (2007), legislation which makes it "relatively easy to keep birds of prey and display them to the public" compared with many other countries.

Despite the specialist nature of these collections, some bird of prey establishments have questioned whether they should even by licensed as zoos (Zoos Expert Committee, 2011). There have been failures of many aspects of the zoo licensing system, but it at least provides a deterrent to setting up collections by people without appropriate skills and provides a basic standard by which welfare needs can be addressed.

5.5.11 Tethering of birds at sampled zoos

Tethered birds were seen at seven of the twenty zoos visited.

The numbers and species of birds listed in Table 22 are based on recordings of visits to the zoos.

Tethered birds were all of the following species:

Order: Families:	Falconiformes (diurnal birds of prey) Accipitridae (hawks and eagles) Falconidae (falcons)
Order: Families:	Strigiformes (owls) Strigidae ('true' or 'typical' owl) Tytonidae (barn owls)

Table 22: Tethering of birds in sampled zoos

Zoo code	BIAZA member?	Total number of birds in zoo	Number of tethered birds	Examples of species of tethered birds	Percentage of birds tethered
BPF-59	No	29 in enclosures + 31 tethered [Total: 60]	31	Order: Falconiformes Families: Accipitridae Falconidae Order: Strigiformes Families:	51.67%
				Strigidae Tytonidae	
BPG-20	Yes	85 in enclosures + 27 tethered [Total: 112]	27	Order: Falconiformes Families: Accipitridae Falconidae	24.11%
ВРК-126	No	62 in enclosures + 16 tethered [Total: 78]	16	Order: Falconiformes Families: Accipitridae Falconidae	20.51%
BPN-137 [See note 1]	No	31 in enclosures + 12 tethered [Total: 43]	12	Order: Falconiformes Families: Accipitridae Falconidae	27.91%
GMK-143	No	22 in enclosures + 6 tethered birds [Total:	6	Order: Falconiformes Families: Falconidae	27.27%

Zoo code	BIAZA member?	Total number of birds in zoo	Number of tethered birds	Examples of species of tethered birds	Percentage of birds tethered
		28]			
GMT-1	Yes	54 in enclosures + 7 tethered [Total: 61]	7	Order: Falconiformes Families: Accipitridae Falconidae	11.48%
OBS-7	No	16 in enclosures + 5 tethered [Total: 21]	5	Order: Falconiformes Families: Accipitridae Falconidae Order: Strigiformes Families: Strigidae	23.81%
Total		403	104		25.81%

Note 1: Zoo BPN-137 had a total of 39 birds in 31 enclosures plus 4 tethered on the lawn. 8 of those birds were housed in mews with the doors open and were seen to be tethered. 13 birds were in aviaries and clearly not tethered. The other 18 birds were housed in mews but the doors were closed and it was not clear whether these birds were tethered or not; for the purposes of Table 22 we have classed these 18 birds as not tethered.

Number of zoos which tether birds: 7 (n=20) Percentage of all 20 zoos which tether birds: 35%

Chart 38: Percentage of birds tethered in zoos which use the practice:

Percentage of all birds in 7 zoos who are not tethered: 403 (74.19%) Percentage of all birds in 7 zoos who are tethered: 104 (25.81%)



A total of 104 birds were found to be tethered at seven zoos at the time of our visits, an average of 14.9 birds per zoo. Analysis of those zoos holding flying displays (Table 38) shows that, on average, 6 birds were flown in public displays each day.

Cromie & Nicholls (1995) note that it takes roughly 15 minutes to exercise a single bird (preparation of food, weighing the bird and putting the bird away), based on flying the bird for just five minutes, which leaves little time for flying remaining birds outside of the time when the public are at the zoo. Table 22 (above) shows two zoos to have 27 and 31 birds tethered. Cromie & Nicholls, in their 1995 study of UK bird of prey centres found up to 35 birds tethered at a single zoo and commented:

"Centres such as the one with 35 tethered birds seem practically to be unable to live up to the claim that all birds are flown daily. i.e. this would take one handler 35 x 15 minutes, 8.75 hours per day doing nothing else but exercising birds."

As mentioned earlier, zoos' claims to fly tethered birds daily are not quite as they seem, with it being far more likely that <u>some</u> birds are flown every day rather than <u>all</u> birds. With an average of 15 tethered birds at each zoo using this practice, it is highly unlikely that every bird has the opportunity to fly each day and is more likely to remain tethered. On days with poor weather (a particular problem during the 2012/2013 period of this study), there would be many days when no birds are flown at all.

5.5.12 Conditions for tethered birds

As discussed above, tethered birds should be provided with shelter from the elements and water for bathing. The following table looks at the provision of these basics at the zoos with tethered birds.

Zoo code	BIAZA member?	Number of tethered birds	Number of birds without shelter	Number of birds without bath	Number of birds with shelter and bath	Percentage of birds with shelter and water
BPF-59	No	31	21	4	6	19.35%
BPK-126	No	16	16	16	0	0%
BPG-20	Yes	27	0	0	27	100%
BPN-137	No	4 on lawn	4	4	4	0%
		8 tethered in mews	0	8	0	0%
GMK-143	No	6	3	5	1	16.67%
GMT-1	Yes	7	5	0	2	28.57%
OBS-7	No	5	5	0	0	0%
Total		104	54	37	40	38.47%

Table 23: Provision of shelter and baths for tethered birds at sampled zoos

Chart 39: Percentage of tethered birds with both shelter and water

Total number of tethered birds: 104 Percentage of birds with shelter and bath: 40 (38.46%) Percentage of birds without shelter and bath: 64 (61.54%)



5.6 Flight restraint in sampled zoos

Looking at Tables 20 and 22, we can assess which zoos of the 20 sampled use pinioning or tethering as flight restraint methods. 15 of the 20 zoos sampled use one of these methods (8 use pinioning, a different 7 use tethering and one uses wing clipping).

Zoo code	BIAZA	Total	Total	Total	Total	Percentage
	member?	number of	number of	number of	number of	of birds
		birds	birds	birds	birds wing	restricted
			pinioned	tethered	clipped	
BPF-59	No	60	0	31	0	51.67%
BPK-126	No	78	0	16	0	20.51%
BPG-20	Yes	112	0	27	0	24.11%
BPN-137	No	43	0	12	0	27.91%
GMB-48	Yes	762	73	0	0	9.58%
GMD-142	Yes	95	12	0	0	12.63%
GMH-69	No	138	40	0	0	28.99%
GMK-143	No	28	0	6	0	27.27%
GML-119	Yes	65	4	0	0	6.15%
GMN-99	No	71	6	0	0	8.45%
GMS-4	No	395	161	0	0	40.76%
GMT-1	Yes	61	0	7	1	13.11%
OBM-146	Yes	1732	1732	0	0	100%
OBS-7	No	21	0	5	0	23.81%
OBW-129	Yes	527	527	0	0	100%
Total		4188	2555	104	1	63.51%

Table 24: Birds in 15 sampled zoos subjected to flight restraint

Chart 40: Percentage of birds subjected to flight restraint in 15 zoos

Total number of birds in 15 zoos using flight restraint methods: 4188 Total number of birds subjected to flight restraint: (2555 + 104 + 1) 2660 Percentage of birds subjected to flight restraint in 15 zoos: 63.51%



Chart 41: Percentage of birds in all 20 zoos subjected to flight restraint

Total number of birds in all 20 zoos: 4762 Total number subjected to flight restraint: 2660 Total number percentage subjected to flight restraint: 55.86%



Seven zoos using flight restriction methods are members of BIAZA. Of these BIAZA members, Table 24 shows that 5 use pinioning (2348 birds) and 2 use tethering (34 birds). One zoo that tethered also had a wing clipped bird.

Total number of birds in BIAZA member zoos which use flight restriction methods: 3354 Total number of birds in BIAZA member zoos subjected to pinioning: 2348 (70.01%) Total number of birds in BIAZA member zoos subjected to tethering: 34 (1.01%) Total number of birds in BIAZA member zoos subjected to wing clipping: 1 (0.03%) Total number of birds in BIAZA member zoos which are not subjected to flight restriction: 971 (28.95%)

Chart 42: Percentage of BIAZA member zoos using flight restraint methods

Total number of zoos using flight restraint: 15 Total number of zoos using flight restraint which are members of BIAZA: 7 Total number of BIAZA members amongst 20 sampled zoos: 8 Total percentage of BIAZA members using flight restraint: 87.5%



(NB: figures for birds pinioned are based on stocklist data while figures for birds tethered and wing clipped are based on data collected during zoo visits. However, as latest stocklists were used, data is unlikely to have significantly changed).

5.7 Chapter discussion: Flight restriction and restraint

Flight restrictions of varying kinds are probably the biggest welfare problem facing birds in zoos, yet they are also one of the least discussed. These restrictions include surgical mutilations (mostly pinioning) which permanently disable a bird and prevent them from ever flying again; such a severe alteration of a bird's natural behaviour would probably be seen as unacceptable for any other species held in captivity.

Pinioning is mainly used on waterfowl, storks, cranes and flamingos, with two of the sampled zoos mutilating all of their birds. Whilst there is some opposition to it from within the zoo industry, this appears to be fairly limited. Indeed, in the UK several organisations representing captive collections of birds campaigned strongly to prevent the practice from being prohibited under the Animal Welfare Act. Although there are welfare risks involved in keeping some full-winged species in roofed enclosures (e.g. injuries caused by flying into mesh), this is not a barrier to seeking other alternatives. Zoos are willing to spend millions of pounds on enclosures which they believe (but others would reject) provide improved conditions for 'characteristic megafauna' but few are willing to do the same for birds.

Even supporters of zoos are concerned about pinioning when they learn about it, which may explain why zoos seemingly never do make reference to it.

Tethering of birds of prey is a visible restriction yet seems to raise fewer concerns from zoo visitors. As with pinioning, there seems to be little internal debate about the ethics of this restraint. In sampled zoos which used this restraint method, up to half of all birds at individual zoos were tethered. Zoos claim such birds are flown every day but this has been shown to be highly unlikely and even when birds are flown in displays it is

just for a few minutes. Smaller owl species, which are widely seen as unsuited to this restraint, were seen to be tethered at some zoos visited.

Common methods of housing and training birds of prey involve some level of distress or cruelty, such as manning. 62% of birds in zoos which tethered birds were not provided with shelter and water.

Overall, 63% of all birds in zoos that use flight restriction methods were either pinioned, wing clipped or tethered, over 2,600 birds in total.

Chapter 6 Zoos and conservation

6.1 Introduction

The European Zoo's Directive, transposed into UK law, requires that zoos undertake conservation measures and gives a number of options for doing so:

I. participating in research from which conservation benefits accrue to the species, and/or;

II. training in relevant conservation skills, and/or;

III. the exchange of information relating to species conservation and/or;

IV. where appropriate, captive breeding, and/or

V. where appropriate, repopulation or reintroduction of species into the wild. (DEFRA, 2012a)

Zoos must undertake, as a minimum, at least one of these options. The measures required should be proportionate to the size and type of zoo.

In addition:

Where the relevant species are held, a zoo must be an active participant in recognised species management programmes.

Zoos must be able to demonstrate their conservation measures, including research if undertaken.

The Zoos Expert Committee Handbook (DEFRA, 2012d) gives guidance on how zoos can meet these requirements: "these activities can be undertaken in the zoo (ex-situ) and/or in the wild (in-situ), which may be in the UK or abroad, and may be species or habitat focused".

Ex-situ conservation in zoos is largely based on Species Management Programmes, usually involving captive breeding.

In-situ conservation can include "using zoo grounds to provide habitat areas or aids to native species in the zoo (e.g. nest boxes for birds)" and working with other bodies to establish nature reserves, although this may also require the zoo to record information and publish the results of the project. Overseas in-situ projects can support conservation work in other countries.

6.2 IUCN status of birds

The IUCN (International Union for the Conservation of Nature) maintains the Red List of Threatened Species. This "is widely recognized as the most comprehensive, objective global approach for evaluating the conservation status of plant and animal species" (IUCN, 2012).

The categories in the Red List are:

Not Evaluated: A taxon is Not Evaluated when it is has not yet been evaluated against the criteria. *Data Deficient*: When there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status.

Least Concern: When the taxon has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.

Near Threatened: When it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.

Vulnerable: Considered to be facing a high risk of extinction in the wild

Endangered: Considered to be facing a very high risk of extinction in the wild.

Critically Endangered: Considered to be facing an extremely high risk of extinction in the wild. *Extinct in the Wild*: When it is known only to survive in cultivation, in captivity or as a naturalized population (or populations) well outside the past range. *Extinct*: When there is no reasonable doubt that the last individual has died.

Data in stocklists recording the species of birds in each of the 20 selected zoos were used to compile an Excel spreadsheet; the Red List website was then used to confirm the conservation status of each species.

Where information in the stocklist was not clear enough to identify the correct species for the purpose of its IUCN status, this was listed as 'unclear' in the spreadsheet and the tables and charts below.

Some stocklists only contained common names for the species, not the taxonomic name. At times the taxonomic name was included but misspelt. This sometimes made it difficult to correctly assess the IUCN status of the species. Where this occurred an attempt was made to obtain the correct scientific name.

Attempts were made to obtain an accurate stocklist for zoo OBS-7. The licensing authority provided stocklists for 2011 and 2012 but these did not provide full details of all birds held at the zoo. Our visit to the zoo recorded eight birds of prey (and other birds) on display and although the 2011 stocklist lists 9.3.0 owls, the species are not recorded. The 2012 stocklist does not have the owls listed. The licensing authority stated in November 2012 "please note the birds of prey are no longer at [name of zoo]", but it is thought that the birds are not on display over the winter. Therefore, zoo OBS-7 is not included in the following analysis.

Table 25: IUCN status of birds in selected zoos

IUCN Red List	Number of Species	Number of individual birds
Not Evaluated	54	416
Least Concern	285	2943
Near Threatened	32	291
Vulnerable	34	554
Endangered	19	169
Critically Endangered	8	130
Extinct in the Wild	1	4
Unclear from stocklist	7	43
Crossbreed*	5	15
Domestic	5	197
Total numbers	450	4762

Based on 18 stocklists as OBC-101 has a 14.1.a dispensation and no complete stocklist was provided for OBS-7.

* Crossbreed generally refers to crossbreed (hybrid) falcons such as Gyr/Lanner cross

The term 'threatened species' refers to those species that are assessed as Vulnerable, Endangered or Critically Endangered (IUCN 2009).

The database used for analysing species of birds in all selected zoos was further analysed to provide data on only those species classed as 'threatened'.

One species of bird at one of the 20 sampled zoos is classed as 'extinct in the wild' (Socorro dove, *Zenaida graysoni*). Although this classification is not actually within the IUCN's 'threatened species' list we have included it here within that category.

Table 26: Threatened species of birds in 18 selected zoos

IUCN status	Order	Number of species	Number of	Number of zoos
			Individuals	notaling them
Vulnerable				
	Anseriformes	9	320	17
	Coliiformes	1	2	1
	Columbiformes	2	10	3
	Falconiformes	1	2	2
	Galliformes	4	18	5
	Gruiformes	4	7	4
	Passeriformes	3	41	5
	Psittaciformes	8	81	15
	Sphenisciformes	1	71	3
	Struthioniformes	1	2	1
Endangered				
	Anseriformes	5	105	8
	Columbiformes	1	3	1
	Falconiformes	4	26	10
	Galliformes	2	4	2
	Gruiformes	5	13	7
	Sphenisciformes	2	18	2
Critically				
Endangered				
	Anseriformes	2	46	5
	Ciconiiformes	1	11	3
	Galliformes	1	5	2
	Passeriformes	3	55	8
	Psittaciformes	1	3	1
Extinct in the Wild	Columbiformes	1	4	1

Chart 43: Threatened species in selected zoos

Total number of birds in selected zoos: 4762 Total number of birds classed as threatened: 847 (17.79%) Total number of birds not classed as threatened: 3915 (82.21%)

Total number of birds classed as Vulnerable species: 554 (11.63%) Total number of birds classed as Endangered species: 169 (3.55%) Total number of birds classed as Critically Endangered species: 120 (2.52%) Total number of birds classed as Extinct in the Wild: 4 (0.83%)



11 zoos are member of BIAZA and/or EAZA

IUCN Red List	Number of Species	Number of individual birds
Not Evaluated	57	585
Least Concern	254	2375
Near Threatened	30	264
Vulnerable	32	536
Endangered	17	163
Critically Endangered	8	104
Extinct in the Wild	1	1
Unclear from stocklist	7	78
Crossbreed	3	6
Domestic	5	116
Total numbers	414	4228

Chart 44: Threatened species in selected zoos that are BIAZA members

Total number of birds in BIAZA selected zoos: 4228 Total number of birds classed as threatened: 807 (19.09%) Total number of birds not classed as threatened: 3421 (80.91%)

Total number of birds classed as Vulnerable species: 536 (12.68%) Total number of birds classed as Endangered species: 163 (3.86%) Total number of birds classed as Critically Endangered species: 104 (2.46%) Total number of birds classed as Extinct in the Wild: 4 (0.09%)



6.3 Births and deaths in selected zoos

6.3.1 Introduction

Stocklists for the 20 selected zoos were used in order to assess the number of births and deaths of birds in each zoo.

Of the 20 selected zoos, this information could only be obtained from fifteen of them. The five that could not be used were:

BPN-137 – stocklist gave only the overall number of birds and no information on births and deaths GMB-85 – stocklist provides no data on births and deaths

OBB-111- stocklist gave only the overall number of birds and no information on births and deaths (however, it did not need to provide a stocklist due to it having a 14.1.a dispensation)

OBC-101- no stocklist due to 14.1.a dispensation

Zoo OBS-7- the licensing authority could not provide an accurate stocklist of species

Table 28: Births and deaths in 15 selected zoos

Based on data in stocklists

Zoo code	Number of species	Number of births		Number o	of deaths	Cases where deaths
	held by zoo	Species	Individuals	Species	Individuals	outnumber births
BPF-59	40	0	0	0	0	0
BPK-126	31	4	7	6	6	6
BPG-20	44	2	4	2	2	2
GMB-131	8	1	3	0	0	0
GMB-48	191	12	47	40	63	33
GMD-142	25	2	7	10	29	8
GMH-69	43	4	7	7	9	3
GMK-143	17	0	0	0	0	0
GML-119	20	1	1	7	9	6
GMN-99	23	3	10	5	9	4
GMS-4	45	6	35	16	38	12
GMT-1	36	2	4	3	3	2
OBM-146	86	41	426	59	275	33
OBW-129	59	32	179	32	174	21
OBW-3	43	25	121	25	72	8

6.3.2 Births and deaths of threatened species

The databases used for analysing species of birds in all selected zoos and births and deaths in those zoos were further analysed to provide data on only those species classed as 'threatened' (Vulnerable, Endangered or Critically Endangered).

Fifteen stocklists were used for this analysis as two (BPN-137, GMB-85) did not provide data on births and deaths, two others (OBC-101, OBB-111) have a 14.1.a dispensation and an accurate stocklist could not be obtained for OBS-7.

Zoo code	BIAZA member?	Total number bird species	Species conservation status		Number of births		Number of deaths		Threatened species as percentage of all
		in zoo	Category	Number species	Species	Individuals	Species	Individuals	species
BPF-59	No	40	VU	1	0	0	0	0	7.5%
			EN	2	0	0	0	0	
			CR	0	0	0	0	0	
BPK-126	No	31	VU	0	0	0	0	0	3.23%
			EN	1	0	0	0	0	
			CR	0	0	0	0	0	
BPG-20	Yes	44	VU	0	0	0	0	0	6.82%
			EN	3	0	0	0	0	
			CR	0	0	0	0	0	

Zoo code	BIAZA member?	Total number bird species	Species cor status	nservation	Number o	of births	Number of deaths		Threatened species as percentage of all
		in zoo	Category	Number species	Species	Individuals	Species	Individuals	species
GMB-131	No	8	VU	0	0	0	0	0	0%
			EN	0	0	0	0	0	_
			CR	0	0	0	0	0	
GMB-48	Yes	191	VU	16	1	8	9	21	14.66%
			EN	4	1	1	0	0	
			CR	7	0	0	2	2	
			EW	1	1	0	1	1	
GMD-142	Yes	25	VU	2	1	1	1	1	16%
			EN	1	0	0	0	0	_
			CR	1	0	0	1	1	
GMH-69	No	43	VU	5	0	0	0	0	25.58%
			EN	5	0	0	0	0	
			CR	1	0	0	0	0	
GMK-143	No	17	VU	1	0	0	0	0	5.88%
			EN	0	0	0	0	0	
			CR	0	0	0	0	0	
GML-119	Yes	20	VU	0	0	0	0	0	20%
			EN	2	0	0	1	1	
			CR	2	0	0	1	2	
GMN-99	No	23	VU	3	0	0	1	1	13.04%
			EN	0	0	0	0	0	
			CR	0	0	0	0	0	
GMS-4	No	45	VU	6	1	2	1	2	13.33
			EN	0	0	0	0	0	
			CR	0	0	0	0	0	
GMT-1	Yes	36	VU	0	0	0	0	0	8.33%
			EN	2	0	0	0	0	
			CR	1	0	0	1	1	
OBM-146	Yes	87	VU	9	7	81	7	66	17.24%
			EN	4	0	0	3	5	
			CR	2	1	2	1	4	
OBW-129	Yes	59	VU	6	5	28	5	37	20.34%
			EN	5	3	34	3	13	_
			CR	1	0	0	0	0	
OBW-3	No	43	VU	3	3	10	3	3	11.63%
			EN	0	0	0	0	0	
			CR	2	2	26	2	11	

The data above show that zoo GMB-48 had the most number of threatened species (28) and GMB-131 had the least (0). GMH-69 had the highest percentage of threatened species as a total of all bird species in the zoo (25.58%) and GMB-131 had the least (0%).

Chart 45: Threatened and non-threatened species in selected zoos

Total number of all bird species: 712 Total number of threatened species: 99 Total number of non-threatened species: 613 Percentage of threatened species: 13.90% Percentage of non-threatened species: 86.10%



Chart 46: Percentage of threatened species in selected zoos by conservation status

n=712 VU: 52 (7.30%) EN: 29 (4.07%) CR: 17 (2.39%) EW: 1 (0.14%) Non-threatened: 613 (86.10%)



6.4 Co-operative breeding programmes, in-situ and ex-situ conservation

Although captive breeding can obviously be carried out by an individual zoo, it has been considered that for any conservation benefits to occur, such breeding has to be conducted in co-operation with others (Cromie & Nicholls 1995).

This study attempts to assess the participation of the selected zoos in co-operative breeding programmes coordinated by the EAZA (European Association of Zoos and Aquaria): the European Endangered species Programme (EEP) and the European StudBook (ESB).

Using the latest stocklist for the selected zoo, the list of species and number of individuals held was matched against a full list of bird EEPs and ESBs, obtained from the EAZA website (EAZA, 2012b).

The EAZA website lists a total of 41 EEPs and 72 ESBs.

31 (27.43%) of these are co-ordinated by UK zoos (9 EEP, 22 ESB), none (0%) of them by any of the 20 UK zoos chosen for this study.

Of the 41 EEPs for avian species, 14 (34.15%) of the species are held by the 20 zoos sampled in this study.

Species – common name	Species – scientific name	Number of zoos holding
Andean condor	Vultur gryphus	1
Bali starling	Leucopsar rothschildi	4
Citron-crested cockatoo	Cacatua sulphurea citrinocristata	1
Edward's pheasant	Lophura edwardsi	2
European black vulture	Aegypius monachus	2
Humboldt penguin	Spheniscus humboldti	3
Mauritius pink pigeon	Columba mayeri	1
Moluccan cockatoo	Cacatua moluccensis	1
Meller's duck	Anas melleri	1
North African ostrich	Struthio camelus camelus	1
Red-crowned crane	Grus japonensis	1
Waldrapp ibis	Geronticus eremita	3
White-naped crane	Grus vipio	1
White-tailed sea eagle	Haliaeetus albicilla	1

Table 30: Species held at 20 selected zoos represented in European Endangered species Programmes

Although Table 30 shows 12 different zoos (n=20) to hold 14 species that have an EEP, Table 32 shows just 3 zoos (n=8) to participate in EEPs (one zoo lists the Bali starling (*Leucopsar rothschildi*), another zoo states in their Pre-Inspection Audit 'refer to guidebook' and the third states 'see attached list', but this was not provided to us by the licensing authority). None (n=8) participates in JMSPs (Joint Management of Species Programmes).

Whitfort and Young (2004), in their analysis of captive breeding records for threatened birds in British zoos between 1988 and 1997 found that only 39 (22.7%) of the potential 172 threatened bird species held were being genetically managed. More non-threatened than threatened avian species were in these

98

management programmes. No difference was found in the median percentage of threatened species breeding throughout this time.

Participation of zoos in co-ordinated captive breeding programmes should not be taken as a sign that 'conservation' is actually happening. Captive breeding is generally conducted in order to maintain a captive population of a species, rather than to reintroduce individual animals to their natural environments.

6.4.1 Zoos' promotion of conservation activities

Given that conservation is repeatedly stated as a main aim of zoos, we assessed what claims the sampled zoos made to their involvement in conservation activities, in particular in-situ conservation and reintroduction of animals to their natural environments.

Printed materials obtained at each zoo, and the websites for each, were researched for any reference to these two types of activity.

Support for in-situ conservation

17 (85%; n=20) zoos had either a website or produced printed materials. Eight of these zoos (47.09%, n=17) mentioned in-situ conservation within these:

- Zoo GMB-131 converted 16 acres of redundant farmland into a wetland nature reserve, which it states is used by 40 species of birds in addition to other animals (information from guidebook).
- The website for zoo GMB-48 lists a number of UK-based in-situ projects: Nest boxes on the zoo grounds and ringing of fledging birds
 Providing trees and nest boxes to local schools
 Support for a project to reintroduce the great bustard (although it doesn't detail the zoo's involvement)
 Fundraising for conservation projects for penguins (but doesn't say which projects)
- Zoo GMD-142 fundraises for a project which supports fieldwork monitoring penguin species (information from website).
- Zoo GMT-1, according to its website, "supports the work of the International Vulture Conservation Programme" but does not say how. A sign at the zoo suggests that it participates in fundraising to support in-situ conservation in Africa and Asia. The zoo is part of a larger estate which has developed habitats for native species.
- Zoos OBM-146 and OBW-129, part of a chain, both have large nature reserves specifically for birds. The chain has nine centres in the UK (six in England), all of which have wetland nature reserves. The chain's website claims that two-thirds of the reserve land (over 1,700 hectares) has been given some sort of designation for its importance. It is also involved in species monitoring, research, in-situ conservation and scientific study. Its website contains large amounts of information on its research and conservation work; however, this relates to the chain as a whole and not necessarily to the two zoos examined in this report (information from website).
- Zoo GMS-4 devotes a large section of its guidebook to its in-situ conservation work. This lists four projects relevant to avian species (all non-UK):



Madagascar – protection of rainforest, scientific monitoring of fauna and flora Peru – protection of habitat for Humboldt penguin Peru – funding of feeding station to encourage condors and vultures back into the area Peru – funding research and conservation project to protect macaws

• Zoo OBW-3 supports a field study project in China for the critically endangered Blue-crowned laughingthrush (*Garrulax courtoisi*), providing GPS and sound recording equipment (information from website).

Whilst support for in-situ conservation is clearly to be applauded, it does not necessitate – or justify – the captivity of birds in each zoo.

Reintroductions

Of the 17 zoos with a website or which produced printed materials, only two (11.76%) make reference to reintroducing captive-bred animals (rather than releasing rehabilitated injured or confiscated animals).

Guidebooks for zoos OBM-146 and OBW-129 both make reference to the Hawaiian goose, or nene (*Branta sandvicensis*), and captive breeding and reintroduction of the species. Both zoos are part of the same chain and although one of the guidebooks gives vague reference to its involvement in the reintroduction, the other notes that it was a third zoo in the chain that was responsible for the breeding (which took place in the 1950s) and reintroduction (in the 1960s).

6.4.2 Pre-inspection audits

Pre-inspection audit forms are completed by zoo operators prior to inspections (usually mid-term periodical and Renewal inspections) to assist inspectors with information to be assessed on the day. Although it is not a legal requirement for zoos to complete PIAs, it saves time during the inspection (and therefore cost as inspectors are paid by the hour) if the inspectors have the information in advance.

In the Freedom of Information Act requests made to local authorities in relation to the 20 zoos in this study, we requested copies of pre-inspection audits. However, the authorities only provided them for 8 (40%) of the zoos.

Using these forms we have assessed the zoos' commitment to a number of conservation requirements. Questions and answers in the tables below are taken from these forms.

Table 31: Commitment to general conservation requirements by selected zoos

Zoo code	Are you a member of any zoo or conservation related organisations?	Do you have a copy of the World Zoo and Aquarium Conservation Strategy? If yes, how does this influence your planning?	Do you contribute to conservation in other ways?
BPN-137 (2011)	No	No	Yes – but is actually 'no' as simply refers back to its in- situ conservation efforts
GMB-131 (2010)	No	No	Captive breeding (for release) of mammals but no bird species
GMB-85 (2010)	BIAZA	No	No
GML-119 (2010)	BIAZA	Yes – effort to focus on conservation activities	Education to foster interest and appreciation of wildlife
GMN-99 (2010)	ISIS	Yes – 'we make look to incorporate some of these ideas'	Local conservation of important native species, including birds of prey
GMS-4 (2009)	EAZA ALPZA (Latin American Association of Zoological Parks and Aquariums)	Yes – consultation purposes	None listed
GMT-1 (2011)	BIAZA Game Conservancy Trust John Muir Lake District Conservation Partnership	Yes – policies are written with this in mind	We manage the estate as part of the stewardship scheme and own two SSSI
OBW-3 (2009)	EAZA 5 avian conservation organisations	Yes – to co-operate in long term breeding programmes through studbooks	Nest box scheme on site
Total 'Yes'	6 (n=8) (75%)	5 (n=8) (62.5%)	5 (n=8) (62.5%)

BIAZA, EAZA and ALPZA are trade organisations for zoos in Britain, Europe and Latin America respectively. Only the other organisations listed (of which just two zoos – GMT-1 and OBW-3 are members) can be classed as conservation organisations

Table 32: Commitment to ex-situ conservation requirements by selected zoos

(Ex-situ refers to activities taken within the zoo)

Zoo code	BIAZA member?	Do you have an animal collection plan?	List EEPs your organisation takes part in	List Joint Management of Species Programmes (JMSP) your organisation takes part in	Do you contribute to any other species management programmes?	Is your collection responsible for maintaining the studbooks of any species?
BPN-137 (2011)	No	No	None	None	No	No
GMB-131 (2010)	No	Yes – collection limited to British species	None	None	No	No
GMB-85 (2010)	Yes	Yes	None	None	No	No
GML-119 (2010)	Yes	Yes – based on BIAZA guidelines	One bird species (Bali Starling)	None	No	No
GMN-99 (2010)	No	Yes – 'based on proposed educational and conservational significance of new additions and breeding'	None relating to birds	None	No	No
GMS-4 (2009)	No	Yes – projects linked to the needs of the zoo via EEP	'refer to guidebook'	No answer	No answer	None relating to birds
GMT-1 (2011)	Yes	No	None relating to birds	No	Yes – but no details given	No
OBW-3 (2009)	No	Yes – guided by EAZA passerine collection plan	'see attached list' (not provided by local authority)	No	No	No
Total 'Yes'	3	6 (n=8) (75%)	3 (n=8) (For 2, no information provided to confirm avian species) (37.5)	0 (n=8) (0%)	1 (n=8) (But no details given) (12.5%)	0 (n=8) (0%)

Table 33: Commitment to in-situ conservation requirements by selected zoos(In-situ refers to activities in the wild)

Zoo code	BIAZA member?	Are you or have you been directly involved in any local or overseas in-situ projects, either by funding or by more direct participation over the past three years?	Have you collected funds from the public for any in- situ projects in the last three years?
BPN-137 (2011)	No	Yes – planted 26ha of deciduous woodland with 4.5ha of lakes	No
GMB-131 (2010)	No	Yes – created 20 acre wetland nature reserve	No
GMB-85 (2010)	Yes	None relating to birds	No
GML-119 (2010)	Yes	Yes – fundraising for World Land Trust	Yes - World Land Trust
GMN-99 (2010)	No	None relating to birds	No
GMS-4 (2009)	No	Yes – 'see attached', but no info provided by local authority	Yes – 'see attached', but no info provided by local authority
GMT-1 (2011)	Yes	Yes – only bird project listed is International Vulture Programme	Sell wristbands for International Vulture Programme
OBW-3 (2009)	No	'See attached' (information not provided by local authority)	'See attached' (information not provided by local authority)
Total 'Yes'	3	6 (n=8) (75%)	4 (n=8) (50%)

6.4.3 Other references

Information on zoo GMD-142, provided to us by the licensing authority under the Freedom of Information Act, included its 2011 Collection Plan. This gave conservation and education plans for 20 species of birds: Listed as 'None' for 12 species (60%)

Listed as 'EEP recommendations to be followed' for 4 species (20%)

Listed as 'In-house research project carried out 2005/2006' for 2 species (10%)

Listed as 'Holds ESB for this species' for 1 species (5%)

Listed as 'EEP recommendations to be followed; in-house research project 2008/2009' for 1 species (5%)

Information from the local authority on zoo OBW-3 included an information sheet stating that in 2011 the zoo supplied four Bali starlings (*Leucopsar rothschildi*), a critically endangered species, who were part of a group of 40 from zoos across Europe sent to a breeding centre in Bali where they will be paired up with birds from Indonesian zoos. The plan is for a potential release of the birds in the future.

6.5 Meeting conservation conditions

The Zoo Licensing Act requires zoos to be licensed and inspected by their local authority. Various levels of inspection occur, requiring that an inspection takes place at least once every year. After the first four years of a zoo receiving its initial licence, licences then last for a six year period before having to be renewed. The midperiod between renewal inspections requires a mid-term periodical inspection.

Renewal and mid-term periodical inspections have to be conducted by at least one DEFRA zoo inspector. Zoos with a 14.1.a dispensation are exempt from requirements under the Zoo Licensing Act. (For a full review of licensing requirements and analysis of standards in zoos in England, see Casamitjana, 2012).

Inspection form ZOO2, the standard form used by DEFRA inspectors, includes a section on Conservation, Education and Research. This requires the inspector(s) to note whether the zoo is meeting its legal requirements in these areas. The form only allows a 'yes' or 'no' answer plus a space for comments.

Directive condition 1A(a) of the EU Zoos Directive questions whether the zoo participates 'in at least one of the following' conservation activities.

Table 34 shows comments of zoo inspectors in these forms, for the most recent Renewal or mid-term periodical inspection, obtained under the Freedom of Information Act.

Table 34: Commitment to conservation requirements by sampled zoos

Zoos OBB-111 and OBC-101 both have 14.1.a dispensation so are not required to meet these standards and are excluded from this table. Unless indicated, it is not known whether any of these activities relate to avian species.

Zoo code	BIAZA member?	Date of most recent Renewal / mid-term	Directive condition 1A(a): Is the zoo participating in at least one of the following:					
		periodical inspection report	Research from which conservation benefits accrue to species of wild animals	Training in relevant conservation skills	Exchange of information relating to the conservation of species of wild animals	Where appropriate, the breeding of wild animals in captivity	Where appropriate, the repopulation of an area with, or the reintroduction into the wild of, wild animals	
BPF-59	No	Mid-term periodical 2010	Yes – little research is carried out	Yes	Yes	Yes – little breeding takes place	No	
ВРК-126	No	Renewal 2010	No	Yes	Yes	Yes	No	
BPG-20	Yes	Mid-term periodical 2012	Yes	Yes	Yes	Yes	No	
BPN-137	No	Mid-term periodical 2011	Inspector has not selected 'yes' or 'no'	Inspector has not selected 'yes' or 'no'	Yes	Inspector has not selected 'yes' or 'no'	Inspector has not selected 'yes' or 'no'	
GMB-131	No	Mid-term periodical 2011	Yes	No	Yes	Yes	Yes	
GMB-48	Yes	Mid-term periodical 2009	Yes – bird boxes	No	Yes	Yes	Yes – involved with red kites and great bustards	
GMB-85	Yes	Mid-term periodical 2010	Yes – only one species is mentioned (mammal)	Yes	No	No	No	
GMD-142	Yes	Renewal 2007	Yes	No	Yes	Yes	No	
GMH-69	No	Mid-term periodical 2010	No 'conservation	No	No	Yes	No	

Zoo code	BIAZA member?	Date of most recent Renewal / mid-term	Directive condition 1A(a): Is the zoo participating in at least one of the following:					
	periodical inspection report	Research from which conservation benefits accrue to species of wild animals	Training in relevant conservation skills	Exchange of information relating to the conservation of species of wild animals	Where appropriate, the breeding of wild animals in captivity	Where appropriate, the repopulation of an area with, or the reintroduction into the wild of, wild animals		
			activity largely limited to fundraising'					
GMK-143	No	Mid-term periodical 2010	Yes	No	Yes	No	Yes	
GML-119	Yes	Renewal 2010	No	No	Yes	Yes	No	
GMN-99	No	Renewal 2010	No	No	Yes	Yes	No	
GMS-4	No	Mid-term periodical 2009	No – 'it appears that little or no research is done in the zoo'	Yes	Yes	Yes	No	
GMT-1	Yes	Renewal 2011	Yes	Yes Mainly by support to in situ projects	Yes	Yes	'Yes' and 'No' both ticked. Co-operation is offered but no projects ongoing at present	
OBM-146	Yes	Mid-term periodical 2010	Yes	Yes	Yes	Yes	Yes	
OBS-7	No	Renewal 2010	No	No	No	No	No	
OBW-129	Yes	Mid-term periodical 2010	Yes	Yes	Yes	Yes	Yes	
OBW-3	No	Mid-term periodical 2010	Yes	Yes	Yes	Yes	Yes	

Zoo code	BIAZA member?	AZA member? Date of most recent Renewal / mid-term periodical inspection report	Directive condition 1A(a): Is the zoo participating in at least one of the following:					
	periodical inspection		Research from which conservation benefits accrue to species of wild animals	Training in relevant conservation skills	Exchange of information relating to the conservation of species of wild animals	Where appropriate, the breeding of wild animals in captivity	Where appropriate, the repopulation of an area with, or the reintroduction into the wild of, wild animals	
Total 'Yes'	8		11 (n=18) Not all relates to birds (61.11%)	9 (n=18) (50%)	15 (n=18) (83.33%)	13 (n=18) (72.22%)	6 (n=18) (33.33%)	

All zoos are required to participate in at least one of these conservation activities as part of their licensing requirements. However, even when inspectors have recorded them as meeting the requirements they usually provide no information about how they are doing this or which species the activity relates to.

For zoo BPN-137, the inspector has failed to even select a 'yes' or 'no' answer to four of five categories and for GMT-1 the inspector ticked both 'yes' and 'no' to one question. As these inspections have been conducted by at least one DEFRA zoo inspector alongside a local authority officer, and the reports have then been submitted to DEFRA's zoo licensing department, there can be no reason for such errors to go unnoticed and not corrected.

6.6 Analysis of conservation efforts

Data from the tables above was entered into an Excel spreadsheet to provide a picture of overall conservation efforts in the sampled zoos.

Species management programmes: Table 35 uses information from Pre-Inspection Audits of eight zoos to assess involvement in species management programmes (EEPs, JMSPs, studbooks and 'any other'). Information was referred to, but not given, in the case of two zoos' participations in EEPs. Even if we presume these two zoos did participate, overall figures show that of all eight zoos, six (75%) had no involvement in these species management programmes and the other two (25%) only had involvement in EEPs.



Chart 47: Involvement of zoos in species management programmes (n=8)

Table 34 shows that only three of 18 zoos (16.67%) fulfil all five conservation requirements under condition 1A(a) of the European Zoos Directive. Five other zoos (27.78%) meet four conditions and the remaining ten (55.55%) meet three or less of the conditions.

Chart 48: Percentage of zoos fulfilling all five conservation requirements under condition 1A(a) of the European Zoos Directive (n=18)



Chart 49: Zoos with BIAZA membership and their fulfilment of the five conservation requirements

Eight of the 18 zoos are members of BIAZA. Of these: Two meet all 5 requirements Three meet 4 requirements One meets 2 requirements Two meet 2 requirements

Four of 8 zoos (62.5%) meet 4 or 5 of the requirements Three of 8 zoos (37.5%) meet 3 or fewer of the requirements


6.7 Chapter discussion: Zoos and conservation

The data in this chapter reveal that zoos are failing in terms of conservation, including in their legal requirements. Of the 18 zoos assessed here (zoos OBB-111 and OBC-101 are not included as they both have 14.1.a dispensations), little information is actually available about any conservation efforts – either on their websites, their published information, Pre-Inspection Audits or licensing inspection reports.

One would presume that any zoo actually involved in conservation would want to promote this to their visitors and ensure that zoo inspectors were aware of it too. Yet, of 17 zoos with a website or printed materials available to visitors, just eight (47.09%) mentioned any support it gave to in-situ conservation. Much of this work is to be applauded (tree planting, nest boxes, nature reserves), but all of this can happen (and does happen up and down the UK by many organisations and volunteers on a daily basis) without the need to keep animals in captivity.

Reintroduction of captive-bred animals to their natural habitat likely remains one of the main beliefs that people have about the work of zoos. The data above show that zoo inspectors consider only 6 of the 18 zoos – one third – are involved in some way with reintroductions; of these, inspection reports only refer to one case involving birds. Two zoos make reference in their guidebooks to its parent organisation's involvement in reintroducing the Hawaiian goose but that this was in the 1960s.

Chapter 7 Zoos and education

7.1 Introduction

European zoo licensing legislation requires zoos to "promote public education and awareness in relation to the conservation of biodiversity, particularly by providing information about the species exhibited and their natural habitats" (DEFRA, 2012a).

The Zoos Expert Committee (previously the Zoos Forum), the UK government's advisory body on zoo issues, has produced a Handbook to supplement the guidance contained in the Secretary of State's Standards of Modern Zoo Practice (SSSMZP). This includes a chapter on Conservation, Education and Research.

The Handbook was updated in November 2012, to replace the one previously published under the old Zoos Forum. It is this updated version which is referred to in this report.

Education is considered to be one of the core objectives of zoos (DEFRA, 2012d) and a zoo's contribution to education is expected to be proportionate to the size and type of zoo.

Zoos are required, as a basic minimum standard, to have a written education strategy, an active education programme, facilities for education purposes (usually a room of some kind) and accurate information about the species exhibited (DEFRA, 2012a). Education should be aimed at all visitors, not just children, and both the formal (e.g. school visits) and non-formal (e.g. other visitors) sectors. Where possible, educational material should be linked to the National Curriculum (DEFRA, 2012d).

Standards of animal welfare are also seen in an educational perspective, in that education is considered to be enhanced if animals on display are expressing natural behaviours.

This study assesses five key areas of education at the 20 zoos visited:

- Species information (enclosure signs)
- Printed materials
- Website
- Animal presentations
- Talks

These five areas are ones most likely to be accessed by visitors.

7.2 Species information

The Standards of Modern Zoo Practice state (Section 7, 7.11):

"Accurate information about the species exhibited must be available. Generally, this should include, as a minimum, the species name (both scientific and common), its natural habitat, some of its biological characteristics and details of its conservation status."

This information is most commonly provided as a label on each enclosure. There has been a variety of research studying the effectiveness of species labels in attracting the visitors' attention, encouraging them to read the information and learn about the species, including the use of colour and cartoons rather than text, and location of the label (Gerritsen, 2008; Matschke, 2010). Although it appears that only small numbers of visitors actually read species labels (Gerritsen (2008) records 1.3% of visitors reading labels for an avian species at

Rotterdam Zoo and refers to one aquarium sign which was 'checked' by 11% of visitors as "super-attractive"), they remain the main way of informing visitors about the species information for each enclosure.

During the visits to each zoo, every enclosure and all signs relating to the animals were filmed. This information was used to assess whether the required information was provided and, if so, if it was correct.

Table 35: Information signs content at sampled zoos

After the first column, each tethered bird is counted as one enclosure unless individuals of the same species were tethered alongside each other.

Figures refer to enclosures even if there was more than one sign on each.

Zoo code	Does each enclosure clearly identified all species by a sign?		Is species correctly identified?	Are common and scientific names included?	Is sign in good condition?	Does sign mention natural distribution of species (including a map)?	Is there any information on species' natural habitat?	Is species biological data included (e.g. diet, reproduction, social structure, behaviour, etc.)?	Does the sign give the species' conservation status?
	Total Number of enclosures	Number of enclosures with signs	Number of enclosures	Number of enclosures	Number of enclosures	Number of enclosures	Number of enclosures	Number of enclosures	Number of enclosures
BPF-59	25 +23 tethered birds [48]	46	46	46	44	46	46	46	46
BPG-20	31 + 15 tethered birds [46]	45	44 (barn owl in enclosure labelled as black kite)	44	42	42 (22 had no map)	42	35	43
BPK-126	31 + 8 tethered birds [39]	30	29	3	29 (although one other was too far away to read)	27 (7 had no map)	14	23	3
BPN-137	31 + 2 tethered [Total: 33]	29	29 (although one enclosure only named 1 of 2 species)	29	29	29 (none had map)	28	3	20
GMB- 131	11	10	10	10	10	10	10	10	0
GMB-48	91	90	89	89	87	89	89	89	89
GMB-85	5	4	4	3	4 (but 1 too far away to	4 (but no map on any)	0	0	3

Zoo code	Does each enclosure clearly identified all species by a sign?		Is species correctly identified?	Are common and scientific names included?	Is sign in good condition?	Does sign mention natural distribution of species (including a map)?	Is there any information on species' natural habitat?	Is species biological data included (e.g. diet, reproduction, social structure, behaviour, etc.)?	Does the sign give the species' conservation status?
	Total Number of enclosures	Number of enclosures with signs	Number of enclosures	Number of enclosures	Number of enclosures	Number of enclosures	Number of enclosures	Number of enclosures	Number of enclosures
					read)				
GMD- 142	12	10	10	10	10	10	10	10	10
GMH-69	33	33	31	28	31	31	28	20	28* (see note 1)
GMK- 143	15 + 6 tethered birds [21]	19	19	18	19	18	18	18	18
GML- 119	14	12	12	12	12	2	0	0	6
GMN-99	15	15	15	15	15	15	15	15	0
GMS-4	8	8	8	8	8	8	8	8	7
GMT-1	18 + 7 tethered [25]	23	23	23	23	23	22	22	23
OBB-111	17	9	0 (no enclosure identified all species)	0	1	9 (although no maps)	0	0	0
OBC-101	1	1	1	0	1	0	0	0	0
OBM- 146	31	30	30	30	30	30	30	27	27
OBS-7	7 + 5 tethered birds [12]	7	7	6	7	0	6	1	5
OBW- 129	13	13	13	13	13	13	13	11	10
OBW-3	10	10	10	10	7	10 (but info on signs is minimal)	10	10	10

Zoo code	Does each enclosure clearly identified all species by a sign?		Is species correctly identified?	Are common and scientific names included?	Is sign in good condition?	Does sign mention natural distribution of species (including a map)?	Is there any information on species' natural habitat?	Is species biological data included (e.g. diet, reproduction, social structure, behaviour, etc.)?	Does the sign give the species' conservation status?
	Total NumberNumber ofof enclosuresenclosureswith signs		Number of enclosures	Number of enclosures	Number of enclosures	Number of enclosures	Number of enclosures	Number of enclosures	Number of enclosures
Total	485 444		430	397	422	416	389	348	348

Note 1: Zoo GMH-69: Signs on 5 enclosures did not give the conservation status of the species. However, an additional 3 gave conflicting status by including an 'endangered species' logo even when the species was not endangered.

Note 2: BPF-59 – tethered birds had signs which only gave their common name and country of origin (a couple included the scientific name as well). However, as the lawn on which they were tethered did have information signs on the barrier giving all the required details, the table above records all the required information as being available for those birds.

Note 3: Although zoo GMS-4 had signs meeting required standards, they were not always easy to find. For example, for one large aviary signs were only in the indoor area so visitors on the outside of the aviary could find no information. Some other areas of the zoo saw birds in large open areas whereas sign were in one place.

Note 4: One zoo (GMN-99) had some unusual signs which could be questioned on educational grounds:

One, 'Birds – Nests and Eggs', includes the section: 'The astonishing amount of information in the Egg germ cell, that produces all the feathers, their colour, the ability to fly, to hunt for food, to find a mate, to build a nest, reproduce, to sing, and to enrich the world, speaks clearly and powerfully of its Creator and ours'.

Another, 'Birds – Song', includes in 'why do they sing': 'To praise their Maker'; and: 'These features go far beyond what is biologically an advantage, and point clearly to a musically minded Creator'.

These theology-based beliefs evoke the comments of 18th and early 19th century naturalists, such as William Derham who saw the adaptation of birds' ears as evidence of 'God's wisdom'. Likewise, William Paley's book *Natural Theology*, published in 1802, used the eye, so perfectly adapted for its purpose, as an example of the Creator's wisdom, calling it a "cure for atheism" (Birkhead, 2012).

Table 36: Analysis of information sign content

Information requirement	Total number of enclosures	Percentage of enclosures with
	with correct information	correct information
Total number of enclosures: 485		
Each enclosure clearly identifying all species	444 (n=485)	91.55%
by a sign		
Species correctly identified	430 (n=485)	88.88%
Common and scientific names included	397 (n=430)	92.33%
Sign in good condition	422 (n=444)	95.05%
Sign mentions natural distribution	416 (n=430)	96.74%
(including a map)		
Information on species' natural habitat	389 (n=430)	90.47%
Species biological data included (e.g. diet,	348 (n=430)	80.93%
reproduction, social structure, behaviour,		
etc.)		
Sign gives species' conservation status	348 (n=430)	80.93%
Average overall score		89.61%

Tables 35 and 36 show that the zoos generally scored highly on providing basic information about the species (89.61% of enclosures correctly provided all of the basic information, but 10.39% did not). However, it would be expected that all species in each enclosure should be identified by a sign, and correctly identified. Although there may be circumstances when species are moved to new enclosures or temporarily placed in an alternative one, a temporary sign can be attached to the enclosure identifying the species.

Where zoos begin to fail more on is the provision of species biological data and information on conservation status.

7.3 Printed materials

All printed materials such as leaflets were obtained at each zoo visited. Some materials were free (e.g. map of the zoo) and some required payment (e.g. guidebook). Such materials provide opportunities to provide detailed information on animals displayed at the zoo and to explain the zoo's perceived roles in conservation and education.

Table 37: Printed materials available at sampled zoos(Other than zoo map or list of feeding times and events)

Zoo code	BIAZA member?	Does the zoo make available printed literature about the birds it exhibits?	Does the zoo charge for printed material?	Do the materials provide information about the birds exhibited?	Do the materials provide information about the birds similar to that required for exhibit signs?
BPF-59	No	No	N/A	N/A	N/A
BPK-126	No	Leaflet listing each enclosure and birds	No	Yes	Yes (most include scientific names but no

Zoo code	Zoo code BIAZA member? 		Does the zoo charge for printed material?	Do the materials provide information about the birds exhibited?	Do the materials provide information about the birds similar to that required for exhibit signs?
					conservation status given; relates to individual birds on display)
BPG-20	Yes	No	N/A	N/A	N/A
BPN-137	No	No	N/A	N/A	N/A
GMB-131	No	Guide book	£3.50	Yes, but only lists species (other than one described in detail)	No (only one species described in detail)
GMB-48	Yes	Guide book	£1.99	Yes, but overview of birds by Order rather than species	No (although information is more detailed than other zoos' guidebooks, it does not include scientific names or conservation status)
GMB-85	Yes	No	N/A	N/A	N/A
GMD-142	Yes	Guide book	£1.50 (other materials free)	Yes (but not all)	No (some biological information but incomplete and not including scientific names or conservation status)
GMH-69	No	Guide book	£2	Yes	No
GMK-143	No	No	N/A	N/A	N/A
GML-119	Yes	Guide book	£3	No (minimal information about a few birds)	No
GMN-99	No	No	N/A	N/A	N/A
GMS-4	No	Guide book	£3	Yes	Yes
GMT-1	Yes	No	N/A	N/A	N/A
OBB-111	No	No	N/A	N/A	N/A
OBC-101	No	No	N/A	N/A	N/A
OBM-146	Yes	Guide book	£2.50	Yes	Yes (although not including scientific names or conservation status)

Zoo code	BIAZA member?	Does the zoo make available printed literature about the birds it exhibits?	Does the zoo charge for printed material?	Do the materials provide information about the birds exhibited?	Do the materials provide information about the birds similar to that required for exhibit signs?
OBS-7	No	No	N/A	N/A	N/A
OBW-129	Yes	Guide book	£1	Yes	Yes (although not including scientific names or conservation status)
OBW-3	No	No	N/A	N/A	N/A
Total 'Yes'		9	8	8	4

One zoo (GMD-142), in addition to a guidebook that had to be purchased, made available two booklets free of charge. One contained photos of different animals around the zoo which visitors needed to find and then stamp the book with the stamp at each enclosure. The other related to information boards at various enclosures and required information in the booklet to be completed.

Zoo BPG-20 did not provide printed materials about the birds but did have a small booklet listing species which required the page to be stamped once that bird was located in the zoo. However, this contained no photo or any information about the species, just the common name.

n=20 Zoos with printed materials: 9 (45%) Zoos without printed materials: 11 (55%)

n=9

Zoos charging for materials: 8 (88.89%) Zoos providing materials free: 1 (although one zoo, in addition to a paid guidebook, provided educational materials free) (11.11%)

n=9

Zoo materials providing information about the birds exhibited: 8 (but in 3 of these the information was incomplete) (88.89%) Zoo materials <u>not</u> providing information about the birds exhibited: 1 (11.11%)





Chart 51: Quality of printed educational materials at sampled zoos

Zoo materials providing information about the birds similar to that required for exhibit signs

n=9

Zoo materials providing information about the birds similar to that required for exhibit signs: 4 (but only one was complete) (44.44%)

Zoo materials not providing information about the birds similar to that required for exhibit signs: 5 (55.56%)



7.4 Websites

Websites are not only a way of directing interest from potential visitors but also provide an educational resource for both pre- and post-visit research. Smith et al (2011) report that "websites can be effective tools for engaging visitors post-visit" to "encourage visitors to reflect on, and take action in relation to conservation and environmental issues".

An internet search was conducted to confirm whether each of the 20 zoos had a website and, if so, details of its content in relation to birds it holds.

Table 38: Websites of 20 sampled zoos

Zoo code	BIAZA	Does the zoo	Does the	Does the	Does the
	member?	have a website	website	website	website
			provide	provide	provide
			information	information	educational
			about the hirds	about the hirds	materials in
			avhibited?	similar to that	line with the
			exhibited:	required for	National
				ovhibit signs?	Curriculum?
	No	Voc	No (only a list of		Downloadable
DPF-39	NO	163	hirds that can	NO	fochools pack
			birus triat carr		SCHOOIS PACK
			be sponsored)		but no
DDK 12C	No	Vac	No (oraly lists o	No	Ne education
BPK-120	NO	res	NO (Only lists a	NO	No education
			few of the		Information
			birds)		
BPG-20	Yes	Yes	Yes	Yes	No, but school
					visits available
					(although no
					specific
					mention of
					meeting NC)
BPN-137	No	Yes	No	No	No
GMB-131	No	Yes	Yes	Yes (no	No, but refers
				conservation	to 'Animal
				status)	Encounters'
					schools
					programme,
					"designed to
					complement a
					variety of
					national
					curriculum skills
					and topics in
					science, history
					and geography
					for pupils at Key
					Stages 1, 2 &
					3".
GMB-48	Yes	Yes	No	No	Yes,
					downloadable
					'school
					workbooks'
GMB-85	Yes	No	N/A	N/A	N/A
GMD-142	Yes	Yes	Yes	Yes	No, but refers
					to school visits
					with classes in
					line with NC
					requirements
GMH-69	No	Yes	Yes, but photo	No	No
			and common		
			name only		
GMK-143	No	Yes	Yes	Yes (no	No

Zoo code	BIAZA member?	Does the zoo have a website	Does the website provide information about the birds exhibited?	Does the website provide information about the birds similar to that required for exhibit signs?	Does the website provide educational materials in line with the National Curriculum?
				conservation status)	
GML-119	Yes	Yes	No	No	Yes, various teacher and student worksheet downloads. Some make reference to NC
GMN-99	No	Yes	Yes	Yes (no conservation status)	Yes
GMS-4	No	Yes	Yes	Yes (although not always detailed or providing conservation status)	No, but school visits meet NC requirements
GMT-1	Yes	Yes	No (only two examples)	No	No, but school visits available (although no specific mention of meeting NC)
OBB-111	No	No	N/A	N/A	N/A
OBC-101	No	No	N/A	N/A	N/A
OBM-146	Yes	Yes	No	N/A	No
OBS-7	No	Yes	No	N/A	Yes
OBW-129	Yes	Yes	No	N/A	No
OBW-3	No	Yes	No	N/A	No
Total 'Yes'		17	7	6	5

Chart 52: Zoos with and without websites

n=20 Zoos with websites: 17 (85%) Zoos <u>without</u> websites: 3 (15%)



Chart 53: Zoos with websites providing information on birds exhibited

n=17

Zoos with websites providing information on birds exhibited: 7 (41.18%) Zoos with websites <u>not</u> providing information on birds exhibited: 10 (58.82%)

n=7

Zoos with websites providing information similar to that required for exhibit signs: 6 (but 4 did not include conservation status) (85.71%)

Zoos with websites not providing information similar to that required for exhibit signs: 1 (14.29%)



Chart 54: Zoos with websites providing educational materials

n=17

Zoos with websites providing educational materials: 5 (29.41%) Zoos with websites <u>not</u> providing educational materials: 12 (70.59%)

n=5

Zoos with websites providing educational materials in line with the National Curriculum: 4 (80%) Zoos with websites <u>not</u> providing educational materials in line with the National Curriculum: 1 (20%)



7.5 Animal presentations

Animal presentation refers to "any animal presentation or demonstration activity within a zoo other than the simple viewing of the animals in their enclosure and/or the provision of a keepers talk. This presentation or demonstration may take place within the animals' usual enclosure or elsewhere" (DEFRA, 2012e).

Annex D of DEFRA's guide to the provisions of the Zoo Licensing Act (DEFRA, 2012e) states that animal presentations have an 'informal' educational function and "should raise awareness in relation to conservation of biodiversity and provide accurate species information to the public". Welfare of the animals involved must not be compromised.

On the question 'How educational should animal presentations be?', Annex D states: "For the animal presentation to meet the requirements of the Act and SSSMZP [Secretary of State's Standards of Modern Zoo Practice] with respect to education, it should raise awareness in relation to conservation of biodiversity and provide accurate species information to the public.



Common buzzard (Buteo buteo) in flying display

Zoo-based research suggests that visitors want to see active animals and interact with keepers. Displays and talks are said to "engage the zoo visitor such that the four goals of the modern zoo [conservation, research, education and recreation] are pursued" (Anderson et al., 2003).

All of the animal presentations seen at the zoos sampled for this study involved flying the birds; most were birds of prey (see Table 38, below).

Flying displays have been described as "potentially an ideal forum for educational talks and raising conservation awareness relating to birds of prey" as the birds are "whole engaging" and "can be seen truly in action" (Cromie & Nicholls 1995), a view supported by Parry-Jones, Nicholls & Farmer (2007).

Both sets of researchers, however, refer to the potential negative aspects of public displays.

Despite providing the viewing public with a spectacular, sometimes exhilarating display, the "human dominion over nature" interaction between handler and hawk may predominate in the public view and lead to misunderstandings of the role of captive collections in bird of prey conservation (Parry-Jones, Nicholls & Farmer, 2007).

It is quite easy to send unintended negative messages to an audience about the value of raptors because the attitude of the handler towards the captive raptor becomes a reflection of the value of raptors in general. For example, if a captive raptor appears uncared for (e.g., overgrown beak and talons, broken feathers, dirty living conditions, handled roughly, etc.) then, irrespective of the content of the associated commentary, the message to the public may be, "this raptor is not worth my care, time or attention." If an educator gives a prepared 40-minute talk with a bird on the arm or in an exhibit, without notice or mention of any of the behaviour the bird may exhibit during the lecture (muting, preening, rousing feathers, watching the audience), the unintended message may be, "this raptor is not really interesting." Parry-Jones, Nicholls & Farmer (2007).

Cromie & Nicholls (1995), in their assessment of flying displays in UK zoos, monitored issues such as whether the birds were portrayed as suitable, easily trained and managed pets ("this may cause an indirect welfare problem if it encourages a viewer/listener to acquire a raptor") and whether the public were allowed to touch or stroke the birds (which may cause fear or annoyance to the bird, effect plumage condition, result in injury to the person or encourage keeping of raptors as pets).



Where any presentations of animals (e.g. a free-flying display of birds of prey) were conducted at zoos visited, they were filmed so that assessment of education content could later be made.

All presentations/displays involving birds at each of the sampled zoos were attended and filmed.

Only six (30%) of the 20 sampled zoos offered animal presentations at the time of our visits.

Visitors crowd around a White-faced Scops owl (*Ptilopsis granti*) to take photos during indoor presentation



Tawny eagle (Aquila rapax) used in flying presentation

Table 39: Analysis of bird presentations at selected zoos

(Where the time for which natural behaviours were discussed for longer than the bird was flown for, this is because the presenter either started their talk before the bird was brought out or continued to talk about the birds after they had been removed from the presentation).

Zoo code	BIAZA member?	Type of performance	Species involved	Length of time performance lasted	Amount of time each bird flying	Mention of natural behaviours, biology and habitat? How long for?	Were the birds displaying natural behaviours?	Mention of conservation status and threats?	Explain zoo's reason for keeping in captivity?	Mention of zoo's support for in-situ conservation?	Was presentation content suitable for audience (e.g. age group)
BPF-59	No	Flying display (outdoors). 3 flying displays. Attended 1	Great horned owl; Kestrel; White Backed Vulture; Bateleur eagle;	38min 10 sec	Great horned owl (8min 30sec)	Yes (7min 30sec)	Yes	No	No	No	Yes
			White-tailed sea eagle		Kestrel (4min 45sec)	Yes (3min 30sec)	Yes	No	No	No	Yes
					White Backed Vulture (7min 14sec)	Behaviour and biology only (6min 30sec)	Yes	No	No	No	Yes
					Bateleur eagle (8min 5sec)	Yes (7min 10sec)	Yes, although encouraged to 'attack' falconer's leg as if it was a snake	No	No	No	Yes
					White-tailed sea eagle (6min 20sec)	Yes (5min 40sec)	Yes	No	No	No	Yes
BPG-20	Yes	Flying display (outdoors) 1	Barn owl, Turkey vulture (2), Bengal eagle owl, Bald eagle	22min	Barn owl: 4min 25sec	Behaviour only (2min 42sec)	Yes	No	No	No	Yes
					Turkey vultures: 7min 25 sec	Behaviour and biology only (3min 5sec)	Yes, although encouraged one to beg as if still fed by parents	No	No	No	Yes
					Bengal eagle owl: 5min	Behaviour and biology only (4min	Yes	No	No	No	Yes

Zoo code	BIAZA member?	Type of performance	Species involved	Length of time performance lasted	Amount of time each bird flying	Mention of natural behaviours, biology and habitat? How long for?	Were the birds displaying natural behaviours?	Mention of conservation status and threats?	Explain zoo's reason for keeping in captivity?	Mention of zoo's support for in-situ conservation?	Was presentation content suitable for audience (e.g. age group)
					16sec	31sec)	Yes	Drief	No	No	Vac
					4min 30sec	biology only (3min 35sec)		впег	NO	NO	res
		Flying display (outdoors) 2	White-tailed sea eagle, African spotted eagle owl, Hooded vultures,	21min 05sec	White-tailed sea eagle: 4min 35sec	Yes (3min 50sec)	Yes	Brief	No	No	Yes
			Black kites (4)		African spotted eagle owl: 5min 50sec	Behaviour and biology only (4min 15sec)	Yes	No	No	No	Yes
					Hooded vultures: 9min 55sec (remained out when kites out)	Yes (2min 20 sec)	Yes	No	No	No	Yes
					Black kites: 6min 45sec	Behaviour and biology only (3min 5sec)	Yes	No	No	No	Yes
GMB-131	No	Flying display (outdoors)	Tawny owl; Barn owl; Long-eared owl; Snowy owl;	24min	Tawny owl: 3min 20sec	Yes (3min 20sec)	Yes	No	No	No	Yes
			Eurasian eagle owl		Barn owl: 4min 10sec	Yes (3min 50sec)	Yes	Brief	No	No	Yes
					Long-eared owl: 4min 55sec	Behaviour and biology only (4min 30sec)	Yes	No	No	No	Yes
					Snowy owl: 3min 15sec	Yes (3min 40sec)	Yes	No	No	No	Yes

Zoo code	BIAZA member?	Type of performance	Species involved	Length of time performance lasted	Amount of time each bird flying	Mention of natural behaviours, biology and habitat? How long for?	Were the birds displaying natural behaviours?	Mention of conservation status and threats?	Explain zoo's reason for keeping in captivity?	Mention of zoo's support for in-situ conservation?	Was presentation content suitable for audience (e.g. age group)
					Eurasian eagle owl: 3min 55sec	Yes (3min 50sec)	Yes	Yes	No	No	Yes
GMB-48	Yes	Flying display (outdoors)	Great grey owl, 2 kookaburra, Blue & Gold Macaw, Striated caracara	Unable to film due to problem with camera							
GMN-99	No	Bird flying display: but very heavy rain so cancelled	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
GMT-1	Yes	Flying display (outdoors)	Common buzzard; Lanner falcon; African tawny eagle	24min 20sec	Common buzzard: 9min 10sec	Behaviour and biology only (3min 20sec). Not until 4min 34seconds in that species name was given!	Yes	Brief	No	No	Yes
					Lanner falcon: 6min	Yes (7min 15sec)	Yes	No	No	No	Yes
					African tawny eagle: 4min	Yes (4min 30sec)	Yes	No	No	No	Yes No PA system so difficult to hear at times
		Flying display (indoors)	Southern White- faced Scops owl; Barn owl; Bengal Eagle Owl	16min 47sec	Southern White-faced Scops owl: 6min 40sec	Brief mention of biology only (1min)	Other than flying was mainly sitting on benches next to people	No	No	No	Yes
					Barn owl: 3min 50sec	Yes (2min 55sec)	Yes	Yes	No	No	At times not suitable for young audience
					Bengal Eagle Owl: 2min		Yes	No	No	No	Yes

Zoo code	BIAZA member?	Type of performance	Species involved	Length of time performance lasted	Amount of time each bird flying	Mention of natural behaviours, biology and habitat? How long for?	Were the birds displaying natural behaviours?	Mention of conservation status and threats?	Explain zoo's reason for keeping in captivity?	Mention of zoo's support for in-situ conservation?	Was presentation content suitable for audience (e.g. age group)
					30sec						
Total 'Yes'						(n=24) Yes to all: 13 No to all: 1 Behaviour only: 22 Biology only: 22 Habitat only: 0	(n=24) 24 (with criticisms of 2)	(n=24) Yes: 2 Brief: 4	(n=24) 0	(n=24) 0	(n=24) 23

Table 39 shows that 6 of the 20 sampled zoos (30%) had animal presentations of some kind (all were flying displays). One was cancelled due to adverse weather and one other was not recorded due to technical problems with the camera. Of the remaining four zoos six displays were filmed (two zoos had two displays each). Five of these were held outdoors and one indoors.

In total 24 birds or groups of birds were flown at these four zoos (an average of 6 per zoo). Table 39 reveals that these displays did not score well on providing basic information to the audience:

Only 1 performance (4.17%) included information on natural behaviours, biology and habitat of the species displayed; 22 individual performances (91.67%) gave information on only natural behaviours or biology (not habitat). Often, the presenter mainly discussed habits of the individual bird on display rather than the actual species, information which gave little or no insight into the natural behaviours of the species. At zoo GMT-1 the presenter did not even name the species being flown until 4 and half minutes into the nine minute presentation. Only once (Kestrel presentation at BPF-59) did the presenter make reference to the bird's scientific name (*Falco tinnunculus*).

Although the birds were displaying natural behaviours, the Bateleur eagle (*Terathopius ecaudatus*) at zoo BPF-59 was encouraged to attack the falconer's leg as if it were a snake and a Turkey vulture at BPG-20 was encouraged to beg as if he was still being fed by his parents. Although both of these were passed off as displaying natural behaviours they actually were not – the falconer's leg was not a snake and the vulture was not of a young age as to be fed by a parent. At GMT-1 the Scops owl (*Ptilopsis granti*) spent most of his time sitting on benches next to people, displaying how imprinting had made him more used to people than other birds being flown.

No zoo gave any detailed information about the conservation status of birds being flown or threats they face in the wild (or, importantly, what the audience can do to help protect the species). Brief information was only given in four of the displays (16.67%). Of the 20 different species of birds used in the presentations, only one (5%) was a threatened species: the Hooded vultures (*Necrosyrtes monachus*) at zoo BPG-20, an Endangered species.

No zoo explained why it kept the particular species in captivity or what it did to support in-situ conservation.

Of the 24 birds (or groups), all presentations except one (95.83%) appeared to be suitable for the audience. The only one that did not (Barn owl (*Tyto alba*) display at GMT-1) did not seem suitable for the mostly young children in the audience as the terminology used was too complex.

We conclude from this analysis that only three of the 24 displays (12.5%) could be classed as close to appropriate in their content (even these only gave brief information on conservation status and threats) and meeting zoo licensing requirements – 87.5% did not.

Average amount of time birds flown

Table 39 shows the amount of time each of the 23 birds (or groups) were flown for, ranging from 2 minutes 30 seconds to 9 minutes 55 seconds. In total, this equates to 7845 seconds of flying time for all birds (2 hours 10 minutes 45 seconds). On average, each bird (or group) was flown for 341 seconds each (5 minutes 41 seconds each).

Chart 55: Zoos with bird presentations



7.6 Talks

As with animal encounters, all talks held at zoos, relating to birds, were visited and recorded (e.g. talks given at feeding times by a keeper).

The Zoos Expert Committee Handbook (DEFRA, 2012d) notes: "In some collections a demonstration, such as a bird-flying display or aquarium tank feed, is used as the main 'teaching opportunity' and this is adapted for different age groups. Demonstrations should always be based on natural behaviours, and consideration given to the message(s) and perceptions associated with this approach".

Keeper talks have been described as one of the most effective ways of conveying conservation education to zoo visitors (as referenced in Parker, 2006).

A number of issues were assessed with the talks:

- 1. Basic information should relate to the type of information also expected from enclosure labels (see section 7.2), with a talk obviously allowing for a greater level of information to be provided natural habitat, behaviours and biology
- 2. Conservation status is a basic piece of information that should be relayed to the public but a talk also provides the opportunity to discuss the threats the particular species face in the wild, the zoo's role in their in-situ conservation (as well as explaining why the zoo actually keeps these species in captivity) and what people can do to help protect species.
- 3. Finally, a good provider of education adapts their talk to the actual audience. A group of adults is far different to a group of primary school children in terms of what they can understand and relate to and what they can do to assist conservation efforts

At the time of our visits, six zoos (30%) offered talks relating to birds.

Table 40: Talks involving birds at selected zoos

Zoo code	BIAZA member?	Species involved	Talk attended?	Length of talk	Mention of natural behaviours, biology and habitat?	Mention of conservation status and threats?	Explain zoo's reason for keeping in captivity?	Mention of zoo's support for in-situ conservation?	Was talk content suitable for audience (e.g. age group)
BPG- 20	Yes	Vulture talk: African whitebacked and Eurasian Griffon	Yes	12min 26sec	Yes. Mentioned they from different continents and "never actually cross paths in the wild"	Yes Threat from livestock drugs poisoning vultures	No	Brief – said raising awareness and money for a specific in-situ project	Yes
GMB- 48	Yes	Humboldt penguins	Yes	9min 30sec	Yes	Not conservation status; Brief mention of threat caused by overfishing	Only in that they breed and send to zoos worldwide	Referred to raising money to protect penguins in wild but nothing specific	No – audience mainly v young children, talk aimed at higher age group
GMD- 142	Yes	Penguin talk: Humboldt and Rockhopper	Yes	7min	Yes	No	No	No	Yes
GMS-4	No	1. 'Birds of the aviary' talk	Talk 1 did not happen	N/A	N/A	N/A	N/A	N/A	N/A
		talk and hand feeding (Humboldt penguins)	Tes	Approx 4min; 10min extra feeding	only	conservation status; Brief mention of threat caused by overfishing	NO	working towards' protecting natural habitat but didn't explain how	audience mainly v young children, talk aimed at higher age group
OBM- 146	Yes	Two talks: 1. Water birds 2. Flamingos	No – not advertised on website so was unaware and arrived after talks	N/A	N/A	N/A	N/A	N/A	N/A
OBW-3	No	Keeper talks held 3 days a week	No – not advertised on website so was unaware and visited on day when no talk	N/A	N/A	N/A	N/A	N/A	N/A
Total					3	1	1	2	2
'Yes'									

Chart 56: Zoos with bird talks



As can be seen from Table 40, only 30% of zoos visited offered talks relating to birds. These zoos offered a total of eight talks but one did not happen (no reason was given) and three were not seen as we were not aware of them until afterwards.

Of the four talks observed, they each gave differing levels of information.

Natural behaviours, biology and habitat: Three zoos (75%) provided an acceptable level of information to be expected within the timeframe of the actual talk (12½ minutes, 9½ minutes and 7 minutes). One discussed only behaviour and gave no information on habitat and biology.

Conservation status and threats: Only one of the four zoos (25%) mentioned conservation status. The same zoo gave examples of threats the species faced in the wild. Two other zoos (50%) briefly mentioned a conservation threat; the fourth (25%) gave no information at all on conservation status or threats. The three zoos that failed to either provide this information or provided very little information were actually talking about species classed as threatened: Humboldt penguin (*Spheniscus humboldti*), a Vulnerable species and the Northern rockhopper penguin (*Eudyptes moseleyi*), classed as Endangered.

Zoo's reason for keeping in captivity: Only one zoo (25%) offered any explanation as to why they had these species in captivity: GMB-48 said it bred penguins and sent them to other zoos worldwide. However, it did not explain why this was done. Yet, in the other zoos, three of the four species in these talks were threatened species – White-backed Vulture (*Gyps africanus*) (Endangered), Humboldt Penguin (*Spheniscus humboldti*) (Vulnerable) and Northern rockhopper penguin (*Eudyptes moseleyi*) (Endangered).

Zoo's support for in-situ conservation: Again, despite three of the four species being threatened, only one zoo (25%) (BPG-20) mentioned it raised funds for a specific in-situ conservation project. BPG-20 briefly mentioned raising money. Zoo GMD-142 mentioned no in-situ support at all and zoo GMS-4 simply said it was 'working towards' protecting natural habitats but didn't explain how, other than charging £1 for a badge and the opportunity to feed the captive penguins. Likewise, zoo GMB-48 said it raised money to protect penguins in the wild but did not elaborate on that.

Talk content suitable for audience: Zoos GMB-48 and GMS-4 failed on this in the sense that the keepers gave talks which were not appropriate for the mainly very young children in attendance. The presence of younger children at GMS-4 is likely to be because the brief talk was immediately followed by the opportunity to hand feed fish to the penguins, something more likely to attract young children with their parents. This also explains why the talk, at four minutes long, was the briefest of the three as approximately ten minutes was then spent feeding the fish. This was the only zoo of the three to not use a PA system for the talk, which made hearing the keeper difficult at times, not helped by her speaking very fast (also unsuitable for the audience).

Of these four zoos, only one (25%) (BPG-20) provided an adequate level of information.

7.7 Other activities

Zoo GMS-4 provided the opportunity for visitors to hand feed Humboldt penguins (*Spheniscus humboldti*) immediately after the talk at their enclosure. The feeding period lasted approximately ten minutes, compared to four minutes for the talk.

Visitors (mostly parents and young children) paid £1 in return for a fish to feed the penguins. This appeared to be done under the guise of buying a badge with the funds presumably going to the conservation project alluded to (but not discussed).

Hand feeding penguins clearly does not encourage natural behaviours, although it does allow visitors to experience the birds much closer. There was much jostling amongst children, encouraged by parents, to get extra fish and this resulted on a few occasions in children pushing penguins around with their feet. There seemed to be no attempt by the keeper to control the situation.

Zoo code	BIAZA member?	Does the zoo have accurate species- specific information signs for each enclosure?	Does the zoo have a website providing accurate information about the birds exhibited?	Does the zoo make available printed literature about the birds it exhibits?	Does the have appropriate animal presentations involving birds?	Does the have appropriate talks involving birds?
BPF-59	No	Yes	No	No	No	No
BPK-126	No	No	No	No	No	No
BPG-20	Yes	Yes	Yes	No	Yes (two)	Yes
BPN-137	No	No	No	No	No	No
GMB-131	No	Yes	Yes	Yes	Yes (one)	No
GMB-48	Yes	Yes	No	Yes	No	Talk but not appropriate
GMB-85	Yes	No	No	No	No	No
GMD-142	Yes	Yes	Yes	Yes	No	Talk but not appropriate
GMH-69	No	Yes	Yes	Yes	No	No
GMK-143	No	Yes	Yes	No	No	No
GML-119	Yes	No	No	Yes	No	No
GMN-99	No	Yes	Yes	No	No	No
GMS-4	No	Yes	Yes	Yes	No	Talk but not appropriate
GMT-1	Yes	Yes	No	No	No	No
OBB-111	No	No	No	No	No	No
OBC-101	No	No	No	No	No	No
OBM-146	Yes	Yes	No	Yes	No	Not seen
OBS-7	No	No	No	No	No	No
OBW-129	Yes	Yes	No	Yes	No	No
OBW-3	No	Yes	No	No	No	Not seen

Table 41: Availability of educational information at sampled zoos

Zoo code	BIAZA member?	Does the zoo have accurate species- specific information signs for each enclosure?	Does the zoo have a website providing accurate information about the birds exhibited?	Does the zoo make available printed literature about the birds it exhibits?	Does the have appropriate animal presentations involving birds?	Does the have appropriate talks involving birds?
Total 'Yes'	8	13 (n=20)	7 (n=20)	8 (n=20)	2 (n=20)	1 (n=18)

Note: n=18 for the question about appropriate talks as the talks offered at two zoos were not attended.

For the five questions in Table 41, the highest total score for all zoos combined could be a maximum of 98. The analysis shows the total to be 31, meaning that overall, the 20 sampled zoos scored 31.63% of their potential to provide basic educational standards to visitors across the five areas analysed.

For the 8 zoos which are members of BIAZA, the highest total score for all zoos combined could be a maximum of 40, if including the two talks which were not seen. Even if these talks were both appropriate, the total score would be 15, 37.5% of their potential to provide full educational standards.

7.8 Inappropriate mixing of bird species

Zoos are required to "promote public education and awareness in relation to the conservation of biodiversity, particularly by providing information about the species exhibited and their natural habitats" (DEFRA, 2012a).

It would appear contrary to this requirement to house together species from different countries or continents which were unlikely to come together in the wild.

Each enclosure at the zoos visited was recorded and the species in each was identified (mostly by the exhibit sign, where it existed and was correct).

Tethered birds are often kept on the same area of lawn. Where this was the case they have been classed as one enclosure for the purpose of this analysis. So, where two different lawns of tethered birds were found at an individual zoo this has been recorded as two enclosures.

However, some tethered birds were housed in separated but adjoining shelters, sometimes individually and sometimes with other birds of the same species. Each separate shelter has been classed as one enclosure.

Zoo code	BIAZA member	Number of enclosures	Number of enclosures with inappropriate mixing	Species inappropriately mixed	Percentage of enclosures with inappropriate mixing
BPF-59	No	25 + 3 tethered bird areas Total: 28	3	Tethered bird areas	10.71%
ВРК-126	No	34 + 1 tethered bird area Total: 35	1	Tethered bird area	2.86%
BPG-20	Yes	31 + 4 tethered bird areas	2	Old World and New World	5.71%

Table 42: Number of enclosures with 'inappropriate mixing'

Zoo code	BIAZA member	Number of enclosures	Number of enclosures with inappropriate mixing	Species inappropriately mixed	Percentage of enclosures with inappropriate mixing
		Total: 35		vultures	
BPN-137	No	31 + 1 tethered area Total: 32	0		0%
GMB-131	No	11	0		0%
GMB-48	Yes	91	36	Seemed to be little obvious reason for the mixing of species within aviaries, other than to maximise use of space	39.56%
GMB-85	Yes	5	1	Mixed aviary: African and Asian doves and passerines	20%
GMD-142	Yes	12	1	African and South Atlantic penguins	8.33%
GMH-69	No	33	5	E.g. African cranes and Asian waterfowl	15.15%
GMK-143	No	15 + 4 tethered bird areas Total: 19	0		0%
GML-119	Yes	13	0		0%
GMN-99	No	15	2	African and Eurasian cranes	13.33%
GMS-4	No	8	0		0%
GMT-1	Yes	18 + 2 tethered bird areas Total: 20	1	Little egret; kookaburra; red junglefowl; hadada ibis; waldrapp ibis	5%
OBB-111	No	18	11	Several enclosures had Galliformes and Psittaciformes housed together	61.11%
OBC-101	No	1	1	African and Australian Psittaciformes	100%
OBM-146	Yes	31	0		0%
OBS-7	No	7 + 1 tethered bird area Total: 8	0		0%
OBW-129	Yes	13	0		0%
OBW-3	No	10	10	E.g. Turaco (African) and partridge (Asian)	100%

Zoo code	BIAZA member	Number of enclosures	Number of enclosures with inappropriate mixing	Species inappropriately mixed	Percentage of enclosures with inappropriate mixing
Total		438	74		16.89%

(At zoo BPN-137) a Tawny owl and Barn owl were housed together. The sign stated that the two were raised together and that although the two species don't naturally mix, "these two represent the love affair at the centre as they can regularly be seen smuggling up". As this does not class as 'inappropriate mixing' in a geographical sense it has not been listed as such in the table above.

Total number of enclosures: 438 Number with adequate species mix: 364 Number with inappropriate species mix: 74

Percentage with adequate species mix: 83.11% Percentage with inappropriate species mix: 16.89%





Other than tethered birds of different species being housed together, bird of prey centres generally had low numbers of enclosures with inappropriately mixed species. This is because mixing species can result in injury or death.

Enclosures with higher rates of inappropriate mixing tended to be where the zoo had attempted to maximise use of space by housing both arboreal and more ground-living birds together.

7.9 Chapter discussion: Zoos and education

This chapter has looked at the role the sampled zoos play in educating their visitors and revealed a mix of good and bad practices.

Most visitors will probably rely entirely on the information signs that should be clear on each enclosure for all of their information about the particular species (they probably never look at the zoo's website other than to

find the address, opening times and price). The vast majority (91.55%) of enclosures had signs, which is to be expected, but that leaves 8.45% that didn't; immediately it means that the visitor is unable to access information. 12% of signs did not identify the species correctly, which is probably worse than providing no information at all. The provision of biological data and conservation status scored poorly too.

Provision of basic information about the species on display was apparent across the board: in printed materials available to visitors, websites (a quarter of the sampled didn't even have one), presentations and talks. All of these are the ways in which visitors should be accessing information about the birds. Over half (58%) of zoo websites did not give detailed information about their birds, yet their collection probably does not change much from year to year, websites are easy to update and they provide a useful pre- and post-visit source of information.

Presentations and talks provide the perfect opportunity to really educate an audience about a particular species, their behaviours, biology and habitats, as well as the threats they face in the wild and what people can do to support conservation efforts. Yet, less than a third of zoos offer either a presentation or a talk involving/about birds.

Seven presentations, involving a total of 24 birds or groups of birds, were observed, but not a single one gave any detailed information on conservation or even explained why they had these species at the zoo. Only 12.5% of these presentations met educational standards at a level that should be provided by enclosure signs (which should be seen as minimal). DEFRA's guide to the provisions of the Zoo Licensing Act state that animal presentations "should raise awareness in relation to conservation of biodiversity"; clearly, the zoos visited are failing to do so.

The talks on offer did not fare much better. Only one of the four provided an adequate level of information and only one zoo tried to explain why it kept these species in captivity (even then it just said it bred penguins and sent them to other zoos worldwide, hardly a real explanation). Yet, in the other zoos, three of the four species in these talks were threatened species – two Endangered and one Vulnerable.

If zoos really want to claim to have an educational role, they have to do something drastic to improve this situation.

Chapter 8 Ethical discussion

Discussion of animal ethics is a necessary part of any look at the captivity of animals. This report raises important issues surrounding the confinement of wild animals in zoos: welfare issues such as flight restriction and restraint and abnormal behaviours as well as limited conservation and education values.

We have seen that as far as captive management of birds is concerned, flight restrictions has supporters and opponents: pinioning, wing clipping and tethering restrict the free movement of birds to varying extents but the former allows waterfowl and others to have more space than a roofed enclosure would and the latter allows birds of prey to be more easily flown. Which is more ethical? If birds can only be kept in captivity if they are subjected to management methods that can cause physical pain, distress or result in a mutilation that permanently prevents them from flying, is it acceptable to confine them in captivity at all?

As for zoos' conservation and education claims, they have been strongly refuted by former zoo director David Hancocks:

"This point has concerned me for many years. I believe that the loud trumpeting of zoos about their role in conservation – which is in truth marginal, and mostly technical in nature – is, for the sake merely of zoo promotion, resulting in misguided and complacent attitudes among the general public. Zoos have managed to convince many people that the only important wildlife species are the typical zoo species, despite these being just a speck of the life forms that exist on the planet, and have then persuaded many of their visitors that the zoos' efforts to breed these species means they will be saved from extinction. It is a disgraceful con-trick. And, I fear, a great disservice to conservation. I know, too, that the exaggerated and noisy clamouring by zoos for centre stage attention in the conservation field is deeply resented by conservation biologists who are working in the wild, actually saving wildlife and wild habitats." (Hancocks, 2010)

Although domestic species are not uncommon in zoos, most birds are of wild species, even if born in captivity for generations. Domestication – adaption by humans to captivity through genetic and developmental changes – has been described as still in its infancy for psittacines (parrots), for example: "they still share natural behaviour and response thresholds with their wild counterparts and should be considered wild animals" (Kalmar, Janssens, & Moons, 2010).

Whilst 'intelligence' should not be the only factor in deciding the fate of captive birds, it is clear that several species (at least) do display sophisticated cognitive abilities, particularly psittacines and corvids (crow family), including tool use, episodic memory, the ability to predict the behaviour of conspecifics (Prior, Schwarz & Gu, 2008) and complex problem solving (Anderson, 2010). A 2008 study reported the first example of self-recognition in a non-mammalian species – in magpies (Prior, Schwarz & Gu, 2008). Social learning – in this instance, birds learning from each other that particular individual humans were dangerous – has been reported in crows. Such learning can evolve over time to become culture (Cornell, Marzluff & Pecoraro, 2012).

In addition, birds, like many species across the animal kingdom, display a range of emotions; although like reptiles and fish they lack expressive faces which can make it harder to interpret their feelings (Bekoff, 2007). In 1872 Charles Darwin wrote about how animals, including birds, feel emotions including happiness, sorrow and jealousy, and can display deceit and a sense of humour (Anderson, 2010).

If men had wings and bore black feathers, few of them would be clever enough to be crows. **Henry Ward Beecher**, 19th century social reformer (Quoted in Nozedar, 2006)

In their natural habitats, birds face infinite challenges, both positive and negative. The 'wild' is a dangerous place, even without the additional pressures of habitat destruction, poaching and global warming caused by humans. Birds face the daily challenges of avoiding being prey (or the challenge of being a predator), of finding a mate, defending a territory or flying thousands of miles on annual migrations (where they often have to also avoid hunters).

Rose, Parsons and Farinato (2009), in a discussion of mortality rates in captive and wild-living cetaceans, in a question which is as relevant to birds, ask: "What replaces, with equal impact, predators, food shortages, storms, ship strikes, fishing gear entanglement, and other causes of death in the wild once a marine mammal is in captivity? One obvious culprit is a degree and form of stress that is uniquely suffered by confined animals".

However, this does not make captivity a better alternative, despite the comments of many in the zoo industry. Food and veterinary care may be provided by zoos, leading one zoo scientist to claim that "for some species, the zoo trumps the wild" (Stern, 2008), but wild animals are uniquely adapted to their own environment and occupy specialised places in their ecosystems, and those places are not zoos. Considering captivity to be the best option for wild animals is akin to giving up on conservation and stepping aside to allow the continued destruction of global habitats.

Increasingly, animals are being recognised as sentient beings with their own emotions and desires and people are awakening to the realisation that using them for our amusement denies the value and rights of those individuals (Redmond, 2009; 2010).

In terms of animal ethics, zoos infringe on the basic needs of animals in order to benefit the secondary desires (amusement) of humans. Any ethic concerning animals should start with regard to the animal herself: her cognitive capacities, interests and needs. A basic step towards a meaningful ethic would require an end to using animals for our entertainment.

According to Randy Malamud, Professor of English at Georgia State University and author of *Reading Zoos:*

"I think that what people see inside the zoo cage is a symbol of our power to capture and control other aspects of the world. They see what was once a marvellous, vibrant, sentient creature, full of instincts and emotions and passions and life-force, reduced to a spectacle, a prisoner, a trophy of our conquest of the natural world. They see a celebration of the human power to displace and reconfigure an animal's life for our own amusement and supposed edification." (Malamud, 2009)

Malamud has written (2009) about how seeing an animal in a zoo, out of context and out of her own environment, means that we really cannot experience that animal. This is a view shared by environmental author Derrick Jensen (2007), who says of zoos:

"We learn that you can remove a creature from her habitat and still have a creature. We see a sea lion in a concrete pool and believe that we're still seeing a sea lion. But we are not. [...] A sea lion is her habitat. She is the school of fish she chases. She is the water. She is the cold wind blowing over the ocean. [...] She is the process of being a sea lion in place.

We could, and should, say the same for every other creature, whether wolverine, gibbon, macaw or elephant. I have a friend who [...] ecstatically reported to me one time that he saw a wolverine. I could have responded, 'Big deal. I've seen plenty in zoos. They look like big weasels.' But I have never seen a wolverine in the wild, which means I have never seen a wolverine."

Chapter 9 Suggestions for future research

The aim of this study was to provide an overview of the situation for birds held in zoos in England: their welfare and what, if any, conservation and education benefits occur. From this brief (looking at just 20 zoos in detail) review a number of areas for future research can be highlighted:

Expanding the study to address a larger representative sample of zoos as well as those in other parts of the UK (as this study looks at England only).

Assess specific categories of zoos in greater depth to see if highlighted problems are specific to some types of zoological collections, e.g. Bird of prey centres or other specialist avian collections such as waterfowl.

More in-depth study of flight restriction methods and potential physical and behavioural harm caused to the birds. Cromie and Nicholls (1995) noted that "further research needs to be carried out into the physiological effects of tethering. Systems for reducing the problems of tethering need to be devised or introduced more widely with appropriate education. Management techniques require further development with emphasis on allowing flying birds to be kept loose".

Mortality of birds in sampled zoos over a one year period were briefly looked at in this study and this is an area of high importance for future research, particularly as it appears overlooked by the zoo licensing regime. More detailed sources of data, such as stud books for avian species, should be obtained, with a species-by-species analysis as well as mortality for birds under one year old (first year mortality rates are expected to be higher (e.g. see Murn and Hunt, 2008). Further data needs collecting to ascertain the reasons for higher levels of mortality and to provide comparison between years and species to see if some species are prone to higher mortality rates than others, possibly as a result of welfare problems in zoos.

This study was not able to conduct sufficient research into the behaviour of individual birds due to the timeconsuming nature of such research. One particular area of interest would be to determine levels of apathy and other non-performance of normal behaviour. Birds of prey may be a useful starting point for this given that zoos often describe them as 'lazy' in defence of not providing a more enriched environment or proper facilities for daily flying.

Chapter 10 Conclusions

The study author shares the view of the Captive Animals' Protection Society that the captivity of animals in zoos is unethical from an animal rights based perspective. A discussion of ethics has been provided in Chapter 8.

Putting the issue of animal rights to one side, the findings of this study reveal significant animal welfare problems caused by the confinement of birds in zoos. Most important are factors relating to restraint and restriction, primarily pinioning and tethering. Surgically mutilating birds to permanently deprive them of the ability to fly, or tethering (tying) them to a perch for hours at a time – or even for days, weeks or months – can not be seen as practices to be continued, at least without open and honest debate, which is not currently happening.

The 'one size fits all' approach to enclosures, whereby birds are housed in enclosures of a uniform nature, regardless of their species-specific needs, has been observed by the study author in over a decade of monitoring conditions in zoos, but have been confirmed by the analysis conducted here. The lack of a varied environment, pond or species-appropriate features all reveal a lack of thought put into what birds require to express normal behaviours, which is not only a requirement of zoo licensing legislation but should be a basic desire of any zoo.

Many of the enclosures seen during the visits to twenty randomly sampled zoos left a haunting impression. Barren enclosures where birds were distressed by the inability to hide from people, injuries caused by flying into the mesh of the enclosure walls, self-mutilation and various forms of 'abnormal repetitive behaviour', all speak volumes as to the zoos' attitudes towards the individuals in their care, birds they claim to display as 'ambassadors for their species'.

Animal welfare is directly linked to the educational message received by the zoo visitor. Display a bird who pecks at her own feathers until she is bald, or house an injured bird in an aviary where she is distressed by approaching visitors, and a damaging message is presented.

Some welfare issues are not so clear to the average visitor, but this does not diminish their importance. Most visitors to a zoo with large numbers of waterfowl who have had half of one of their wings cut off (pinioned) may never even notice. They may enjoy a day watching birds who they think are experiencing the freedom of lakes and extensive grassed areas, oblivious to the mutilation. However, when aware of it and specifically looking for effects of pinioning, the flapping and stumbling of the birds is clear. When first clearly observed on a large bird such as a crane, the visual nature of pinioning is a shock.

Tethering is a practice which cannot be hidden from public view, but it is claimed that these birds are flown daily so this is not great a restriction. Yet this study shows that this is not always the case and even when birds are flown it may only be for a few minutes.

Mortality rates are also not known by visitors, and this research reveals they may not be noticed by too many zoo inspectors either. Despite this, annual death rates appear higher than would be expected, particularly as zoos are meant to protect birds from the usual causes of death such as illness, starvation or predation.

Ask most people their opinion on the role of zoos and conservation is likely to be the number one point. What role do zoos exactly play in conserving avian species? Over 80% of the individual birds in the sampled zoos are not of threatened species. There appears to be minimal involvement in co-ordinated breeding programmes and even less in actually reintroducing species to their natural habitats. Zoos are also poor at highlighting any involvement they have in conservation, even where they conduct useful programmes such as converting redundant farmland into nature reserves or fundraising for in-situ conservation (neither of which requires keeping birds captive).

We have already seen how poor welfare leads to a negative educational perspective for visitors. But what of 'traditional' forms of education? 12% of enclosure signs did not even correctly identify the species held and printed materials and websites, where they existed, largely failed to provide much information either.

Presentations and talks provide the ideal opportunity to present a whole package to the visitor: discussion of welfare, educational messages about the species and information about the threats they face and what each individual person can do to make positive changes. Yet sadly these opportunities appear lost. Not one of the 24 individual presentations observed gave any detailed information on conservation; no presentations or talks adequately explained why the zoos kept the species they did, even if they were endangered.

If zoos were providing high standards of animal welfare, were educating visitors about the biology or natural habitats of the birds they confined, or seriously conducting conservation programmes that protected natural habitats and reintroduced threatened species, then their activities would match the level of the grand claims they make. However, this study shows that they are failing to do this. Even if they were, it does not negate the ethical objections to keeping thousands of wild birds on display to serve the requirement of an inquisitive public to be entertained.

This study raises a number of important questions, some of them (such as flight restrictions) rarely previously seen as a topic of debate. As Chapter 9 shows, there is a need for further research, but now is the time to start encouraging a more open debate about the future of zoos and an effective and compassionate alternative for conservation.

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Appendix Three: References

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