



**THE ZOOLOGICAL
SOCIETY OF LONDON**

**ANNUAL REPORT
1990 - 1991**

This Report covers the period from 1 April 1990 to 31 March 1991. Animals in the Collection, however, will continue to be recorded on a calendar year basis.

The Society's three main areas of activity, the animal collections, The Institute of Zoology and the Learned Society, remain indivisible. Within this Annual Report, references to London Zoo and Whipsnade Wild Animal Park may therefore encompass activities which involve the resources both of the Society and of Zoo Operations Limited.

Published by

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THE ZOOLOGICAL SOCIETY OF LONDON

MISSION STATEMENT

To promote the worldwide conservation of animal species and their habitats by stimulating public awareness and concern through the presentation of living collections, by relevant research and by direct action in the field.

MISSION AIMS

1. To foster public awareness of the variety and diversity of the living world through imaginative exhibits featuring live animals in appropriate environments.
2. To maintain and breed species with a high conservation and education value and to link this to a comprehensive programme of learning for all age groups, but particularly for children of school age.
3. To increase our understanding of the biology of rare animal species, concentrating on veterinary research, reproduction, genetics, ethology and ecology.
4. To initiate and run practical conservation programmes chosen in accordance with accepted international criteria for effective and high priority conservation.
5. To promote the understanding of conservation issues and their relationship to the development of the world's poorest countries and to promote the application of sound scientific principles to wildlife management.
6. To ensure that the highest standards of husbandry and welfare are employed wherever we care for animals and that techniques to improve further the husbandry of these species are studied and communicated to others.
7. To co-operate with other responsible societies and organisations promoting conservation on a worldwide basis.
8. To disseminate new knowledge in Zoology and field conservation through publications, symposia, scientific meetings and maintenance of the library.
9. To make awards of prizes and medals for distinguished work in Zoology and Conservation.

ILLUSTRATIONS

Cover: Scimitar-horned Oryx by Joseph Wolf, from *The book of antelopes* by Philip Lutley Sclater (then Secretary of the Society) and Oldfield Thomas. 1894–1900.

This species is kept at Whipsnade Wild Animal Park and has been re-introduced to Tunisia as part of the Society's conservation programme.

Photographs: Michael Lyster and Terry Dennett

EDITORIAL: Marcia A. Edwards and Peter H. Denton

The Council has pleasure in presenting its 162nd Annual Report to the Annual General Meeting of the Society to be held on 25th September 1991 at 3.00 pm in the Society's Meeting Room at Regent's Park.

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PATRON: HER MAJESTY THE QUEEN

COUNCIL 1990–1991

President: Professor N A Mitchison, DPhil, FRS

Treasurer: The Rt Hon Lord Peyton of Yeovil

Secretary: Sir Barry Cross, CBE, MA, PhD, ScD, MRCVS,
FIBiol, FRS

Professor R McNeill Alexander, MA, PhD, DSc,
FIBiol, FRS, *Vice-President*

Lord Armstrong of Ilminster, GCB, CVO

J Barrington-Johnson

Professor P P G Bateson, MA, PhD, ScD, FRS

Professor B B Boycott, FIBiol, FRS

Lord Clinton-Davis, LLB

Sir Alcon Copisarow, DSc, FInstP, CEng

Professor A W Cuthbert, PhD, MACantab, FRS

Professor R L Gardner, MA, PhD, FRS

Mrs Philippa Herbert, MA, *Vice-President*

Professor P A Jewell, BSc(Agric), MA, PhD, FIBiol, CBiol,
Vice-President

J M Knowles, OBE, *Vice-President*

C J S Marler

The Hon Sir William McAlpine

Lord McAlpine of West Green

A J F Smith, MA

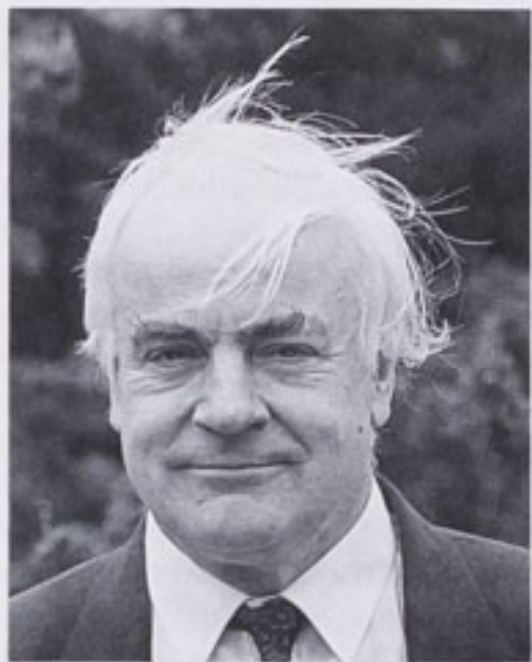
Lord Walton of Detchant, TD, MA, MD, DSc, FRCP

Professor A J Zuckerman, MD, DSc, FRCP, FRCPATH

HONORARY FELLOWS

Date of Election

- 1977 HRH The Prince Philip, Duke of
Edinburgh, KG, KT
- 1952 Professor Sven Otto Hörstadius
Zoologiska Institutionen, Uppsala, Sweden
- 1974 Dr Roger Tory Peterson
Route 4, Box 131, Neck Road, Old Lyme,
Connecticut, USA
- 1975 Professor Jean Anthony
Muséum National d'Histoire Naturelle,
55 rue de Buffon, Paris 53, France
- 1975 Professor L D Brongersma
Rijksmuseum van Natuurlijke Historie,
Leiden, Holland
- 1975 Professor Jean Dorst
Muséum National d'Histoire Naturelle
(Mammifères et Oiseaux),
55 rue de Buffon, Paris 53, France
- 1978 Professor José Carvalho
Museu Nacional, Quinta da Boa Vista,
Rio de Janeiro, Brazil 20940
- 1984 Professor George Evelyn Hutchinson
† Dept of Biology, Osborn Memorial
Laboratories, Yale University, POB 6666,
New Haven, Connecticut, USA
- 1984 Professor Ernst Mayr
Museum of Comparative Zoology,
Harvard University, Cambridge,
Massachusetts, USA
- 1984 Professor Lord Zuckerman, OM, KCB, FRS
University of East Anglia, Earlham Hall,
Norwich
- 1988 Professor Dr Milton Thiago de Mello
Instituto de Ciências Biológicas,
Universidade de Brasília, Brasília,
Brazil DF70.910
- 1990 Professor Knut Schmidt-Nielsen,
Department of Zoology,
Duke University, Durham,
NC 27706, USA
- 1990 Professor John Z Young,
Emeritus Professor of Anatomy,
University College London,
Gower Street, London WC1



Avrion Mitchison, FRS

I hope all readers of this Report will be struck by the progress made in our scientific and educational work, in the breeding and presentation of our animal collections, and in improving facilities for visitors, resulting in significantly higher attendance figures than last year in defiance of the trend in a year of recession.

Nevertheless, few can remain unaware of the financial crisis threatening our continuance at Regent's Park. As the only zoo in a capital city without a large annual subsidy, and despite the dedicated efforts of probably the best professional management team in any zoo in the world, we have been forced to concede that the plan proposed in 1988 by Peat Marwick McLintock, the consultants, commissioned by

the Government and the Society was not realisable in present economic conditions. At the time of writing we are still in negotiation with the Department of the Environment and hope to insert an update on developments with this Report.

The most recent external study of our problems by McKinsey & Company resulted in quite different proposals from Peat Marwick McLintock. One of these was to develop a sharper focus to our activities that would accord with current perceptions of environmental priorities. This is now embodied in the Mission Statement, set out at the beginning of this Report, which is in effect a modern formulation of the objectives enshrined in our Royal Charter.

In these turbulent times, the steadfastness of the staff and of the members of Council and its committees, has been of paramount importance. No one has laboured more unremittingly to ensure our survival than Lord Peyton, who negotiated the £10M package with the Government in 1988 without which the Society might well have expired. Lord Peyton's term as Treasurer would have been completed at the Annual General Meeting and it was with regret that we learned of his decision to resign earlier. We shall always be indebted to him for his great services to the Society over the last seven years.

As for the future, I am sure that whatever happens to London Zoo, the Society's scientific work in the Institute of Zoology and in overseas conservation projects will continue to flourish, supported by the remarkable regeneration of Whipsnade which will provide the nation with an indispensable window on the natural world of living animals.

Avrion Mitchison

PRESIDENT

VISIT TO LONDON ZOO BY
THE QUEEN AND THE DUKE OF EDINBURGH

Her Majesty The Queen accompanied by His Royal Highness The Prince Philip, Duke of Edinburgh, visited London Zoo on 9 May 1990, their first official visit for some fourteen years. After being welcomed by the President and introduced to Officers and senior staff of the Society, The Queen and Prince Philip walked through the grounds to the Elephant House where, after touring an exhibition on Elephant Conservation, Her Majesty inaugurated the Elephant Tracking by Satellite programme. The Queen, to her considerable amusement and the delight of over ninety cameramen assembled for the occasion, then watched three of the Elephants, 'Dilberta', 'Thi', and 'Mya', taking their daily bath. Leaving the Elephant Paddock over a bridge, most expertly constructed by a detachment of the Assault Pioneer Platoon from 3rd Battalion, The Royal Anglian Regiment, Her Majesty walked to the Penguin Pool where she met Mr Berthold Lubetkin, the architect of the Grade I listed structure. The Queen then opened the Lifewatch Centre and expressed sympathy with the conservation message so graphically portrayed.

His Royal Highness in the meantime had been touring the Animal Hospital where he showed considerable knowledge in discussing two of the animals under treatment, an Abdim Stork and an Indian Python. Haematology, Molecular and Population Genetics and Partula Snails were next on the Duke's itinerary, the last being the subjects of an extensive graphics display in the Giraffe House. Prince Philip's tour of the Institute of Zoology enabled the Society to demonstrate how its scientists are involved in conservation projects around the world, many in association with the World Wide Fund for Nature, of which His Royal Highness is President.

Her Majesty concluded her tour of the grounds by presenting prizes to the winners in a Schools' Art Competition organised by the Education Department. With the theme of endangered animals in the Collection, some 14 local schools participated. The overall prize-winner received a framed certificate and the adoption of an Elephant. She also featured on the front page of the following morning's 'Times'. This chapter of the visit was expertly compèred by Mr Rolf Harris, the TV personality. All the entries in the competition were displayed in the Zoo for the following few days to allow parents and other pupils the opportunity to judge for themselves. Both The Queen and Prince Philip then toured a small pavilion, located on the Members' Lawn, featuring Whipsnade Wild Animal Park. The highlight of this was undoubtedly the freeflying of a Scarlet Macaw.

Tea was served in the Regency Suite where Her Majesty and His Royal Highness were introduced to Development Trustees, benefactors and civic dignitaries. In a short speech, the President reminded The Queen that as Patron, her visit was continuing a long tradition of the Royal Family's association with the Society. As a memento of the visit, Her Majesty was presented with a photograph album featuring previous royal visits.

1. Introduction

The most enjoyable event of the year was the honour and excitement of The Queen and Prince Philip visiting London Zoo in May. The most important constitutional matter was the recognition by Council that the benefits of the Government-inspired changes introduced only two years ago, would not come to fruition before the £10 million grant had been spent. In the meantime, the day-to-day activities of London Zoo, Whipsnade Wild Animal Park, the Institute of Zoology and the Learned Society continued, attracting as always over one and a half million visitors and their share of media attention.

At the invitation of The Rt Hon The Lord Mayor of London, the Society held a reception at the Mansion House in November. A comprehensive exhibition was mounted to illustrate the scientific achievements of the Society from its foundation to the present day.

On 21 June, Prince William celebrated his birthday with a visit to the Insect House. The Prince and Princess of Wales joined the party later.

Later in the year, whilst His Majesty King Hussein of Jordan was in London discussing the Gulf crisis, his two younger children visited the Zoo.

2. Securing the Society's Future

The depressed economic situation which, despite valiant efforts of the Development Trust, affected the Society's capacity to meet the £2 million fundraising target for the year, coupled with the continuing and increasingly demanding Health and Safety requirements, persuaded the Board of Zoo Operations Limited to recommend to Council that an immediate strategic review be undertaken of all the Society's activities. The recommendations were further influenced by the continued erosion of the Society's financial assets due in part to attendance levels at London remaining static.

Following discussion with the Department of the Environment, McKinsey & Company Inc. were selected to undertake the study. McKinsey provided their entire services *pro bono publico*. Their report recommended *inter alia* that a Core Group be established to prepare detailed plans to secure the future but priority had to be given the means to avoid the Society sinking into bankruptcy. The Core Group, consisting of the Executive Directors, Secretary, Treasurer and two Vice-Presidents, Mrs P Herbert and Mr John Knowles, was chaired by Sir Alfred Shepperd, the former Chairman and Chief Executive of Wellcome plc. Other key points in the McKinsey study were that the diversity of many of the Society's activities created a picture of confused purpose in the minds of both the public and the staff; that the Society should decide on an unambiguous mission and objectives and that all its activities should relate directly to those objectives and should be clearly seen to be relevant to them. The management of the Society should be so arranged as to pursue the mission and objectives without deflection. Finally, that the mission should be chosen with sufficient public relevance, and therefore interest, and be adequately communicated. McKinsey's view was that if the above points were addressed then resources could be found from a number of sectors in the community. The Core Group met weekly. It produced in late March a series of options, including proposals for moderate development coupled with some retrenchment at London Zoo, which formed the basis for discussion with Government.

3. Attendance Levels

The 1990/1991 season was a difficult one for the leisure industry in general. The bad weather over Easter followed by hot and humid weather during the main summer weeks, combined with the economic recession, had adverse effects on most attractions' attendances, particularly in the capital. Given the economic climate, the successes achieved by London and Whipsnade were considerable. The downward trend in visitors to London Zoo was stopped with last year's visitor numbers retained and at Whipsnade the percentage growth in visitor numbers over the past year was a major achievement, unlikely to be beaten by any other major tourist attraction.

4. The Society's Notable Visitors

Mrs Angela Rumbold, the former Minister of State, Department of Education and Science, visited the Zoo to discuss the adverse effects of the recent Education Act, and Professor Bill Stewart, the newly appointed Chief Scientific Adviser to the Cabinet, saw something of the work of the Institute during his visit last October. Members of the Select Committee for the Environment were entertained to lunch by Officers of the Society in February and then inspected the Animal Hospital, showing considerable interest in the Society's Conservation Biology programme. Visits to the Zoo were also made by the Japanese Ambassador and the Chinese Ambassador, the latter being in connection with the announcement later in the year that Pandas were once again to return to London Zoo.

5. Persons associated with the Society

The Right Honourable Michael Heseltine resigned from the Board of Zoo Operations Limited on his appointment to the Government as Secretary of State for the Environment, and Councillor David Weeks, a Non-Executive Director of the Board, was appointed Leader of Westminster City Council in succession to Dame Shirley Porter. Mr Ashley Stephenson, the Bailiff of the Royal Parks, and a good friend of the Society, retired in July. Mr Berthold Lubetkin, a supporter of the Society for many years and the architect of the world-famous Penguin Pool, died in October. The Thirties Society held a party at the Penguin Pool in December in celebration of his life.

6. Personnel

Staff movements involved the appointment of a new Head of Education and a new Director of the Development Trust replaced Lady Park, who had unfortunately to retire on health grounds. Increasing domestic responsibilities forced Dr Georgina Mace to retire as Head of the Conservation Biology Group. Other retirements include Mr Joe McCorry and Mr David Ball, two stalwarts at London Zoo whose aggregated service was 88 years.

7. Conditions of Service

The staff employed in the Institute, Publications Department and Library continued to have their pay determined by reference to outside analogues, whereas all staff employed by Zoo Operations Ltd benefited from implementation of a major job evaluation exercise. A performance appraisal scheme was also introduced, the aim being eventually to link pay increments to performance. Both initiatives were developed by a Joint Working Party consisting of management and union representatives.

8. Management Matters

A value for money audit was undertaken in the Maintenance Department at London Zoo. The outcome was a reduction in the size of the work force reflecting the new policy of only retaining in-house staff sufficient to meet routine maintenance requirements, all other tasks being contracted out. We are indebted to Sir Robert McAlpine & Son Limited, who have been principal contractors in the African Aviary and Clore Pavilion refurbishment schemes. Visitor reception services at London Zoo were moved to the Main Entrance complex so permitting closure at weekends of the Main Office.

9. The Fellowship

Two Fellows' Days were held during the year. The first at Whipsnade in April was attended by thirty-nine Fellows and their guests. The second was held to coincide with the Annual General Meeting and fifty-three Fellows took advantage of the special arrangements which included lunch.

10. The Council

Council met eight times during the year. Two of the meetings were held solely to consider the McKinsey report and one meeting was held at Whipsnade. The average attendance throughout the year was 70%.

An amended set of rules governing use of the library was introduced and the Standing Orders were revised in order to safeguard the position regarding disposal of assets. A policy statement on the study of animals in the Society's care was approved.

A Mission Statement emphasizing the Society's conservation role was adopted and is set out at the front of this Report.

ANNUAL GENERAL MEETING

The Annual General Meeting was held on 25 September 1990 with the President, Professor N A Mitchison, in the Chair.

In accordance with Article 10 of the Charter and Byelaw 25, the following Fellows retired as Ordinary Members of the Council: Sir John Ackroyd and Mr B C Owens (Ordinary Fellows); Professor R J Berry and Mr A J Stevens (Scientific Fellows). Professor R M Anderson also retired from Council.

In accordance with Article 11 of the Charter and Byelaw 26, the following Fellows were elected Members of Council: Lord Clinton-Davis and Sir Alcon Copisarow (Ordinary Fellows); Professor P A Jewell, Mr Anthony Smith and Lord Walton of Detchant (Scientific Fellows).

The President presented the following awards for contributions to zoology:

The Prince Philip Prize (awarded for an account of practical work involving some aspect of animal biology, by a pupil under 19 years of age of a school in the United Kingdom) to *Miss Jennifer Smiles*, of the Lindsey School, Cleethorpes, for her essay 'A behavioural study of the whip-scorpion'.

The Thomas Henry Huxley Award (for original work submitted as a doctoral thesis) to *Dr C S Davies*, of Imperial College, University of London, for her thesis 'In vitro assay of hydroxynaphthoquinones against the liver stages of *Plasmodium*'.

The Stamford Raffles Award (awarded to an amateur zoologist for distinguished contributions to zoology) to *Major K W England*, for contributions to the taxonomy of sea-anemones.

The Scientific Medal (awarded to persons under 40 years of age for distinguished work in zoology) to *Dr James C Smith*, of the MRC National Institute for Medical Research at Mill Hill, for his work on early embryonic development.

The President also announced the award of **The Zoological Society of London Frink Medal for British Zoologists** (for significant and original contributions by professional zoologists to the development of zoology in its wider implications) to *Professor J Maynard Smith, FRS*, of the University of Sussex, for contributions to the theory of evolutionary biology, behavioural ecology and population genetics.

Certificates of Honorary Fellowship were presented to *Professor Knut Schmidt-Nielsen*,

J B Duke Professor of Physiology, Duke University, Durham, North Carolina, and *Professor John Zachary Young, FRS*, Emeritus Professor of Anatomy in the University of London.

OBITUARIES

The Council records with deep regret the deaths of Sir Eric Smith, Life Scientific Fellow and former member of Council and the Awards Committee; Professor Angus d'Albini Bellairs, Scientific Fellow, the Society's Honorary Herpetologist, Emeritus Professor of Vertebrate Morphology at London University and member of the Awards Committee; Professor Sir Alan Parkes, Scientific Fellow, former Professor of the Physiology of Reproduction at Cambridge University and former member of the Breeding Policy Committee; Dr Ralph Neal, Chairman of the Zoological Record Editorial Board; Mr William Timym, Ordinary Fellow and sculptor, best known for his sculpture of Guy the Gorilla; HG Sally, Duchess of Westminster, Ordinary Fellow; Dame Violet Dickson, Ordinary Fellow; Mr Harold Nixon, Associate and former President of the British Association of Paediatric Surgeons. Berthold Lubetkin, the Russian born architect, who died last October, was responsible, through the Tecton group, for the design of several buildings of which the Penguin Pool, the original Gorilla House, and North Gate Kiosk (Refreshment Bar) remain at London Zoo, together with the Elephant House, Restaurant (Hall Farm) and the two houses at Whipsnade.

MEMBERSHIP

At the end of the subscription year (31 December 1990) there were 2,218 Fellows (1,066 Ordinary, 1,082 Scientific, 30 Honorary and 40 Corresponding Members) and 2,760 Associates, including 164 Student Associates.

STAFF

At 31 March 1991 there were 95 full time staff employed by the Society and 316 by Zoo Operations Limited.

Many months of hard work by a Joint Working Party bore fruit with the implementation of a new simplified pay and grading system based on a comprehensive job evaluation covering all ZOL staff below Board level. A multiplicity of unrelated grades under which some staff enjoyed guaranteed incremental progression while the majority remained on flat rates, regardless of experience or effort, has now been replaced by ten new grades each of which provides for incremental pro-

gression dependent on performance appraisal.

The Working Party also devised the appraisal system, which came into effect in March 1991, following training of all managers and supervisors and a series of open meetings at which appraisal was explained to staff.

In accordance with well established practice, staff throughout the Society and the Company were kept informed of developments by means of monthly team briefings, regular meetings of the Joint Consultative Committee, by departmental meetings and via the management information sheet known as 'Zewsflash'.

In London some cost savings were achieved by reductions in the maintenance labour force and, in the Institute of Zoology, by the closure of the Nutritional Biochemistry Unit. Further reorganisation and reductions were announced in March involving the Architect's, Works, Information and Design, and Personnel Departments and a number of posts were left unfilled.

Changes at senior level at London included the appointment of Mrs C Boroughs as Senior Personnel and Training Officer, Mr A Elischer as Development Director, Mr S Murtagh as Operations Manager, Mr B V Nutkins promoted to Visitor Operations Manager, Mrs S D Tunnicliffe as Head of Education, and Miss Alexandra Dixon as Conservation Officer.

Awards

The completion of twenty-five years service was recognised by the presentation of gold clocks or watches to Dr D E Bidwell, Dr G R Smith and Mr R R Smith.

In the examinations for the City & Guilds Certificate in Zoo Animal Management six candidates were successful. Ian Owtram (Keeper, Whipsnade) achieved double distinction and was awarded not only the Ashby prize from the Society but the City & Guilds Bronze Medal for best overall result nationally.

Departments and Retirements

Departures and retirements (years of service in brackets) included D J Ball (43) Assistant Curator of Reptiles; Mrs S Bevis (20) Assistant Librarian; T V Bradley (19) Boilerhouse Maintenance Mechanic; Professor M A Crawford (25) Head of Nutritional Biochemistry Unit; D J Ford (22) Gardening Chargehand; J P McCorry (45) Visitor Operations Manager; R D Poland (30) Services Supervisor; J Weatherhead (32) Head Keeper, Elephants, Whipsnade; R E Willis (36) Boilerhouse Maintenance Mechanic.

Obituaries

We regret to record the deaths of the following pensioners: W G Gardener, Mrs A D Jones, C Leach, V Sands, G Stanbridge, H W Styles, J Ward.

ACKNOWLEDGEMENTS

Council is particularly appreciative of the continuing help and support given by so many individuals and organisations, and by those Fellows who give their time and expertise to the various advisory committees. All enrich the work of the Society.

THE LONDON ZOO

Visitors during the year: 1,199,922

ANNUAL REPORT
1990 - 1991

THE COLLECTION

Mammals

Once again, Giant Pandas played an important part in the Department's activities, even though none was on show in London. In August, 'Tohui', the eldest female panda at the Chapultepec Zoo in Mexico City, gave birth to a healthy baby, fathered the previous February by 'Chia Chia', the London Zoo male. Mother and baby are in good health, as the photograph taken in January 1991 shows. For the 1991 breeding season, 'Chia Chia' is being run with the younger female 'Xiu Hua', in the hope that last year's success will be repeated.

In the Michael Sobell Pavilion for Apes and Monkeys, where 'Chia Chia' resided when he was in London, there have been many notable births, including Orang Utan, two female Chimpanzees, a male Lar Gibbon, a male

Reindeer to Father Christmas's grotto, were important features of the Christmas promotion, as was the special nativity-scene Meet-the-Animals involving animals mentioned in the Christmas gospel. A member of the Children's Zoo also maintains the UK Regional Studbook for Douroucouli.

The Clore Pavilion redevelopment, made possible by a generous donation from the Clore Foundation, is proceeding. The basement was closed in December 1990, emptied of animals, and is being completely rebuilt. A large proportion of the budget for this project will be used to develop new interpretative material. Of particular note in the Clore Pavilion this year has been the arrival of a colony of the very rare Rodriguez Fruit Bat, and significant births and arrivals of a variety of small forest mammals, including Grey Mouse and Fat-tailed Dwarf Lemurs, Slow and



'Tohui' and her cub 'Xin Xin' at Chapultepec Zoo

Mandrill, and a female Sulawesi Crested Macaque. Two young male Orang Utans have been sent to Sweden and Spain, and integrated into the European co-operative breeding programme.

In the Children's Zoo, the usual crop of births amongst the domestic animals has occurred, and the section has continued its year-round heavy involvement with public events, by providing saddle and pony-and-trap rides; these, together with the visits of the

Slender Lorises, and Senegal Bushbabies; studbooks for several of these are also maintained by staff of the Mammal Department.

As part of continued involvement in the breeding programme for Black Rhinoceros in captivity, several departures and arrivals have occurred, including the arrival of the young male 'Jos' from Dvur Kralove Zoo in Czechoslovakia as a mate for 'Rosie'; he is a little younger than she and it has taken some months for them to settle down together. Our



Rodriguez Fruit Bat, one of a colony in the Clore Pavilion

four young female Asian Elephants continue to delight the public, either exhibiting their skills as part of the training programme, or simply when enjoying themselves in their outdoor bath. 'Dilberta', the eldest, is now ten and sexually mature, and so plans are being made to send her away for mating; if this is successful, she will return to London to have the baby.

Various species of hoofstock have been moved to and from the Cotton Terraces, particularly in collaboration with Marwell, with whom many of the animals are jointly owned. Bongo, Greater Kudu, and Arabian Oryx have all arrived, and Okapi, Gaur, Bongo and Arabian Oryx have departed, all for genetic or demographic management purposes. The usual important births occurred on the Cotton Terraces during the year, including Giraffe, Greater Kudu, Arabian Oryx, and the first Anoa born at London Zoo for 58 years.

On the Lion Terraces, a notable event was the arrival of two young male and two young female Asiatic Lions from the Sakkarbaug Zoo in India. Following the discovery that the majority of so-called Asiatic Lions in the North American population were actually hybrid, the captive-breeding programme for this highly endangered sub-species disintegrated. There are, however, likely to be significant numbers of surplus animals, because their last stronghold in the wild, the Gir Forest, can hold only limited numbers, and also because of the probable increase of captive-bred animals. We are particularly pleased, therefore, to have been the first in what we hope will become a re-invigorated captive-breeding programme of pure-bred Asiatic Lions. Work also continues on investigating the reproductive physiology and the techniques of artificial reproduction in Clouded Leopards, which are notoriously difficult to breed naturally, and also of Sumatran Tigers; European co-ordination of Sumatran Tiger captive breeding (EEP) is also undertaken by Mammal Department staff. A young female Ocelot was born during the year.

As usual, the Mammal Department has been involved in a variety of events designed to make the visitor's day at the Zoo more interesting, and also to give 'Lifewatch' members some of the extra activities that make membership worthwhile. Meet-the-Animals, Elephant Demonstrations, and Animal Encounters around the Zoo have proved extremely popular, enjoyed by both the public, who have the chance to learn about the animals and the people who look after them, and by the keepers who get the opportunity to explain what they do, and why they do it.

Birds

A series of outdoor rearing and holding aviaries adjacent to the Incubation and Rearing Unit on the North Bank, were completed early in the year. These aviaries, which were built with generous donations from a number of people, are designed to hold young birds being hand-reared until they are fully fledged and independent. The aviaries are holding areas and not permanent homes, and are a valuable addition to the Unit.

The results from the Unit, its first full year in operation, were good; 76% of fertile eggs artificially incubated hatched, and the rearing success would have been as high if there had not been an outbreak of an unidentified viral infection to which a number of chicks succumbed.

Generally eggs and/or chicks are not taken from the parent(s) unless there is a good reason, e.g. abandoned or neglected by

parent(s), excessive disturbance, if the species is rare and will relay, etc. Interesting and unusual examples of artificial incubation and successful hand-rearing were Pygmy Falcon, Red-crested Turaco, Kookaburra, Inca Tern and Stone Curlew.

The Black-footed Penguin colony increases each year and in 1990 twelve chicks were hand-reared. All were successfully assimilated into the colony where there are now second and third generation hand-reared individuals.

Parent-reared birds included Cattle Egrets, Abdim's Storks, Sacred Ibis, many ducks and pheasants, Demoiselle and Crowned Cranes, pigeons (Speckled and Crested), parakeets (Barraband, Princess of Wales', Quaker), Patagonian Conure, and a number of owls (Great Horned, Turkmenian Eagle, Kenya Eagle, Burrowing).

A Superb Glossy Starling was successfully hand-reared after being neglected by its parents and surviving a major operation on its leg.

Over 100 birds were brought into the Collection, most were captive-bred, and were either presented or on loan or in exchange. A number were presented or placed on deposit by HM Customs and Excise after confiscation as illegal importations. Species of special interest included Eastern White Pelicans, a Brown Pelican, Night Herons, Scarlet Ibis, Temminck's and Satyr Tragopans, a Congo Peafowl, Ruffs, Inca Terns, Pin-tailed and Double-banded Sandgrouse, a Pennant's Parakeet, White-faced Scops Owls, a Rusty-barred Owl, a Yellow-billed Hornbill and a Fairy Bluebird.

A Chestnut-eared Aracari (a small toucan-like bird) which was stolen in April was returned a few weeks later by a member of the public who realised, after watching an appeal item on the TV programme 'Police 5', that she had in all innocence bought a stolen bird. Fortunately the bird is extremely tame and does not appear to have suffered from its enforced absence.

This year all the Chilean Flamingoes were examined and measured before they left their winter quarters. There is a significant difference in males and females in the length of the tarsus and, to a lesser extent, in the length of the middle toe. The measurements showed that the colony comprised 13 males and 24 females, and this is probably one of the main reasons why there has been no successful breeding in the last few years. More males are being obtained to try to equalise the sex ratio.

Departures included a number of individuals being sent to other collections as part of international or national cooperative management programmes: species included a

Bennett's Cassowary, Kiwi, Dalmatian Pelican and White-faced Scops Owls.

There was considerable re-landscaping and replanting to simulate particular habitats with especially good results in the owl, pheasant and parrot aviaries.

The most exciting event of the year was the completion of the African Aviary which was officially opened on 18 October by Professor David Bellamy. This refurbishment retains the essential style of the 1864 building designed by Anthony Salvin jr., whilst incorporating a technically innovative aviary which encloses realistic savannah-type habitats. Instead of the usual mesh there are barely visible barriers of single tensioned wires running horizontally across the hooped roof and vertically down the sides. The aviary is over 30.5 m long and has 1688 wires totalling over 15 miles. The wire is made of an alloy seven times stronger than ordinary mild steel, is 0.9 mm in diameter, and is held 31 mm apart.

Within the aviary there is a background of rock cliffs, a waterfall, interconnecting ponds, simulated baobab trees and a termite mound, and carefully sited African or African-look-alike plants. The aviary is separated into four enclosures by panels of thin, strong mesh discreetly hidden by the use of trees, shrubs and rocks. The enclosures contain a pair of



Anoa and calf, the first born at London Zoo for 58 years

Bateleur Eagles, colonies of Abdim's Storks and African Spoonbills, a pair of African Harrier Hawks, and a pair of Lappet-faced Vultures.

The extensive graphics present information on Birds of Prey, African savannah, and on the species in the Aviary. They also emphasise the necessity for the conservation of habitats particularly those areas such as African savannah, which are under threat from a multitude of dangers.

A most successful Bird Department Open Evening took place on 19 July when guests could see and hear of the wide-ranging activities of the department. Over £100 was raised for the National Federation of Zoos' Bali Mynah appeal.

Reptile House

Staff of the Reptile House continue to work closely with HM Customs concerning the identification of live reptiles and their products following possible illegal importations. To highlight the effects of this type of trade on

natural populations of reptiles, an exhibit has been incorporated into the new Encounter Area in the Reptile House. Using colour graphics, video and working models, this Encounter Area offers a unique opportunity to find out more about reptiles, and is aided by regular demonstrations by the Reptile House staff, using live snakes and lizards.

Notable acquisitions during the period included Sri Lankan, Central Asian and Red Spitting Cobras, Mangrove Pit Vipers, East African Saw-scaled Vipers and Frog-eyed Sand Geckos. Four juvenile, captive-bred Chinese Alligators were obtained from the New York Zoological Society and a number of British reptiles came on breeding loan from the Forestry Commission. Close contact with a number of Australian zoos has allowed the acquisition of several unusual species, including Blue Ring Python and Pacific Boa. Most of these animals will be used for co-operative breeding efforts, although we continue to work closely with a number of researchers specialising in studies of snake venom.

The adult Chinese Alligators were observed mating and subsequently 17 eggs (unfortunately infertile) was discovered. This is, however, a hopeful sign of potential future breeding success. Species bred during the year included Fat-tailed, Leopard Ground and Namib Sand Geckos, Five-lined and Eyed Skinks, Plumed Basilisk, Eyed Lizards, Californian King Snakes and Malayan Pit Vipers.

During the course of the year the 'Teenage Mutant Turtle' craze involved the Reptile House in providing a great deal of advice directly to the public and via the media concerning the general unsuitability of freshwater terrapins as pets. Hatchling terrapins are imported into the UK in tens of thousands each year (mainly from the USA), and few survive longer than a year. Furthermore, they may carry an organism capable of causing food poisoning in humans, and if the terrapin does survive it often grows too large for a small home aquarium.

Under the auspices of the Joint Management of Species Group, the Reptile Joint Management Group met at London Zoo where members were updated on UK husbandry techniques and breeding achievements. Of particular interest was the apparent role of Vitamin D3 supplements in achieving successful breeding results with a number of species at other zoos, and trials are now under way at London to investigate this further.

In addition to the excellent colour graphics which are now installed throughout the Reptile House, several large displays have



been completely refurbished and many others improved and upgraded. Such renovations take place after a great deal of thought by Reptile House staff so that the final result not only looks appealing and interesting to the Zoo visitors, and can be easily serviced by the keepers, but (most importantly) also provides a natural habitat for the reptiles.

Aquarium

While the majority of the fish exhibited in the Aquarium are available from captive-bred sources, each year well over 30 species held here breed on show or in special tanks in off-show areas. In order to permit a more active role in the conservation by captive propagation of rare fish, colonies of two species which are thought to be extinct in the wild have been obtained. *Haplochromis ischmaeli* is a cichlid from Lake Victoria (Africa), and is one of the many fish from that lake which are thought to have been driven to extinction by the combined effects of over-fishing and introduced predators. A small group of these fish was obtained from the Horniman Museum (London) where they are also being bred. A colony of *Xiphophorus couchianus* was obtained from a private breeder. This Central American livebearer is also thought to be extinct in the wild, although there are plans to re-introduce it to protected areas in its former range.

Staff of the Aquarium now routinely record additions and losses to the fish collection in a seven-column format, and it is hoped that the provision of a computer system by IBM will permit the incorporation of this and other information into a relational database in the near future.

The early part of 1990 saw an unusually



Hand-reared Pygmy Falcon at six weeks of age



The Slender Loris 'Boris' at one week old, successfully hand-reared

large number of marine turtle strandings on the south and west shores of the British Isles. At least 10 juvenile Loggerhead Turtles were stranded at various locations, and one of these turtles was brought to London Zoo in an extremely debilitated condition. However, it responded well to treatment and was eventually released off the Azores along with four other UK strandings. These animals were probably carried to these waters by unusual currents and/or storms and without assistance would surely have perished.

Improvement to the exhibits included a new tank for Conger Eels, a modified tank for the three Hawksbill Turtles, and a splash-tank specially designed to simulate the turbulent conditions on a north-east Atlantic rocky seashore. Additional split-level exhibits (with above and below water viewing) added variety to the displays throughout the Aquarium.

Trials with gelatin-based artificial diets have produced encouraging results in the treatment of a bacterial disease, and also in the colour-enhancement of a number of marine fish species.

Following their illegal importation, a group of South American Poison Arrow Frogs were donated to the Aquarium by HM Customs. During the early part of 1991 these animals bred, which is the first time this species has been bred at London Zoo. A similar first was the breeding of Trinidad Stream Frogs in a mixed exhibit in the Invertebrate House.

Staff of the Aquarium contributed to a number of conferences including an international Symposium organised by the British Small Animal Veterinary Association, and the Fisheries Society of the British Isles. The second issue of 'Fish', the newsletter of the IUCN Freshwater Fish Specialist Group, was



Professor David Bellamy at the opening of the African Aviary

prepared at London Zoo and attempts are under way to secure funding for the production of an Action Plan for the conservation of freshwater fish around the world. In October 1990 the Aquarium hosted the annual meeting of the European Union of Aquarium Curators and over 100 delegates attended from Europe and North America.

Once again, the Aquarium proved to be a particularly popular venue for evening functions and parties, which is a useful additional source of income.

Invertebrate House

A considerable amount of press interest has centred around the Invertebrate House, its innovative displays and its wide-ranging conservation work. Media attention, including TV, radio and newspapers, continues to be drawn to the Zoo's efforts to save the Moorean Tree Snails (see below), its success in breeding Mexican Red-kneed Spiders and the need to control the sending of live invertebrates through the mail. As a result of lobbying by the Invertebrate House staff, the Post Office has agreed to confiscate any live invertebrates imported through the mail in an unsatisfactory manner. The Invertebrate House played a significant part in the Royal visit in May, and also participated in displays on invertebrate conservation at a Royal Society meeting in London and at the Mansion House Reception. Following on from the London Zoo

expedition to the South Atlantic island of St Helena (to seek the Giant Earwig), the Proceedings of a symposium held at Regent's Park to consider the value and conservation importance of this unique island have now been published and were co-edited by staff of the Invertebrate House.

The high level of interest in invertebrates has undoubtedly helped fund-raising efforts. A donation of £5,000 allowed the installation of a visitor-operated camera system above the Leaf-cutter Ant display, which is the first time this type of equipment has been used at London Zoo. A second major donation (of £18,000 over three years) has permitted the purchase of essential equipment (including environmental chambers) for the culture of endangered invertebrates, and computer hardware for the development of an in-house database on invertebrate husbandry and related breeding projects.

Studies on the moulting and behaviour of Robber Crabs continues, and a second group of two species of New Zealand Wetas was obtained to further investigations of the captive management of these rare and endangered insects. The Invertebrate House is playing a significant rôle in a joint programme (with the Nature Conservancy Council and Imperial College, London) to establish a captive population of the endangered Wart Biter Cricket, with a view to a re-introduction programme in southern England. Significant breeding successes included Italian Ground Beetles and Dung-rolling Beetles, which may be the first time that the latter species has been bred in a zoo.



Young Loggerhead Turtle, treated in the Aquarium and eventually released

Improved graphics (especially in the walk-through butterfly area) and public viewing windows into the butterfly rearing and tropical breeding rooms, are among the display improvements in the Invertebrate House.

London Zoo's involvement in the international programme to save the Moorean Tree Snails from extinction increased still

further following the arrival of a fourth species from a colony at the University of Nottingham. The husbandry techniques employed for these snails is under close scrutiny by staff of the Invertebrate House, and following discussions with other zoos a number of modifications have been made. Despite the fact that the overall trends for populations here are downward, we hope that full analysis of our data as well as information from other collections, will soon reverse this situation.

OPERATIONS DEPARTMENT

Zoo Hospitality

The catering concessionaire continued to promote banqueting and conference facilities at the Zoo by attending trade fairs and exhibitions, such as the World Trade Fair and Entertain '91. With the imminent introduction of new food handling legislation, training of appropriate staff was undertaken by those senior staff who had obtained the Environmental Health Officers' Food Handling Certificate. A complete analysis of all product ranges was undertaken with the result that several new items were introduced. Annual turnover exceeded £2.4 million, which represented a 23% increase in average spend. Visitor catering facilities were upgraded, the most notable being the transformation of the serving and dining area of the coffee shop in the heart of the Zoo into the Victorian-themed Regent Cafe.



Italian Ground Beetle, a breeding success

Retail

The shop at London Zoo enjoyed a 16% real increase in spending, despite the adverse affects of the recession. The Gift Shop continued to set an example to other leisure operators and retailers and extremely complimentary remarks were received with regard to the variety and types of products display



Plumed Basilisk bred in the Reptile House

themes and general professionalism. The main shop proved as popular an attraction as ever with its unique decor and special effects.

Visitor Operations

The policy of allocating considerable resources to maintaining the grounds free of litter continued, many visitors making favourable comment.

The retirement of the Visitor Operations Manager in June and the recently introduced legislation regarding the maintenance of a register on the use of hazardous substances meant a re-organisation within the Department.

Additional clerical help has been provided to monitor all Health and Safety matters, so permitting the managers to spend more time in the grounds.

Gardens

There was a significant increase in overall gardening standards despite the Gardens department being under-staffed for most of the year. Floral displays at the Main Entrance, along with a sub-tropical planting of a large wooden planter significantly enhanced the approach and entrance to London Zoo. In Barclay Court, eight Phoenix Palms were spaced around the fountain, complementing the atmosphere created in Raffles and the Gift Shop.

The range of plant varieties grown continued to increase with special attention being

given to the half-hardy perennials. Two species of banana did particularly well out of doors during the summer.

Information and Design

The decline of the African Elephant and the contribution of the Society towards securing a future for this species in Kenya were subjects of an exhibition produced for the Elephant House. To match both the scale of the subject and the architecture of the building, large photographic panels were suspended from the ceiling so that visitors walk among them as they might a path in the bush. Models and moving lights were used to illustrate how elephants are tracked using satellites. A video



Some of the works on show at the Society's art exhibition

and computer have been installed to show details of research and movements of individual elephants.

Many other aspects of the Society's work in animal care and conservation were featured in an exhibition opened in the Lifewatch Centre, previously the Zoo Shop.

New interpretation was provided throughout the Reptile House involving approximately 100 information panels. These follow a series of themes developed by the Unit jointly with the staff of the Reptile House and Education Department. The old Giant Tortoise enclosure has been transformed into an interactive area where visitors can examine specimens, learn about the hazards of keeping reptiles in captivity, discover the effects of snake bite and even test their reactions against those of a striking and spitting cobra.

Interpretative panels in the new African Aviary utilised the system proposed for all the

Zoo's outside enclosures. The materials used were chosen carefully to survive years of exposure to the rigours of the British climate. Large panels introduce the theme of each area with smaller modular and interchangeable panels being used for each species.

Two important temporary exhibitions were prepared during the year. An art exhibition in the Raes Restaurant featured paintings by a wide range of artists including Savery, Agasse, Tickell, Wolf, Henry Jones and Grisot. This unprecedented occasion allowed work from the Society's collection to be shown that has seldom been seen by the public. In addition there were paintings by artists whose work is used to illustrate the information panels on the animal enclosures.

To celebrate the work of the Institute of Zoology, in a reception held at the Mansion House last November, 100 large illustrated panels were produced and arranged so that research workers and members of the Library and the Education Department could demonstrate and discuss with visitors practical aspects of their work. Other sections were concerned with proposed new developments for both London and Whipsnade.

The Unit continued to provide a design, print and signage service for other sections of the Zoo and in particular produced a range of materials for the visit of HM The Queen and for the various special promotions during the school holidays.

Building and Services

The 1990/1991 Season has largely been one of consolidation and reflection, with the completion and opening of the new African Aviary as its highlight. This project, which included the complete refurbishment of the original 1864 Anthony Salvin Junior (1827-1881) Eastern Aviary, with bird holding areas and keepers' quarters, the erection of a new tensioned wire structure, and naturally landscaped aviaries, was successfully opened on 18 October 1990. As usual, the opportunity was taken to increase the space devoted to individual species, and four new open aviaries replaced the original ten, rather cramped, ones.

Other projects started in 1990 include a major refurbishment scheme for the Clore Pavilion and in the main gardens, a new pathway lighting project linking the Main Gate with Barclay Court was completed in time for the 1991 summer evening events, considerably extending and enhancing these occasions.

Minor works carried out included the erection of new banners at the Main Gate, and, with the Works Department, the creation

of new Public Affairs Offices on the Ground Floor of the Main Office, the erection of a new Ice Cream Kiosk on the south side of Barclay Court and the new Koala Exhibit in the Old Ape Breeding Colony. The Works Department were also closely linked with the various exhibitions and events carried out throughout the year, in particular the Art Exhibition held in the Regent Building, the successful exhibition mounted at the Mansion House and the Christmas Event.

No major maintenance work was carried out during the earlier part of the year, but several projects started during 1991. These include work in the Clore Pavilion, which is being carried out at the same time as the general refurbishment, and the installation of a new emergency lighting and alarm system throughout the Regent Building.

General maintenance items undertaken by the Works Department included the installation of the replacement Rhino doors in the Elephant House, and a prototype sliding door operating rod in the South Block of the Sobell Pavilions, together with the usual roof and paving repairs.

Following demolition in the earlier storm, the Amphitheatre tent structure, was, after a rather stressful period, re-erected in time for the Queen's visit on 9 May 1990.

Owing to the extended dry weather last year, followed by a prolonged cold period in February, a greater number of breakdowns than normal were experienced in connection with the general services. In addition to fractured water mains, the Works Department had to tackle an electric cable fault and boiler breakdowns in the Aquarium.



The Mansion House reception. Aspects of the scientific work of the Society

WHIPSNADE WILD ANIMAL PARK

Visitors during the year: 472,852
Cars brought into the Park: 60,663

GENERAL

A combination of a co-ordinated marketing campaign, the fine summer weather and an increase in repeat visits resulting from customer satisfaction with the improved facilities, meant that Whipsnade had its best attendance in fifteen years. It showed a 27% increase (including Educational visits) on 1989/1990 and a 15% increase in revenue in catering and retail despite the difficult economic climate. These figures meant that Whipsnade was one of the most successful leisure attractions in terms of growth.

Of the items in the capital investment programme, the 'Run Wild' children's play area proved highly successful, and was opened for



The 'Run Wild' children's play area

Easter 1990. The Children's Farm was partly ready in time for August and was completed on schedule by the October half term. Also opened at Easter were the first of the two amphitheatres and the Lifewatch Centre. The latter was so successful that by the year end it accounted for 43% of total Lifewatch recruitment. The animal activities programme was particularly popular with the sealion demonstration and free flying birds' display earning very high visitor satisfaction ratings in the market research. Both have proved excellent methods for communicating conservation and educational messages whilst at the same time entertaining the Park's visitors.

On the 5 November 1990, the steam railway which had been operating under a concession in the Park for some 20 years, was purchased from the owner Pleasurerail Limited. The railway engines (four steam, two diesel), staff, equipment and track is now

wholly owned by the Society, and plans are in hand to utilise this unique asset for the benefit of the Park. We are indeed grateful to the directors of Pleasurerail Limited for agreeing to sell on terms advantageous to the Society.

The adoption of the new Whipsnade corporate identity has been very well received by visitor and staff alike. Manifesting itself in vehicle livery, signage and banners, it complements the rural estate atmosphere of the Park.

Further capital investment was undertaken during the winter, the major project being 'Tiger Falls'. This is a three and a half acre exhibit for Siberian Tigers on the site of the old Wolf Wood. Sixteen thousand cubic metres of earth were relandscaped and the display enhanced by a thirty foot waterfall which visitors will negotiate by crossing a rope suspension bridge. They will be able to look over the top of fencing at the tigers in their rock pool, and also enjoy nose to nose contact with these magnificent animals, separated by a few millimetres of toughened glass. The Wolves have been relocated to a spacious two acre site between the Giraffe house and the Chimpanzees who have been given an additional acre and a half outdoor enclosure utilising relatively inexpensive electric fencing. The latter two projects were opened to the public for Easter 1991, 'Tiger Falls' was officially opened by HRH The Prince Edward on the 23 May 1991, on the occasion of the Park's Diamond Jubilee.

While much has been achieved in improving the exhibits, the public areas have not been neglected. The Farm Shop and Duck Island next to the new Children's Farm were opened at Christmas and initial trading results were encouraging. In addition, a new 'Railway Shop' and a face painting photographic parlour opened for the 1991 season. The purchase back of the Catering Contract from Allied Lyons Limited proved a wise move and in the first year generated substantial revenue. Further improvements planned include the Café on the Lake in order to capitalise on the anticipated success of 'Tiger Falls'. Conference facilities are being upgraded and the toilets in the banqueting suite have been refurbished.

A start has been made on the graphics programme. Fifteen 6 foot x 4 foot interpretative boards were commissioned, the first four were erected in the Park for Easter 1991, the quality of the artwork receiving favourable comment. In addition, audio-taped information has been installed at the Sealion and White Rhino houses with more planned at the Tiger, Chimpanzee, Elephant and Giraffe displays. Further information is disseminated to the public by a taped commentary on the



The new Children's Farm

'Trail Breaker' road train and live commentary on the steam railway is now a regular feature.

Market research of visitors during 1990 showed:

- (a) 93% rated the Park good value for money.
- (b) 97% rated the Park better than expected.
- (c) 94% would recommend a visit to others.
- (d) 96% rated the Run Wild Play Centre as a much needed amenity.
- (e) 100% liked Meet the Animals.
- (f) 43% said that apart from watching animals, there was lots to do.
- (g) 98% rated Teddy Bear 1990 as good as the previous year.
- (h) 100% liked the World of Sealions.
- (i) 95% liked the Discovery Centre.
- (j) 87% liked the Birds of Prey.

THE COLLECTION

More than 55 species of mammal, bird and reptile were bred successfully this year, 22 of which were rare or endangered species. Examples were a male and female White Rhinoceros and two Red-crowned Cranes.

Although there has been a reduction in the number of species kept at Whipsnade, the most recent departures being the Peccary and Guanaco, there were a number of additions during the year. These included the Golden Lion Tamarin and West African Dwarf Crocodiles in the Discovery Centre, Bighorn Sheep from London, now living on Bison Hill, Nile Lechwe, the latter from the Sudanese swamps in Africa and not hitherto kept in the United Kingdom, and Scarlet Ibis. Two Chimpanzees were sent to South Africa and a pair of Siberian Tigers to India.

There were also various animal moves as part of co-operative breeding programmes with other institutions both in the UK and abroad. Among these were a Pygmy Hippo exchange with Barcelona in Spain, two Cheetahs which were sent to the National

Zoo in India, two Grevy's Zebra to Australia, an Indian Rhinoceros to Czechoslovakia as well as Przewalski's horses to and from collections in the UK.

Nineteen of the Humboldt's Penguins bred at Whipsnade were distributed elsewhere and five Cranes of three species were relocated. One Wattled Crane was sent to New York to introduce new blood to the United States stock, and two of the same species were received from the Natal Parks in South Africa. The need for successful captive breeding of this species of Crane is becoming urgent and Whipsnade is one of the few places where this has occurred. Regrettably, thefts of Psittacines continued with the loss of a Scarlet Macaw. Thieves broke through the perimeter fence leaving a hole through which five White Wallabies disappeared and were seen bouncing around the downs until caught during the following few days and returned to the Park.

Internal rearrangements of the Collection continue with significant changes in the Discovery Centre including a conservation video to enhance the main message of the Centre, that of habitat and conservation.



Belted Galloway calf in the Children's Farm

The European Bison were relocated to the European region and the Père David's deer to the Asian area, both species benefiting from new housing. The Crane breeding area was moved and new pen systems installed enabling a greater number of birds to be kept. This area is adjacent to where the Great Bustard are kept and eventually incubation facilities



Indian Rhinoceros at Whipsnade



Pygmy Hippo

will service both projects. The Vultures were moved from their old netted aviary to an open exhibit and have settled well.

The general policy to upgrade older facilities at Whipsnade continues with associated improvements in animal welfare. Each species is considered for its conservation value or educational importance and priorities identified to ensure that resources are not too thinly spread. For instance, bird breeding activities are now concentrated more on the Gruiformes (Cranes) and Sphenisciformes (Penguins) and less on the Galliformes (Pheasants) and Psittaciformes (Parrots). Other collections are better suited to the latter groups while the larger birds benefit from the greater space available at Whipsnade.

The Animal Activities and Encounters Programme was successful with particular interest and enjoyment shown by the public at the 'Meet the Animals' sessions. Close contact with the animals remains a highlight especially for children and the educational opportunities this allows are considerable. The Children's Farm was a success and most of the stock was obtained with the help of the Rare Breeds Survival Trust, including Shire Horses, a Red Poll Cow, Belted Galloway Cattle, Manx Loghtan, Lincoln and Wensleydale Longwool and Hampshire Down Sheep and an Oxford Sandy & Black Pig.

Many years ago, before the Rare Breeds Survival Trust was established, significant numbers of rare domestic animals were kept at Whipsnade, and it is particularly gratifying to see the return of some of these old breeds.

Lady Park resigned as Director of the Development Trust in September due to ill health. During her time at London Zoo, Lady Park worked tirelessly on behalf of the Trust and her good humour and verve were very much appreciated. Prior to her departure from the Trust and in addition to her energetic approaches to various company chairmen, Lady Park successfully obtained funds from livery companies to support the conservation of rare books in the Library and funds from charitable foundations for the establishment of an Education Officer with special knowledge of the needs of disadvantaged children.

In September, Development Trustees hosted an exhibition of the Society's art collection. The event was sponsored by Mr Hugh Sykes, the Master Cutler of Sheffield. A display featuring the work of the Institute was mounted at the Mansion House in November and the Lord Mayor of London in his speech paid tribute to the prominence of the Society's contribution to scientific understanding and its unique and traditional role in the everyday life of London.

An appeal on behalf of the Society's proposed Insect House at London and Animal Breeding Centre at Whipsnade was broadcast by BBC TV in October but the response was disappointing with only £3,100 being received.

The number of trustees was reduced, in accordance with a recommendation from McKinseys but in order to retain their interest, Council resolved to create the new designation of 'Stamford Raffles Fellow'. This new category of membership would be awarded by Council in recognition of those Trustees, Fellows and friends who, by their efforts in support of the Society, deserved some formal recognition. The designation has no constitutional significance.

In the New Year, the Society appointed Tony Elischer as Director of Development. Under his guidance, many new opportunities for fundraising within the Society were identified and the whole fundraising base was broadened in order to realise the full potential of the Society's major assets. The Director's priorities are to develop an integrated structure for development work and, in close co-operation with the marketing department, he sees many opportunities for exploring new ways of generating funds.

The Society's consolidated operating deficit for the year is £4.58 million compared with the operating deficit for the previous year of £4.7 million.

A government Grant for the year totalled £1.38 million, being the annual revenue grant towards the costs of the Institute of Zoology.

After accounting for this grant and investment income, the deficit for the year is £2.08 million (previous year £1.75 million). Transactions relating to individual funds are transferred to the appropriate fund, leaving a surplus on the General Fund only of £0.45 million. The General Fund balance brought forward at 31 March 1990 of £0.5 million has been increased to £0.96 million.

The total number of visitors to both Zoos is up by 3.9% over the corresponding financial year. Adjusting for the occurrence of the Easter weekends in the two years, there was a fall of 1.6%. Visitor attractions normally report numbers of visitors based on calendar years. In 1990 5.25% more visitors came to both Zoos, an increase at each, as compared with 1989. This was a fine achievement in a difficult economic climate and contrary to the experience of many of our competitors.

DONATIONS, GRANTS AND GIFTS

The Society wishes to express its thanks to all those who contributed to the general funds of the Society and its subsidiary Zoo Operations Ltd. In particular Dynamic Imaging Ltd donated £1,365 to the Comparative Physiology Group, Donald Forrester Charitable Trust donated £1,000 and the Kweller Charitable Trust £500.

The following legacies were received: £100,000 from the executors of the late Mrs Frances R Van Brunt of the United States of America; £9,225 from the executors of the late Miss Kate Louise Cockell; from the executors of the late Mrs A B Partridge a first distribution of £6,000 for research into avicultural diseases in memory of her husband William Partridge; a final distribution of £1,826 from the executors of the late D H Gollan; £500 from the executor of the late Thirza Underwood and from the executors of the later Mrs Hazel Clarke coupled with the name of her husband Patrick Clarke, both former members of the Society, £500.

A grant of £1,383,000 was received from the University of London for the core work of the Institute of Zoology. £827,000 was received from numerous research funding bodies to support specific research projects of the Institute.

The Marsh Christian Trust undertook to provide a grant of up to £500 annually for three years, to be divided among the recipients of certain of the Society's awards.

The advertising agency Messrs Lowe Howard-Spink, was appointed by Zoo Operations Limited with the brief to develop a set of brand identities for London Zoo and Whipsnade Wild Animal Park, which would complement the aims and objectives of the Society. A television advertising campaign, on London Weekend Television, used the technique of animated clay animals in promoting London Zoo as the place to experience close encounters with a wide range of animals. Whipsnade was portrayed as the country home, in the Chilterns, of the Zoological Society of London, in an area of outstanding natural beauty where visitors enjoy the opportunity of seeing groups of animals living in natural settings. Market research into the effectiveness of these advertisements revealed satisfactory ratings.

New information leaflets highlighting events and facilities were produced for London Zoo and Whipsnade, and were widely distributed through the market catchment areas and at consumer fairs and exhibitions.

'Encounter', a joint newsletter from London and Whipsnade, was established specifically for the travel industry and is distributed three times a year. Manuals and advertisements were developed and direct mailings to travel and consumer groups were initiated. Key travel trade shows attended included the World Travel Market at Olympia, Excursions '91 held at Wembley, and MOOT held at the NEC, Birmingham. Whipsnade staff also attended numerous county shows and trade fairs. Specialist advertisements were placed in the educational press to promote the benefits of the programmes at London and Whipsnade.

Familiarisation days were held at London Zoo for tour and coach operators, the Society of the Golden Keys (the association of London Hotel hall porters), British Tourist Authority executives, the Guild of Guide Lecturers and members of BITOA (British Incoming Tour Operators Association). The tourist press was targeted by means of press releases and several articles in the press, and details were also provided of the various discount schemes and other programmes. The Zoo was featured by British Airways as part of the video-entertainment on all in-coming flights in July. A successful campaign was run with London taxi drivers, the aim being to increase their awareness of the value of the Zoo as a visitor attraction.

Whipsnade continued to develop greater recognition in the Bedfordshire area, becoming a founder member of the South Bedfordshire Tourism Association, and the Society is most grateful for the continuing

support given by the local tourist board and council. The introduction of the 'Hop on Stopper' bus which serves the local community and displays the Whipsnade corporate identity, together with the numerous brown and white tourist road signs, has served to heighten awareness of the Park.

Special events at Whipsnade included an Easter weekend spectacular, an experience Africa month, a steam weekend to coincide with Father's Day, a conservation weekend and a major 'Teddy Bear '90' event held during the August bank holiday. At London, a special event based around the Koalas, took place at Easter 1990, in conjunction with Scholler Biscuits. Particularly popular were the Christmas promotions which at Whipsnade featured the Christmas animals and a visit to Father Christmas in his grotto while London staged a living nativity scene in the Hummingbird Amphitheatre.

The volunteers at both London and Whipsnade continue to provide invaluable help and support and the Society remains indebted to them and to the ladies who assist with the programme of Lunchtime Lectures held at London Zoo.

The media gave extensive coverage during the year and the press, radio and television all regularly reported the Society's activities. A 'Times' special report was produced to celebrate the visit to London Zoo by Her Majesty The Queen and His Royal Highness The Duke of Edinburgh. The 'Times' continued to give considerable attention to the Society, discussing both research projects and financial prospects. The 'Sunday Express', 'Sunday Mirror' and 'Woman' Magazine, ran features on the work of the Veterinary department and the breeding programme involving the Giant Panda 'Chia Chia'. The media also covered the speech by Professor David Bellamy on the occasion of the opening of the new African Aviary, when he stressed the importance of habitat-led exhibits.

The effects on the animals of the hot summer weather attracted interest from many national newspapers which also featured stories about some unusual invertebrates, the difficulties of keeping exotic pets and the hand-rearing of animals, particularly 'Boris' the Slender Loris.

Zoo staff made numerous visits to the studios of TV am, and footage was shown on BBC 'Newsround', BBC 'Tomorrow's World' and BBC 'Horizon'; Channel 4 put out five one hour programmes 'As it Happens' on the daily running of the Zoo.

The many joint activities with other charities and companies at London Zoo were also reported and a special press event with the

Conservation Foundation to launch 'Acorn 1990' was organised with the Rt Hon Michael Heseltine planting the first acorn. This event coincided with the Prime Minister's announcement of her impending resignation and consequently brought a huge international media presence to the Zoo, keen to question Mr Heseltine on his political intentions.

Whipsnade maintained excellent relations with the media, and highlights of the year were included in 'Boom', a new Channel 4 programme co-presented by Jane Pardoe, a Whipsnade employee. There was extensive coverage in the local and national press which included numerous new birth and arrival stories, and the captive breeding programmes with the 'Two Yaks to Turkey' story gaining extensive national coverage.

licensed London taxi drivers association for a number of joint promotions.

'Lifewatch' exhibited at the Alexandra Palace Garden Show in April, the Green Show at Birmingham in June, and at the Festival of the Earth at the Natural History Museum in August. Good coverage was given by national and local newspapers and items from 'Lifewatch' magazine were picked up by several papers. The series of special events for 'Lifewatch' members were well attended, with the close-up visits in individual animal houses proving very popular.

The Adopt an Animal scheme continued to be a valuable source of income, generating some £185,000 of revenue, an increase of 18% against the target figure. The many adopters, particularly of London Zoo animals,

London Zoo and Whipsnade Wild Animal Park Visitor Satisfaction Survey

Question	Wave 1 26/27/28 May* London Whipsnade		Wave 2 14/15/17 July London Whipsnade		Wave 3 25/26/27 August* London Whipsnade	
	Visit better or as good as expected (percentage)	78	96	86	87	92
Would recommend a visit to a friend (percentage)	82	91	85	91	87	94
Visit represented very good or good value for money (percentage)	—	—	85	92	90	93
Length of stay (in hours)	4.06	4.51	3.87	4.2	4.18	4.84

*Bank holiday

Source: Feedback Market Research 1990

Whipsnade Curator and Veterinary Officer, Richard Kock, was involved in the project known as 'Out of the Blue', which aims to create a new home in a Caribbean sanctuary for Dolphins formerly captive in Britain. This important work has drawn favourable attention to the Park and to the Society.

Considerable market research was carried out during the year and the table above shows the results of the survey.

At the end of its first year, 'Lifewatch', the Zoological Society of London's conservation orientated scheme, had attracted more than 15,000 members. Of these, 57% were recruited at London Zoo and 43% at Whipsnade Wild Animal Park. During the first year, 'Lifewatch' teamed up with Harvey Nichols, Watch, the Natural History Museum, and the

secured considerable attention for the scheme during the year. Children's television star Andy Crane helped on the in-store promotion at Harvey Nichols, Barry McGuigan named and adopted a newly born Arabian Oryx, Anthony Hopkins continued to support a Penguin, Capital Radio's Neil Fox adopted an Orang-utan, and television personality Adrian Mills adopted a Penguin. Adrian, with other celebrities including Henry Cooper and Steve Davis joined company supporters of the scheme, such as Suzuki, who continue their generous adoption of 'Rosie' our hand reared Black Rhino. Numerous magazines, national papers and local radio featured the scheme for Christmas and St Valentine's Day presents. The Society is much indebted to those whose generosity sponsors so many animals.

PROGRAMMES FOR SCHOOLS AND COLLEGES

Following an extensive programme advertised through direct mailing, the numbers of students attending both departments showed a significant increase. The programme offered was wide ranging, from the facility to have a guided tour with a specially trained volunteer or member of staff, through interactive sessions with non-living material for primary children, and illustrated talks and discussions, particularly at A-level standard. This year the A-level sessions were offered on specified days only – a system which worked well. The most popular topics were: Classification, Primates, Homeostasis and Social Behaviour. Plans are being made to produce learning packages to encourage the students to become involved in field work at the Zoo on topics such as Behaviour, Genetics, Classification and Animal Enrichment Activities. There was an increasing number of visits from initial teacher training students studying biological topics and science.

Attendances at various programmes

	London	Whipsnade	Total
Children			
Primary	33,007	13,164	46,171
Secondary	10,548	4,188	14,736
A Level	4,169	—	4,169
Total	47,724	17,352	65,076
Adults	6,800	2,921	9,721
Total	54,524	20,273	74,797

The Discovery Centre at London Zoo was opened, providing children with the opportunity to apply physical science principles to animals and the work was reinforced by focusing their attention on animals in the collection. Whipsnade was invited to run twilight courses in conjunction with the Bedfordshire Primary Science and Technology Centre. Links with local teachers' centres were maintained and courses offered at both centres were 'Processes of Life', 'Conservation' and 'Grouping Animals'.

Eighty-five students were placed at London to gain work experience. They worked in areas ranging from secretarial work to that of junior Keepers and veterinary students. The department established links with a number of colleges, particularly Regent's College and the American University in London. Three students were seconded on a day a week basis, working on specific assignments as part of their degree work within the area of biological education.

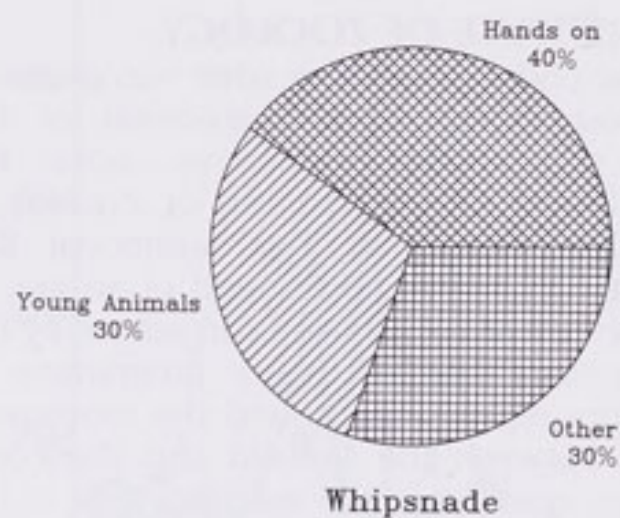
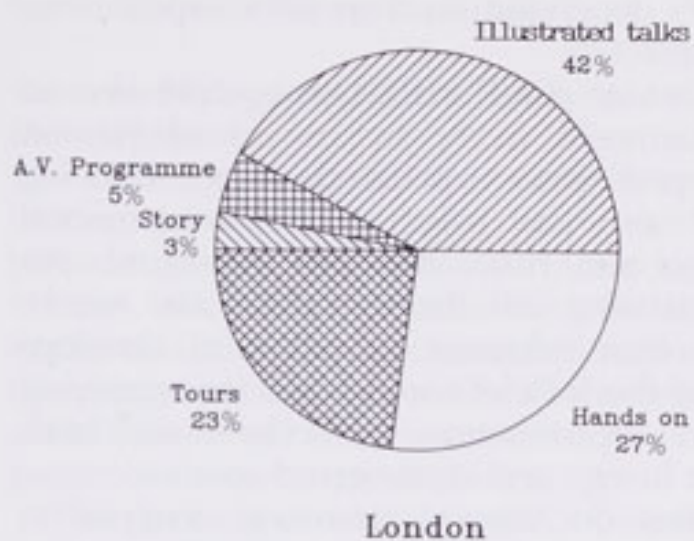
The department continued to prepare students for the City and Guilds Animal Management Course and was gratified that Ian Owtram, a Keeper at Whipsnade, was awarded the Society's Ashby Prize and the City and Guilds Bronze Medal.

At Whipsnade, the programme included Come and Touch sessions for younger children. Discussions and illustrated talks on topics such as Conservation, Animal Grouping, Movement, Colour and Pattern were developed. Secondary students requested in particular Conservation, Rain Forests, Diversification and notably there was an increased awareness by Geography departments to the potential of a visit to Whipsnade to extend their students' educational experiences.

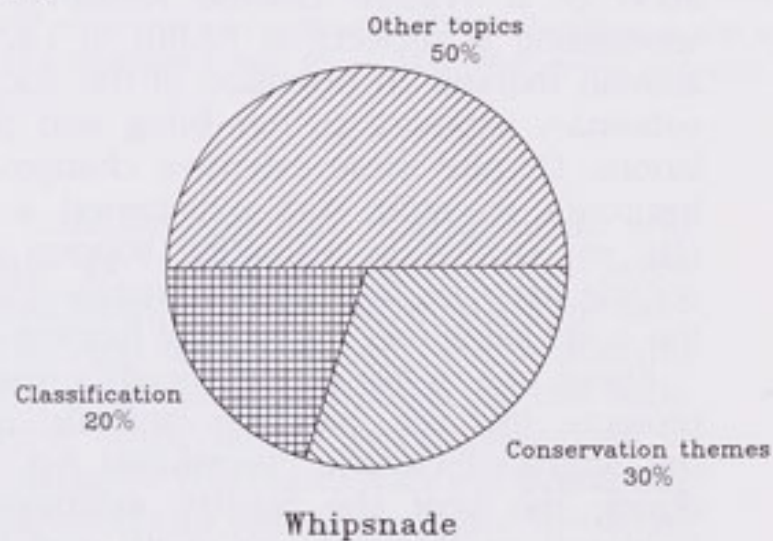
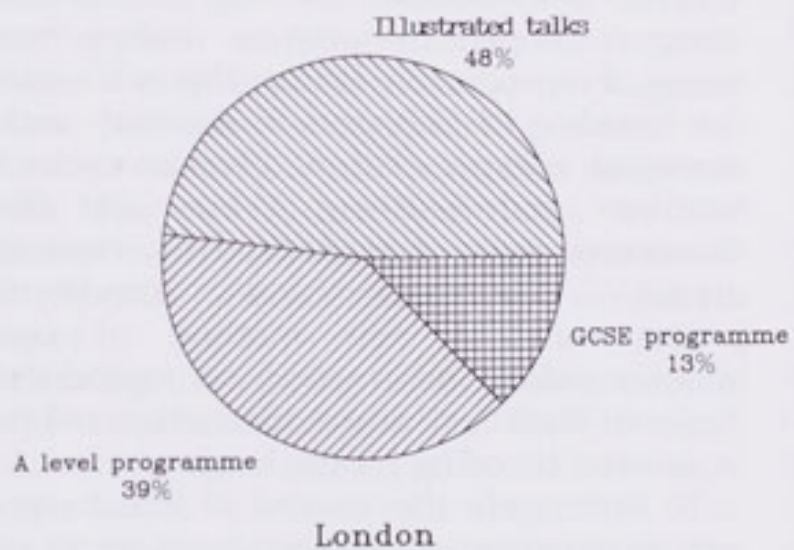
VOLUNTEER ACTIVITIES

There were on average 153 volunteers at London and 60 at Whipsnade. They staffed the Christmas events at both locations which without their tremendous contribution would have been almost impossible to stage. A small group worked with the Royal National Institute for the Blind in developing opportunities for the visually impaired visitor. Volunteers also helped sort the archive material in preparation for the Whipsnade Jubilee Exhibition and recorded the commentary to be used on the Steam Train. A working party has developed a puppet theatre which will be held in the Children's Farm and one volunteer designed and made a Whipsnade Alphabet sheets for young children. Touch tables were staffed at local exhibitions and events as part of the marketing thrust. Tours were given as requested on a range of topics.

PRIMARY



SECONDARY



Preferred educational programmes

RESEARCH

THE INSTITUTE OF ZOOLOGY

The year under review saw what was probably the most extensive re-organisation of the Society's scientific programme since the establishment of the Institute of Zoology in 1977. The closure of the Nutritional Biochemistry Unit marked the end of an era, as nutrition research had been carried out by the Society since 1965. A major programme of laboratory refurbishment, and the movement of staff between the Nuffield and Wellcome Buildings, resulted in the establishment in the Nuffield Building of possibly the largest group of reproductive biologists in the United Kingdom, with 16 post-doctoral staff in a single suite of modern laboratories. The initiation of a Wildlife Disease Research Unit specialising in aspects of health of UK wild animals marked an extension of the Society's veterinary expertise to free-living wild populations. Despite these extensive changes, the Institute's scientific staff maintained a high rate of success in attracting support from outside agencies, with approximately 33% of the costs being met by external funding.

About one in five of the Society's research projects involves handling animals under the Animals (Scientific Procedures) Act 1986; during the year the Society examined its approach to this work in depth and introduced a set of guidelines, limiting the severity of such procedures and establishing protocols for assessment by internal and external committees.

1990 also marked the establishment of a Postgraduate Veterinary Training Course in Wildlife Management. This course, which is expected to take students in mid-1991, aims to provide practical training in techniques of handling large animals to veterinarians and biologists involved in the management of wildlife in developing countries. The course will last for six months, between five and eight students being accommodated at any one time, and will be based at Whipsnade Wild Animal Park. The Institute continues to expand in other areas of postgraduate training, with 16 postgraduate students – the largest number ever – enrolled for PhDs. Although principally from the UK, this group includes students from Canada, Italy, Kenya, New Zealand, Nigeria and Paraguay.

REPRODUCTIVE BIOLOGY

Endocrinology

The role of growth factors, particularly Insulin-like Growth Factors I and II (IGF-I and IGF-II), in primate ovarian follicular development was investigated in cultured Marmoset granulosa

cells. The ability of such cells to respond to the IGFs depended on their prior exposure to oestradiol-17 β .

Studies on IGF-I and -II gene expression in the Marmoset ovary by means of human cDNA probes were initiated, emphasis being placed on the effect of developmental changes and how they are regulated. An understanding of the intrafollicular mechanisms that influence growth and development of the follicle is important for improving assisted reproduction techniques in both human beings and endangered species.

Studies on urinary hormone analysis in endangered species continued. The major urinary progesterone metabolite in Asian Elephants was identified by gas chromatography and mass spectrometry, and an enzyme immunoassay for this metabolite is being developed to facilitate routine monitoring of reproductive status. This will assist in the breeding of Elephants in captivity and in managed, wild populations. Ovarian cycles for Northern and Southern White and Black Rhinoceros were characterised by measuring urinary oestrogens and 20 α -dihydroprogesterone. A new method of faecal analysis yielded information on reproductive cycles in Blackbuck and Addax which will help in assisted breeding programmes.

To investigate the control of luteal regression in primates use was made of an *in vitro* system of human luteinised granulosa cells, one of two cell types present in the corpus luteum. The luteolytic agent prostaglandin F_{2 α} or its analogue cloprostenol, inhibited the stimulation of progesterone and cyclic AMP by luteinizing hormone (LH) or human chorionic gonadotrophin (hCG). Prior exposure of the cells to hCG prevented the subsequent anti-gonadotrophic action of cloprostenol. It is possible that such a mechanism enables the embryo to prevent luteal regression in early pregnancy. Investigation of intracellular mechanisms showed that cloprostenol inhibited the generation and action of cAMP via protein kinase C and cAMP phosphodiesterase. The role of these mechanisms is being investigated in luteal cells from the Marmoset Monkey.

The Marmoset corpus luteum produces high concentrations of the alpha-subunit of inhibin but not inhibin dimer. Plasma concentrations of alpha-inhibin increase significantly in early pregnancy four days before implantation. Marmoset chorionic gonadotrophin (mCG) could not be detected in the peripheral circulation until five days after implantation, raising the question of the role of mCG in the pre-implantation increase in alpha-inhibin. Recent results suggest that Marmoset embryo provides a stimulus on days seven to eight

post-ovulation that triggers an increase in luteal alpha-inhibin production.

Gamete Biology and Early Embryonic Development

The development of the early Marmoset embryo is of interest as a model for other primate species. Fertilisation of Marmoset eggs in the laboratory provided access to pre-implantation embryos. Genomic imprinting in the primate was examined by determining the contribution of the maternal and paternal genomes to early development.

The removal of a single cell for biopsy from four- to eight-cell embryos led to the diagnosis of sex-linked hereditary diseases in human pre-implantation embryos. Efficient techniques for the analysis of the chromosomes of a single Mouse embryonic cell are being applied to the embryos of several species. It may soon be possible to diagnose disease (eg Down's syndrome) caused by chromosomal imbalance in human embryos at the four-cell stage. Fluorescent *in situ* hybridisation to the X and Y chromosomes will improve the detection of sex-linked diseases.

Following the cloning of a cDNA encoding bovine trophoblast interferon, the principal antiluteolytic signal produced by the developing blastocyst in ruminants, the cDNA has been transfected into eukaryotic cells for production in tissue culture. This technique should offer a means for investigating the activation of trophoblast interferon gene transcription early in blastocyst development, and the cessation of its transcription about 10 days later. In addition it should provide a source of pure trophoblast interferon for studies of interferon-receptor interactions. This work is expected to lead to a better understanding of the factors controlling blastocyst growth following extra-specific transfer of blastocysts of rare species to surrogate mothers, a method for the promulgation of rare species which is increasingly utilised but ill-understood.

Mechanisms of injury in individual spermatozoa during cryopreservation were investigated with the cryomicroscope installed in 1990. This instrument was also used to determine optimal freezing techniques for Marmoset and Mouse spermatozoa. Sperm motility was assessed by computerized image analysis, a new automatic technique having been developed. A collaborative study of artificial insemination in ungulates was made. Three Scimitar-horned Oryx were inseminated in November 1990 with frozen semen imported from Dvur Kralove Zoo (Czechoslovakia), but the outcome is as yet unknown.

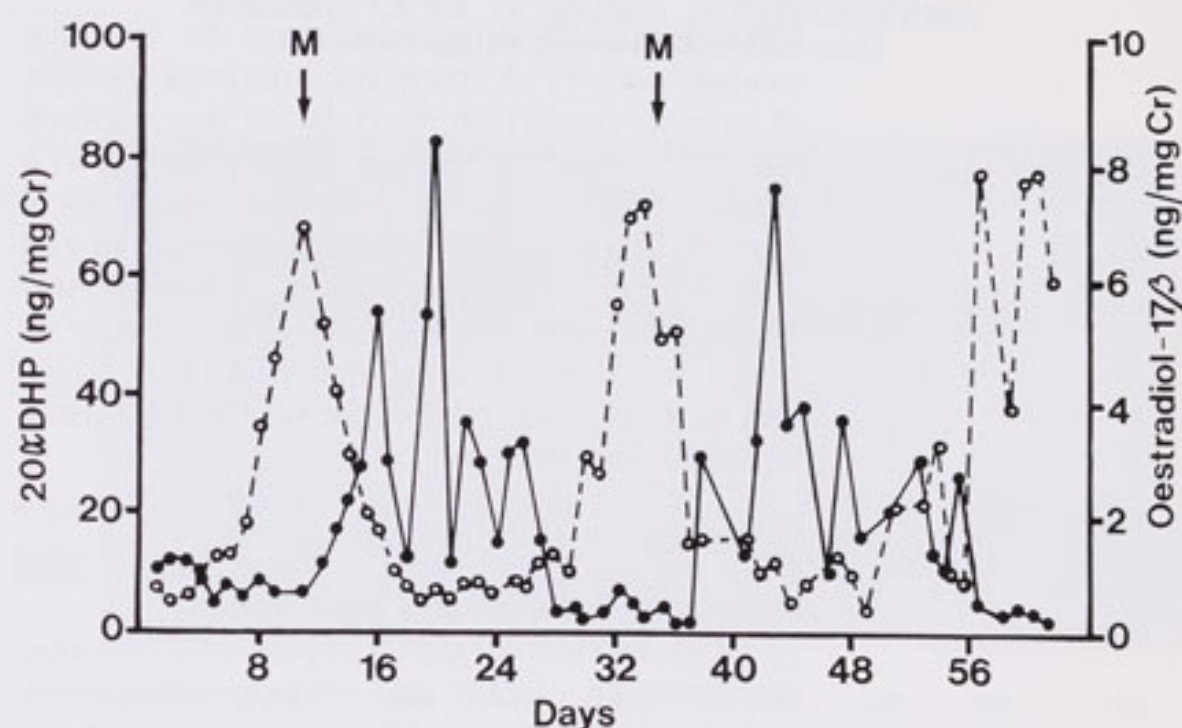


Fig. 1 Pattern of excretion of the urinary hormones 20 α -dihydroprogesterone (20 α -DHP; solid line) and oestradiol-17 β (dashed line) during successive oestrous cycles in a Northern White Rhinoceros. The arrows represent the times of observed mating (M).

To improve genetic management and breeding of Sumatran Tigers, eggs were collected from females synchronised for oestrus. The eggs were fertilised *in vitro* and the resulting embryos were cultured to the early blastocyst stage before being preserved in liquid nitrogen. The blastocysts will eventually be transferred to a suitable recipient Sumatran or Siberian female Tiger.

Studies on the nature of sperm-egg recognition in mammals were advanced by the identification of a complementary DNA encoding an acrosomal protein concerned in the binding of the spermatozoon to the outer case of the egg (zona pellucida). Synthetic peptides generated from the deduced amino acid sequence were effective in inhibiting human sperm-egg attachment. Thus a fully characterized molecule on the surface of the human spermatozoon has now been implicated in fertilisation, a finding that may eventually lead to new methods of birth control.

Physiological ecology

Studies in Bennett's Wallaby gave information on the sites of melatonin binding in the brain of developing young. This work, together with investigations on the prolactin secretory mechanisms, gave insight into the establishment of seasonal rhythms of reproduction in animals in early life.

In Red Deer the role of the time of day in the occurrence of oestrus and ovulation was elucidated. Advances were made in the induction of ovulation and in understanding the timing of the hormonal and behavioural events necessary for artificial insemination.

Ultrasound scanning was used to monitor ovarian activity. A study was made of the role of ovarian steroids in modulating the seasonal metabolic rhythms that occur at puberty. In a study of the role of hormones and local growth factors in hair growth by means of cell culture and molecular biological techniques, androgens were shown to bind selectively to cells from the mane area of Red Deer stags. This work should throw light on the hormonal control of growth.

GENETICS

Molecular Genetics in Conservation

Techniques established to improve the genetic management of rare and endangered species included multilocus DNA fingerprinting, a valuable tool for pedigree analysis and for maximising outbreeding in small populations. Fingerprint studies for captive groups of Arabian Oryx and Mauritius Pink Pigeon are in

progress, and locus-specific minisatellite probes are being isolated for population studies. Human single locus probes were tested in a number of primate species, results being obtainable from DNA isolated from hair. Samples were collected for a fingerprint study of the genetic structure of the Society's large breeding colony of Abdim Storks. Relationships determined by genetic analysis will be compared with those suggested by previous behavioural observations.

A search for sex-chromosome specific DNA probes for monomorphic birds was initiated with a view to avoiding the difficulties often encountered with karyotyping or laparoscopy. A 'DNA bank' from a wide range of species is constantly being expanded with the collaboration of the Veterinary Science Group.

Collaborative studies with the Reproductive Biology Group on the role of insulin-like growth factors in follicular maturation and on cloning Marmoset β -chorionic gonadotrophin were also initiated.



Fig. 2 DNA fingerprints of the Mauritius Pink Pigeon. Blood samples were collected from captive birds at Jersey Zoo and DNA was extracted for fingerprinting. Individuals were compared, and the number of bands shared correlated with their level of relationship. Using this information, how birds are related to each other can be predicted with greater accuracy than previously possible. UR = unrelated; 1st = first degree relative; 2nd = second degree relative.

Population Genetics

Two protein polymorphisms were studied in the Arabian Oryx to evaluate their usefulness as markers for population studies in captive herds. Lactate dehydrogenase and haemoglobin (Hb) were polymorphic at the B and β -loci respectively, but in juvenile Oryx care was necessary to distinguish fetal Hb and the 'fast' Hb variant. No protein polymorphisms were identified in a collaborative study of 22 loci in the Scarlet Tiger Moth. In a further collaborative study the glucose phosphate isomerase locus was successfully used as a marker to distinguish the Mesopotamian and European subspecies of Fallow Deer.

A chromosomal polymorphism was identified in Arabian Oryx and comparisons of gazelle karyotypes suggested that the subspecies Saudi Dorcas Gazelle should be given full species status.

Studies were initiated to test theoretical predictions about loss of genetic variability and extinction rates in small experimental populations of an African Satyrine Butterfly maintained over many generations.

Population analyses were made in collaboration with the studbook keepers for the world captive populations of White-winged Wood Duck and Waldrapp Ibis.

ANIMAL MANAGEMENT

Mammals

Regionally and internationally coordinated breeding programmes played an important

role in the management of captive populations of threatened species. Regional studbooks for Sulawesi Crested Macaques, Douroucoulis, Slow Loris, White-faced Saki Monkeys, South American Small Cats, Kudu and Asian Short-clawed Otters were maintained by keeper staff. International studbooks for Giant Panda and Mongoose Lemurs were also kept, and responsibility was taken for the management of European coordination on Sumatran Tigers and Golden Lion Tamarins. The Captive Breeding Action Plan for Rodents (IUCN/SSC) continued to develop.

The Curator of Mammals presented data at a Population Viability Analysis Workshop for Lion Tamarins at Belo Horizonte, Brazil in June 1990. Support was given to the distribution in Brazil of educational material highlighting the plight of Lion Tamarins, and to a survey of Golden-headed Lion Tamarin habitat in southern Bahia.

Birds

Further baseline data were obtained on the environmental requirements of eggs being artificially incubated and on the techniques of hand-rearing. Holding pens were erected adjacent to the Incubation and Rearing Unit on the North Bank (Regent's Park).

There was continued collaboration with Dr Marian Stamp Dawkins of the Animal Behaviour Research Group at Oxford and with M Sullivan, a postgraduate student, for his studies on the behaviour of free-ranging Red Junglefowl at Whipsnade.

Studies on the breeding behaviour of Peafowl at Whipsnade were continued by Drs Marion Petrie and T Halliday of the Open University.

Behavioural Enrichment

Work continued on the enrichment and consequent improvement of zoo animal environments. Various behavioural enrichment devices and techniques (eg insect dispensers, puzzle feeders, naturalistic food presentation, temporal changes in enclosures, auditory stimulatory changes) were developed, their effects being measured and statistically evaluated.

Whipsnade

Student projects included the design of a tropical hall, and a behavioural study of the herd of Scimitar-horned Oryx, the main conclusion of which was that dominance in females was not age related but depended on size and horn structure.

Arabian Oryx β -globin polymorphism (globins separated before electrophoresis)

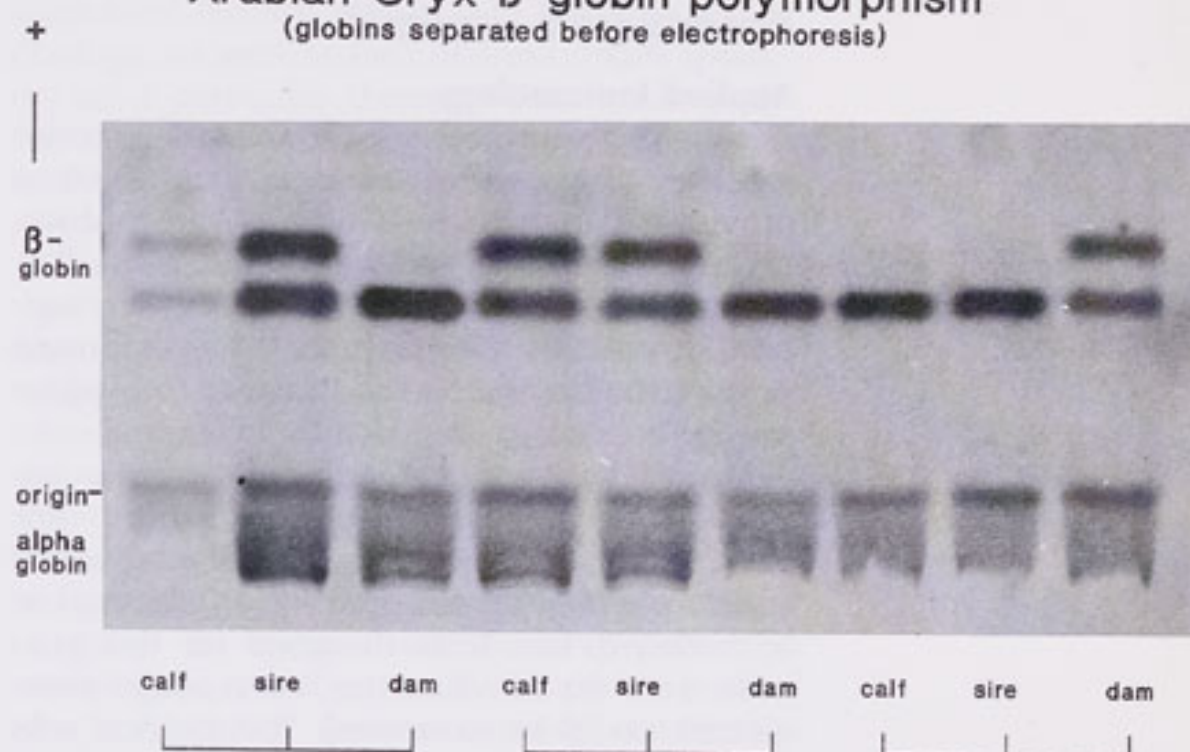


Fig. 3 There are two types (allelic products) of β -globin in Arabian Oryx, either or both of which can be inherited genetically. By separating the globins (from a small blood sample) in an electric field, followed by staining, it is possible to determine which type(s) are carried by individuals. Proteins (like β -globin) which have more than one natural form (i.e. are polymorphic) can be used as genetic markers for parentage and lineage.

Conservation Projects Overseas

The Society continued to manage the King Khalid Wildlife Research Centre at Thumamah on behalf of the National Commission for Wildlife Conservation and Development in Saudi Arabia. Work on the physiology, genetics and reproductive biology of gazelles expanded into two projects aimed at re-establishing viable populations of Idmi in the Special Ibex Reserve at Howtah Bani Tanim and of Rheem at Mahazat As Said.

Dr R A Brett, seconded to the Kenya Wildlife Service, continued his work on the protection and management of Kenya's 400 or so Black Rhinoceros. A second project, undertaken on behalf of the Kenya Wildlife Service and in collaboration with the World Wide Fund for Nature and the Gallmann Memorial Foundation, is concerned with the management of Elephants on the Laikipia Plateau in a way which reconciles their needs with those of local people. The herds, which represent the second biggest remaining population in Kenya, travel extensively but little is known about their movements or the pressures they face. Satellite collars as well as conventional radio tracking are being used to collect data.

Under the auspices of IUCN, the World Conservation Union, a technical evaluation of the Tamaraw Conservation Project in the Philippines was produced for the Philippine Government. Other projects were concerned with the reintroduction of Arabian Oryx in Saudi Arabia, Oman and Jordan, and of Addax and Scimitar-horned Oryx in Niger and Tunisia.

COMPARATIVE MEDICINE

Applied Immunology

A simple colour test which showed promise for the diagnosis of malaria was given a provisional trial in the Gambia, West Africa. Improved versions will be tried out in East African and Thailand. This work was supported by the UK Overseas Development Administration and by the Program for Appropriate Technology and Health (USA).

Many diseases of Man and animals are transmitted by insects, and it is often important for disease control to know which insects are feeding on a particular mammal or bird. Easy-to-use tests designed for this purpose were so sensitive that even single mosquitoes could be examined. The method was used in various African countries, the USA and Cuba.

Development of methods for the assessment of vaccines designed to prevent pregnancy was supported by the World Health Organization.

Microbiology

Studies on necrobacillosis of animals continued. Six virulent ('type A') strains of *Fusobacterium necrophorum* were all strikingly susceptible to infectivity-enhancement by a wide range of bacterial species. Two strains of low virulence ('type B') were insusceptible.

Necrobacillosis is caused by contamination of small wounds with *F. necrophorum* excreted in the faeces. Infectivity-enhancement was used as the basis of a highly sensitive method for demonstrating faecal excretion of the organism. Studies made by this method suggested that only a small proportion of animals contaminate the environment with *F. necrophorum*. The factors that influence such contamination are now being examined. What proportion of animals of various types or species excrete type A organisms? When it occurs, is excretion intermittent or continuous? Is it related to age? How long does the organism persist in manure or litter?

F. necrophorum infections also occur in Man, but the precise relationship of human isolates to animal strains is uncertain. Human strains are now being tested for virulence and for their susceptibility to infectivity-enhancement.

WILDLIFE DISEASE RESEARCH

Relatively little is known about the incidence of diseases in free-living wild animals and about their impact on population dynamics. No agency bears special responsibility for



Fig. 4 Common Porpoise found stranded at Sea Palling Beach, Norfolk. Post-mortem examination revealed death from severe necropurulent pneumonia.

wildlife disease in Britain. The Wildlife Disease Research Unit was formed jointly by the Comparative Medicine and Veterinary Science Groups to undertake investigation and research, and to provide advice on diseases of wildlife.

Collaborative investigations into the causes of disease and mortality in sea mammals stranded around the coast of England and Wales began in September 1990, and research on avian botulism continued.

VETERINARY SCIENCE

Clinical Studies

The main objective was to develop techniques of wild animal husbandry and medicine through the routine veterinary care of the animals in the Society's Collections and of other wild animals (free-living and captive). Nutritional studies included investigations of the efficacy of oral supplementation with the novel vitamin E preparation tocopheryl polyethylene glycol 100 succinate for treating Black Rhinoceros and Grevy's Zebras, and measurement of voluntary food intake in snakes in relation to bodymass.

Medetomidine was a valuable addition to the range of agents available for chemical restraint. The efficacy and physiological effects of a medetomidine and ketamine mixture used to immobilise Sika Deer and other species for management and clinical purposes were measured.

Ultrasonography is increasingly used as an aid to diagnosis and with this in mind the normal ultrasound anatomy of the Marmoset Monkey and the Bosc Monitor was studied. Ultrasonography also proved valuable in monitoring ovarian activity in a variety of zoo ungulates.

In a collaborative study of Great Bustards at Whipsnade, poor breeding performance

appeared to be related to inadequate nutrition. There was a suggestion of seasonal fluctuation in appetite and weight. Two pelleted diets were successfully introduced.

Haematology

As in the past, a diagnostic service was provided for animals at Regent's Park and Whipsnade Wild Animal Park and from external sources. Haematological screening for avian tuberculosis, based on striking changes observed in the blood of infected Cranes at Whipsnade, is now being applied to birds at the Wildfowl and Wetlands Trust, Slimbridge.

The Haematology and Biochemistry Database, which now covers more than 500 wild species, is an important resource which has been used to develop a PC-based package entitled 'LYNX'. This provides haematological and plasma biochemical reference values for a wide range of mammals, birds and reptiles. LYNX is now available to all concerned in the health care and management of wild animals.

Pathology

An 18-month old Greater Kudu died of a spongiform encephalopathy in November, its mother having died of a similar disease the previous year. It is possible that the disease was transmitted from the dam, a mode of infection not previously recognised in spongiform encephalopathy of Bovids.

Avian malaria was diagnosed in a Black-footed Penguin that died in September, a similar case having occurred one year previously. These were the first cases seen in the Society's Collection for more than 40 years and they may have been associated with the recent hot summers and mild winters.

Two sibling Chimpanzees at Whipsnade had focal epithelial hyperplasia of the lips and oral mucosa, resembling papillomatosis in Man, a disease caused by a papilloma virus. A possible viral aetiology is being investigated.

A captive Bornean Small-toothed Palm Civet, the last anywhere other than Indonesia, died in June aged 14 years, from hepatocellular adenocarcinoma with pulmonary metastases.

SCIENTIFIC MEETINGS, SYMPOSIA AND SEMINARS

Eight Scientific Meetings were held during the year for Fellows and Associates of the Society, and their guests, and were also open to members of Lifewatch and to other people with an interest in the subject. As in previous years, the meetings included brief reports on additions to the animal collections and on

aspects of current research in the Institute of Zoology, as well as two or three main speakers on a particular theme. Attendances were encouraging, with the average of 65-70 at each meeting maintaining the levels of recent years.

The meeting in April 1990 was held on the theme 'Birds of the rain forests'; subsequent meetings covered 'Toxins, transmitters and evolution', 'Behavioural ecology of newts and salamanders', 'Animals and plants', 'Modern views of invertebrate relationships', 'Conservation all at sea?', 'New perspectives on Protozoa' and 'Red deer: a new look at their biology'. As in the past, the programme aimed to cover as wide a variety as possible of animal groups and research disciplines, and to offer subjects of general interest, sometimes with a more 'popular' presentation, at the June and December meetings. The Society is extremely grateful to all those whose suggestions and contributions ensured the success of the programme.

Two symposia were held during the year. The first, on 3-4 May 1990, was organised for the Society by Mr P S Meadows and Miss Azra Tufail of Glasgow University on 'The environmental impact of burrowing animals and animal burrows'. The second, on 4-5 September, was organised by Dr H D M Moore, Dr W V Holt and Dr G M Mace of the Institute of Zoology and Dr O A Ryder of the Center for Reproduction of Endangered Species, Zoological Society of San Diego, with the subject 'Biotechnology and the conservation of genetic diversity'. The proceedings of both meetings will be published in the series *Symposia of the Zoological Society of London*.

As previously, scientific seminars were held during the academic terms for Institute of Zoology staff and guests. The Society is grateful to all contributors to this seminar series.

PUBLICATIONS

Journal of Zoology

The *Journal of Zoology* is issued in monthly parts, four parts making up a volume of 700 pages. Volumes 220 Part 4, 221, 222 and 223 Parts 1-3 were published during the year, containing a total of 150 papers. These range over every branch of zoology and are submitted from all over the world by zoologists who appreciate the *Journal's* high editorial standards, broad interest and excellent quality of production. Enthusiastic comments of readers and contributors worldwide, from the USA to the USSR, from Bulgaria to Hong Kong, were noted at the display of publications included among the exhibits at the Society's Mansion House Reception in November.

The 150 papers published are selected from many more submitted, and in the major task of assessment the Editor is greatly indebted to all those who act as referees. Council wishes to express its thanks for the time and effort they so generously give.

The level of subscriptions remains stable, which is gratifying at a time of continuing reductions in library budgets. This year, however, the Society and Oxford University Press have decided to alter the method of accounting, from a cash to an accruals basis. Previously there was no material difference between the two bases but following the introduction of an improved system for subscription renewals, a large part of the income in respect of volumes produced in 1990 was included in the 1989–1990 accounts, with the result that this year, in contrast to preceding years, the *Journal* shows a deficit. Hereafter, the accruals basis will more accurately reflect profitability and avoid any possible future fluctuations in income due to variations in dates of the receipt of subscriptions.

Zoological Record

Volume 126, which covers literature received during the period July 1989 to June 1990, was published in December 1990 and the complete volume contains over 77,500 citations.

Indexing for Volume 127 is in progress but the availability of literature is giving cause for concern. Because of the present economic situation, many libraries, including the British Library at Boston Spa, have cancelled subscriptions to journals relevant to the *Record*, with the result that considerable efforts have had to be made in order to locate alternative sources of supply.

A new Document Control System was completed and incorporates the previously separate functions of the Serial Sources and Journal Control computer systems and the manual Book Control system. A new computer system to replace the microcomputer based system was introduced with the installation of a VAX 3400. This has already increased overall system reliability and a completely new system will eventually be developed.

Co-operation between BIOSIS and the Society has continued throughout the year to develop a more rapid and economical means of producing the *Nomenclator Zoologicus*. This compilation of generic names with bibliographical details is an essential work for taxonomists and librarians. It is hoped to bring it up to date with the publication of two volumes which together will contain references to some 70,000 names.

The Council of the Society joins with the Board of BIOSIS, in expressing thanks to the Director General for Science, Technology and Industry, at the British Library Document Supply Centre, Boston Spa, and to the Director of the British Museum (Natural History) for the assistance and support afforded to the staff of the *Zoological Record*.

International Zoo Yearbook

Volume 29 of the *International Zoo Yearbook* was published in December. Section 1, 'Horticulture in zoos', which included papers from the Ninth Conference of the International Association of Zoological Horticulture held in October 1989, received favourable comment from zoo managers, whose interests are usually more zoological than horticultural.

Section 1 of Volume 30, currently in preparation deals with 'Invertebrates in zoos', the first time the *Yearbook* has undertaken a special section on this huge group. The emphasis is mainly on land invertebrates; although comparatively few zoos display these animals, there is a rapidly growing interest in their conservation and there has been an enthusiastic response to requests for papers. As always, Section 2, 'New developments in the zoo world', covers a wide range of species, including papers on the rarely bred Amazilia Hummingbird and Red Bird of Paradise and the first breeding in captivity of a recently discovered species of Guenon.

The reference section includes the biennial list of zoos and aquaria of the world, the list of vertebrates bred in 1988 and 1989, the census of rare species in captivity at 1 January 1989 and 1990, and the summary of international studbooks and world registers.

The editor, P J S Olney, continues his work as international co-ordinator on the ever-expanding regional and international studbooks, which are an important contribution to co-operation worldwide.

LIBRARY

Throughout the year the Library provided a service to Fellows and Associates of the Society, to the staff of the Institute of Zoology, Zoo Operations Limited and the Zoological Society of London, and to members of the general public holding Reference Tickets or enquiring on the telephone. In addition the Library continued to play its part in the national library service by supplying loans and photocopies to other libraries.

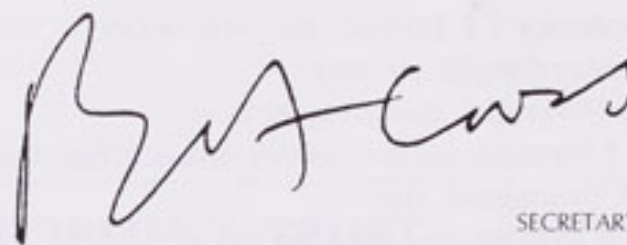
The Library's extensive collection of pictures and older illustrated books attracted a grant of £8,000 from the Getty Foundation to support conservation work on the collection.

The Society is also grateful to the Clothworkers' Foundation for a generous donation of £20,000 specifically for the use of the Library. This will be used to finance a programme of modernisation of the Library's services.

As always the Library owes a great deal to the generosity of its readers. Those who donated books during the year include: Mr D Bruce, Mr W Campbell, Mr B Coleman, Professor S B Day, Mr A Desmond, Dr N I

Diaz, Mr J Edwards, Mr J E Hill, Mr M I Kerzhner, Mr W Kourist, Dr I Rieger, Mr D Robinson, Mr G A Smith, Mrs T Thomson, Mr H Wade, Mr C Warwick, Mr G Wood, and the Trust for the Protection of Reptiles.

The Society also acknowledges its gratitude to Valezina, Lady Bolingbroke, the daughter of F W Frohawk, the animal artist, for her donation of two pictures by her father, of 'Sandy' the Orang Utan.



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*Journal of Zoology, Symposia, Nomenclator
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Research Associates: D R E Abayasekara, PhD;

Joanne E Hindle, PhD; Marie R Rodway, PhD

Senior Technicians: Daphne I Green, HNC, AISCt;

G Williams, MScT, HNC, LIBiol

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Marsden, BSc; Mary-Jo Searle, BSc

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Commander, BSc; Joanne E Hindle, BSc (until

30.9.1990); A E Michael, BSc;

Cheryl Niemuller-Hare, BSc

Gamete Biology

Zuckerman Research Fellow: H D M Moore,
PhD

Lalor Research Fellow: Caroline A Smith, PhD

JRF Research Fellow: D A Taggart, PhD

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5.10.1990); W V Holt, PhD; Leeanda J Wilton,

PhD

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C Piercy, BSc

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MSc; Isabel Lea, BSc; Vivienne S Marshall,

BAGriSc; Stella A Pelengaris, BSc; Linda M

Penfold, BSc; Tessa Smith, BSc

Physiological Ecology

Research Fellows: B R Brinklow, PhD;

A S I Loudon, PhD

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Yinka Fasawe, BSc; A G Hartley, BAGriSc;

Caroline Layram, OND; D G Thomas, BSc

Postgraduate Research Students: M J Heydon,

BSc (until 30.9.1990); Alison M Paterson, MSc

CONSERVATION BIOLOGY

(Georgina M Mace, DPhil – until 16.11.1990)

Molecular Genetics

Research Fellow: Helen J Stanley, PhD

Research Assistant: M W Bruford, BSc

Technician: Deborah K Seaman, HND

Population Genetics

Research Fellow: Georgina M Mace, DPhil (until
16.11.1990)

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Samour Hasbun, DVM, PhD; C R Thouless, BA, PhD

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C R Andrews, PhD

Curator (Whipsnade Wild Animal Park):

R A Kock, MA, VetMB, MRCVS

Honorary Research Fellows: A J E Cave, MD,

DSc, FRCS, FLS; Sir Cyril A Clarke, KBE, MD,

FRCP, FRS

Research Fellow: D Shepherdson, PhD**COMPARATIVE MEDICINE**

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Ekpedme Udom-Peter, MD

Microbiology*Research Fellow:* G R Smith, PhD, MRCVS, DVSM,

DipBact

Technician: Sarah A Barton, BSc*Postgraduate Research Student:* Nelly Ortiz

Rodriguez, DVM, MSc

Nutritional Biochemistry (Unit closed 30.9.1990)*Research Fellows:* M A Crawford, PhD;

Wendy Doyle, BA, DipDietetics

Research Associates: K Ghebremeskel, MSc, PhD;

A Phylactos, PhD

Senior Technician: G Williams, MScT, HNC, LIBiol*Postgraduate Research Student:* L S Harbige, BSc**WILDLIFE DISEASE RESEARCH**

(J K Kirkwood, BVSc, PhD, MRCVS and G R Smith, PhD, MRCVS, DVSM, DipBact)

Research Fellows: A A Cunningham, BVMS, MRCVS;

Christine M Hawkey, PhD; J K Kirkwood, BVSc,

PhD, MRCVS; G R Smith, PhD, MRCVS, DVSM, DipBact

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Gascoyne, BSc, VetMB, MRCVS; T Kuiken, DVM

Technicians: Sarah A Barton, BSc; Katharine

Thorpe, BSc; P Turp, HNC

Postgraduate Research Students: Nelly Ortiz

Rodriguez, DVM, MSc; Ekpedme Udom-Peter, MD

VETERINARY SCIENCE

(J K Kirkwood, BVSc, PhD, MRCVS)

Clinical Studies*Senior Veterinary Officer:* J K Kirkwood, BVSc, PhD, MRCVS*Honorary Research Fellows:* G H du Boulay, CBE, MB, BSM, FRCP, DMRD, FRCP; P Kertesz, BDS, LCS, RDS*Veterinary Officer (Whipsnade Wild Animal**Park):* R A Kock, MA, VetMB, MRCVS*Veterinary Officer (London):* Suzanne I Jackson,

BVMS, MRCVS

Veterinary Officer (Ultrasound):

A W Sainsbury, BVMS, MRCVS

*Veterinary House Surgeon (Whipsnade Wild**Animal Park):* J E F Barnett, BSc, BMVSc, MRCVS*Senior Technician:* A K Fitzgerald, VN*Technicians:* Alison J Beasey, BAgrSci;

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Meryl Lang; Giselle Talbot, VN

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LONDON ZOO

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Overseers: T B Kichenside; W A B James

Zoological Assistant: D J Shepherdson, PhD

Secretary: Miss E M Chaplin

Head Keepers

Elephant & Rhino Pavilion: B J Harman

Clore Pavilion: P J Rodway

Cotton Terraces: G S Asher

Children's Zoo: Mrs L S Walker

New Lion Terraces, Mappin Terraces:

D S Richardson

Sobell Pavilions for Apes & Monkeys:

M E Carman

Senior Keepers: M A Hennessy; R E Charter;

F Wheeler; J Nicklin; R M Dillingham;

J B Robson; K G Short; Miss A James;

M S Clark

Qualified Keepers

Mrs T Sheppard; J H Pullen; D S McGinnie;

Miss S K Christie

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A T Hallsworth; Miss M A Rawbone; J Buchan;

Miss L. Rusbridge; S Young; Miss J W

Ossowski; Miss D Walker; J Leng; Miss M D

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Secretary: Miss C C Kelly

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Bird House: A W James

Pheasantry & Ostrich House: A D Maskell

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Qualified Keeper

M Hegarty

Trainee Keepers

S J Bishop; K J Carroll; Miss A Ferguson; Miss E L

Wenman; Miss H M Mardon; J F Boyd

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Assistant Curator, Reptiles: D Ball, AIAT, MIBiol
(until September)

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Aquarium: B Harris

Reptiles: D J Risley

Insect House: P Pearce-Kelly

Senior Keepers

T W March; D Clarke; S J Matchett; M Robertson

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Chargehand: R J Pearce
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Chargehand: A E King
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 E A Wheeler; E J Bass; C F Humphries
First Aid Attendant: Miss G A Reay
Lodge Cleaner: Mrs B Shoboyede

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Car Park Attendant/Gatekeeper/Cashier: Miss L
 Lewis

WORKS DEPARTMENT

Maintenance Manager: R White
Maintenance Supervisor: M J Swallow
Electrical Supervisor: G Roden
Storekeeper: C P Major
Secretary: Mrs D Price
Building Craftsmen: R Tofield; A M Connolly;
 J C Froud; P D Bell; G W Stephenson;
 M Foster; T Sheehan
Handymen/Labourers: A Whitworth; J Baker;
 R Coles
Electricians: I Lekha; C G Rolfe; P Davies

WHIPSNADE WILD ANIMAL PARK

Chief Executive: A I C Forbes, MHCIMA
Projects Manager: O C Chamberlain
Operations Manager: C R Webster
Animal Activities Co-Ordinator: D Frank
Secretary to Projects & Operations Managers:
 Miss L Hughes
Cashiers/Wages Clerks: Mrs J Lee; Mrs S Smith
Accounts Clerk: Mrs C Davies
Receptionist/Clerks: Mrs J Heard; Mrs M Hull;
 Mrs S Chapman; L Bereton

WORKS DEPARTMENT

Clerk of Works: R Raft
Foreman: G Guild
Building Craftsmen: G F Rayment; D Law;
 J Whinnett; J C Harrold; T Elliott; M Guild
Electrician: J A Hutton
Supplies Co-ordinator: A Latham

TRANSPORT

Foreman: D E Watson
Chargehand: M Shillingford
Drivers: D C Shipham; J E Baisbrown; J Bradley
Driver's Mate: J Barnard

ESTATE

Foreman: P Clark
Estate Chargehand: A F Weston
Estate Worker: J Wright
Toilet Attendants: G Newman; Mrs V Bayliss
Cleaners: M Tilley; C Prentice; R A Bangs; R
 Wingate

GARDENERS

Foreman: W G Prentice
Gardeners: T Hignell; N G Read; A G Mowlem

ARBORICULTURE

Arboricultural Assistant: A Southern

GATEKEEPERS

Head Gatekeeper: Mrs P Clark
Senior Gatekeeper: H Jackson
Gatekeeper: J E Davis

RETAIL

Retail Controller: Mrs M White
Supervisor: Miss M Matthews

RAILWAY

Railway Manager: F Crawley
Asst. Railway Managers: Mrs A P Crawley;
Mrs E Short
Chief Engineer: R N Stanghan
Engineer: I Gordon

ANIMAL MANAGEMENT

Animal Manager & Veterinary Officer: R Kock,
MA, VetMB, MRCVS
Senior Secretary: Mrs G Hickman
Animal Records Clerk: Mrs C Datlen
Clerical Assistant: Miss D L Martin
Overseer (Asia): J Datlen
Head Keepers: C Bates; P J Williams
Overseer (Central): A White
Head Keepers: R G Wingate; L J Radford;
G Frost (Acting)
Overseer (Africa): V Curzon
Head Keepers: A W Billington; C Tack
Head Keeper Animal Activities: G Lucas

Senior Keepers

A E Morris; Miss M Spittel; K Taylor; M Lear;
R M Catchpole; J E Baines; J C Chapman;
T Moxey; J Lear; C D Wallbank; Mrs C Day

Qualified Keepers

Miss J Crabtree; I Owtram; M Best

Trainee Keepers

Miss L Waterhouse; F Smith; Miss J Pardoe;
M Brett; D Fisher; N Rogers; N Williams

Bird Show Organiser/Demonstrator: A Reeve

Assistant Falconer: G Mellor

CATERING DEPARTMENT

Food & Beverage Manager: L Killorn
Asst. Food & Beverage Manager: Miss L Tiarks
Senior Chef: P Sheridan
Assistant Chef: Miss D Nicholls
Catering Supervisor: Miss M Keeting
Senior Catering Assistant: Miss S Weir
General Catering Assistant: Miss Z Fitzpatrick
General Catering Assistant: Mrs M Grizzell

MARKETING DEPARTMENT

Marketing Manager: R Thomas
Marketing Executive: Mrs C Mulcaster
Marketing Assistant: Miss C Boys

EDUCATION

Senior Education Officer: Miss M L Williams, BSc,
PGCE
Education Officer: Mrs F K Grainger-Allen, BSc,
PGCE

THE VISIT TO LONDON ZOO BY THE QUEEN AND THE DUKE OF EDINBURGH

*The Queen and Prince Philip at
the Elephant Conservation exhibition with (L to R,
Richard Leakey, Kenyan High Commissioner Sally
Kosgei, Director of Zoos David Jones*



Her Majesty opens the Lifewatch Centre

*The Queen with the United States Ambassador
The Hon. Henry Catto*



The Queen and the President, Professor Mitchison, walking to the Elephant House at the commencement of the visit



Meeting 'Layang Layang' with Georgia King of St Paul's C E School, Westminster, winner of the art competition, Mr Rolf Harris and Keeper Lee Sambrook

The Duke of Edinburgh with Dr Christine Hawkey and Dr Peter Bennett discussing LYNX, the haematology and biochemistry database, developed in the Institute of Zoology for the health care of wild animals





In the Animal Hospital. Dr James Kirkwood, Senior Veterinary Officer, explains to Prince Philip the treatment of an Indian Python



The Queen with Chief Executive Andrew Forbes (L) and Veterinary Officer Richard Kock at the Whipsnade Wild Animal Park exhibition



The Queen and Prince Philip looking at a presentation album of photographs of previous royal visits



His Royal Highness meets David Frank and the Scarlet Macaw at the Whipsnade exhibition, with (L to R) The Secretary, Sir Barry Cross and Veterinary Officer Richard Kock



Her Majesty watches the Elephants' daily bath with (L to R) Overseer Bill James, Lord Peyton, Curator of Mammals Dr Jo Gipps, Managing Director Mr A Y Grant, The President, Head Keeper Brian Harman and Director of Zoos David Jones



A unique occasion. The President, Professor Mitchison (R), with three of his predecessors (L to R) Sir William Henderson, Lord Zuckerman, HRH The Duke of Edinburgh

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ANIMALS IN THE COLLECTIONS

column 1	Number of animals in the Collection at 1st January 1990.
column 2	Number of animals received in 1990 by presentation, exchange, purchase, or transfer between the Society's two Collections. The figures in brackets indicate animals which have been so transferred.
column 3	Number of animals born or hatched during 1990.
column 4	Number of animals which died in 1990 within 30 days of birth or hatching. The figures in brackets indicate animals born or hatched during December 1989 and which died during January 1990. Stillbirths are not included.
column 5	Number of animals which died from natural causes during 1990 apart from those included in column 4.
column 6	Number of animals disposed of in 1990 by presentation, exchange, deposit, sale, or transfer between the Society's two Collections, as well as culled animals and those killed by vermin or vandals. The figures in brackets indicate animals which have been transferred between the two Collections.
column 7	Number of animals in the Collection at 31st December 1990 showing sexes where these are known, e.g. 1/3/1 indicates 1 male, 3 female, 1 sex unknown.

Key

G	Genus new to the Collection
S	Species new to the Collection
SS	Sub-species new to the Collection

*Species subject to the Agreement with the Marwell Preservation Trust on joint ownership and management.

LONDON ZOO

1 2 3 4 5 6 7

MAMMALS

Monotremata

<i>Tachyglossus aculeatus</i>	Australian Echidna	1	4	—	—	—	—	3/2
<i>Zaglossus bruijni</i>	Bruijn's Echidna	3	—	—	—	—	—	1/2

Marsupialia

<i>Monodelphis domestica</i>	Grey Short-tailed Opossum	6	—	—	—	4	2	—
<i>Phalanger gymnotis</i>	Grey Ground Cuscus	4	—	—	—	—	1	1/2
<i>Gymnobelideus leadbeateri</i>	Leadbeater's Possum	13	—	3	—	2	—	5/5/4
<i>Petaurus breviceps</i>	Sugar Glider	2	—	—	—	1	1	—
<i>Dasyuroides byrnei</i>	Byrne's Pouched Mouse	1	—	—	—	—	1	—
<i>Phascolarctos cinereus cinereus</i>	New South Wales Koala	2	—	—	—	—	—	0/2
<i>Bettongia penicillata</i>	Brush-tailed Bettong	8	—	—	—	8	—	—
<i>Macropus rufogriseus frutica</i>	Red-necked Wallaby	5	—	2	—	—	2(2)	2/2/1
<i>Dendrolagus goodfellowi</i>	Goodfellow's Tree Kangaroo	1	—	—	—	—	1	—

Insectivora

<i>Erinaceus europaeus</i>	European Hedgehog	2	2	—	—	1	—	0/2/1
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Chiroptera

<i>Pteropus giganteus</i>	Indian Fruit Bat	16	—	4	1	—	19	—
<i>Pteropus rodricensis</i>	Rodriguez Fruit Bat	—	20	2	—	—	10	1/10/1
<i>Carollia perspicillata</i>	Seba's Short-tailed Bat	56	—	48	13	20	3	0/0/68

Scandentia

<i>Tupaia glis</i>	Common Tree Shrew	2	—	—	—	—	2	—
<i>Tupaia tana</i>	Large Tree Shrew	1	—	—	—	—	—	0/1

Primates

<i>Lemur catta</i>	Ring-tailed Lemur	5	1	—	—	—	3	1/2
<i>Lemur fulvus mayottensis</i>	Brown Lemur	10	—	1	—	1	3	2/4/1
<i>Lemur mongoz</i>	Mongoose Lemur	2	—	—	—	—	—	1/1
<i>Varecia variegatus rubra</i>	Ruffed Lemur	2	—	—	—	—	—	1/1
<i>Cheirogaleus medius</i>	Fat-tailed Dwarf Lemur	6	—	—	—	—	—	3/3
<i>Microcebus murinus</i>	Grey Mouse Lemur	6	3	—	—	1	2	5/1
<i>Loris tardigradus</i>	Slender Loris	4	—	2	—	1	—	3/2
<i>Nycticebus coucang</i>	Slow Loris	6	2	1	—	1	2	3/2/1

		1	2	3	4	5	6	7	
<i>Galago senegalensis</i>	Senegal Bushbaby	7	1	2	—	—	4	4/2	
<i>Aotus trivirgatus boliviensis</i>	Douroucoul	7	2	—	—	—	2	4/3	
<i>Pithecia pithecia</i>	White-faced Saki Monkey	6	—	2	—	—	—	4/3/1	
<i>Saimiri sciureus</i>	Squirrel Monkey (olive-capped form)	9	—	2	—	5	6	—	
<i>Ateles geoffroyi</i>	Black-handed Spider Monkey	2	—	—	—	—	—	1/1	
<i>Callithrix jacchus</i>	Common Marmoset	—	2	—	—	—	—	1/1	
<i>Cebuella pygmaea</i>	Pygmy Marmoset	4	3	—	—	2	1	2/2	
<i>Saguinus oedipus</i>	Cotton-headed Tamarin	10	—	4	1	—	—	4/4/5	
<i>Saguinus imperator</i>	Emperor Tamarin	4	—	—	—	3	—	1/0	
<i>Leontopithecus rosalia rosalia</i>	Golden Lion Tamarin	5	1	—	—	1	—	3/2	
<i>Leontopithecus rosalia chrysomelas</i>	Golden-headed Lion Tamarin	—	4	—	—	1	—	2/1	
<i>Callimico goeldii</i>	Goeldi's Marmoset	3	3	—	—	—	—	3/3	
<i>Macaca nigra</i>	Sulawesi Crested Macaque	8	—	—	—	—	1	4/3	
<i>Mandrillus sphinx</i>	Mandrill	8	—	2	1	1	1	5/2	
<i>Cercopithecus diana diana</i>	Diana Monkey	5	1	—	—	—	2	2/2	
<i>Cercopithecus hamlyni</i>	Owl-faced Monkey	2	—	—	—	—	—	1/1	
<i>Colobus polykomos polykomos</i>	Western Black & White Colobus Monkey	2	1	—	—	—	1	1/1	
<i>Presbytis entellus thersites</i>	Hanuman Langur	—	3	—	—	—	—	1/2	
<i>Hylobates lar</i>	Lar Gibbon	2	—	1	—	—	—	2/1	
<i>Pongo pygmaeus pygmaeus</i>	Bornean Orang Utan	11	—	1	—	—	2	3/7	
<i>Pan troglodytes</i>	Chimpanzee	12	—	1	—	—	1	6/6	
<i>Gorilla gorilla gorilla</i>	W. Lowland Gorilla	5	—	—	—	—	—	1/4	
Edentata									
<i>Choloepus didactylus</i>	Two-toed Sloth	2	—	—	—	—	—	1/1	
<i>Chaetophractus villosus</i>	Hairy Armadillo	2	—	—	—	—	—	1/1	
Rodentia									
<i>Callosciurus prevosti</i>	Prevost's Squirrel	2	—	—	—	—	2	—	
<i>Cynomys ludovicianus</i>	Prairie Marmot	6	—	—	—	1	—	0/1/4	
<i>Tamias townsendi</i>	Townsend's Chipmunk	6	—	—	—	—	2	2/2	
<i>Tamias sibiricus</i>	Siberian Chipmunk	—	2	—	—	—	—	1/1	
<i>Glaucornys sabrinus</i>	Northern Flying Squirrel	8	—	—	—	2	6	—	
<i>Castor canadensis</i>	American Beaver	2	—	—	—	—	2	—	
<i>Pedetes capensis</i>	Springhaas	10	—	4	4	2	7	1/0	
<i>Peromyscus polionotus</i>	Oldfield Mouse	22	—	39	2	4	42	0/0/13	
<i>Sigmodon hispidus</i>	Cotton Rat	20	—	33	10	8	35	—	
<i>Phodopus sungorus</i>	Dwarf Hamster	69	—	6	—	9	43	0/0/23	
<i>Cricetulus barabensis</i>	Chinese Hamster	70	—	50	—	42	28	0/0/50	
<i>Gerbillus perpallidus</i>	Pallid Gerbil	40	4	16	2	7	20	18/13	
<i>Meriones unguiculatus</i>	Clawed Jird	6	4	—	—	1	3	0/4/2	
<i>Meriones shawi</i>	Shaw's Jird	17	1	3	3	5	6	5/2	
<i>Dicrostonyx torquatus</i>	Collared Lemming	8	—	2	—	9	1	—	
<i>Alticola strelzowi</i>	Mountain Vole	—	6	—	—	—	—	4/2	
<i>Clethrionomys glareolus</i>	Bank Vole	4	—	—	—	2	1	0/1	
<i>Microtus agrestis</i>	Field Vole	1	—	—	—	—	1	—	
<i>Apodemus sylvaticus</i>	Field Mouse	25	—	3	—	8	6	5/6/3	
<i>Micromys minutus</i>	Harvest Mouse	17	1	—	—	8	3	2/5	
<i>Acomys cahirinus</i>	Arabian Spiny Mouse	74	6	104	23	33	101	10/17	
<i>Acomys dimidiatus</i>	Spiny Mouse	—	30	26	2	2	9	0/0/43	
<i>Acomys russatus</i>	Golden Spiny Mouse (Black form)	48	—	67	22	4	50	19/20	
<i>Rattus rattus</i>	Black Rat	80	—	105	—	—	125	0/0/60	
<i>Rattus norvegicus</i>	Brown Rat	50	—	394	—	—	384	0/0/60	
<i>Dryomys nitedula</i>	Forest Dormouse	—	6	—	—	—	—	3/3	
<i>Muscardinus avellanarius</i>	Common Dormouse	9	—	4	—	—	—	7/6	
<i>Jaculus jaculus</i>	Arabian Jerboa	4	—	—	—	1	—	2/1	
<i>Hystrix indica</i> × <i>H. cristata</i>	Hybrid Indian × Crested Porcupine	2	—	—	—	—	—	1/1	
<i>Atherurus africanus</i>	African Brush-tailed Porcupine	6	1	3	1	—	1	3/3/2	
<i>Kerodon rupestris</i>	Rock Cavy	14	—	9	1	3	14	0/0/5	
<i>Dolichotis patagonum</i>	Mara	3	—	—	—	—	3(3)	—	
<i>Dasyprocta aguti</i>	Orange-rumped Agouti	10	—	13	4	4	4	5/3/3	
<i>Myoprocta pratti</i>	Green Acouchi	5	3	3	2	1	1	2/4/1	
<i>Chinchilla laniger</i>	Chinchilla	7	—	7	4	—	4	3/3	
<i>Octodon degus</i>	Degu	12	—	5	1	3	—	7/6	
Carnivora									
<i>Canis lupus</i>	Grey Wolf	6	—	—	—	1	—	1/4	
<i>Fennecus zerda</i>	Fennec Fox	3	—	—	—	1	—	1/1	
<i>Potos flavus</i>	Kinkajou	4	—	1	—	—	5	—	
<i>Mustela nivalis</i>	Weasel	1	—	—	—	1	—	—	

		1	2	3	4	5	6	7
<i>Mustela putorius</i>	Polecat Ferret	4	—	—	—	2	—	2/0
<i>Amblonyx cinerea</i>	Oriental Small-clawed Otter	2	—	—	—	—	—	1/1
<i>Genetta tigrina</i>	Blotched Genet	2	—	—	—	—	—	2/0
<i>Arctogalidia trivirgata</i>	Small-toothed Palm Civet	1	—	—	—	1	—	—
<i>Suricata suricatta</i>	Suricate Meerkat	7	—	—	—	—	—	5/2
<i>Helogale parvula</i>	Dwarf Mongoose	16	—	7	—	1	6	4/4/8
<i>Cynictis penicillata</i>	Yellow Mongoose	2	6	—	—	—	—	3/5
<i>Felis caracal</i>	Caracal Lynx	3	—	—	—	—	1	1/1
<i>Felis pardalis</i>	Ocelot	2	—	1	—	—	—	1/2
<i>Felis serval</i>	Serval	1	—	—	—	—	—	1/0
<i>Felis wiedi</i>	Margay	2	—	—	—	—	—	1/1
<i>Felis trigrina</i>	Oncilla	—	1	—	—	—	1	—
<i>Panthera leo</i>	Lion	2	3	—	—	1	1	1/2
<i>Panthera leo persica</i>	Asian Lion	—	4	—	—	—	—	2/2
<i>Panthera tigris sumatrae</i>	Sumatran Tiger	3	1	—	—	1	—	1/2
<i>Panthera pardus saxicolor</i>	Persian Leopard	2	—	—	—	—	—	1/1
<i>Neofelis nebulosa nebulosa</i>	Clouded Leopard	3	—	—	—	—	—	2/1
<i>Panthera onca</i>	Jaguar	2	—	—	—	—	1	0/1
Pinnipedia								
<i>Zalophus californianus</i>	Californian Sealion	5	—	—	—	—	—	2/3
Tubulidentata								
<i>Orycteropus afer</i>	Aardvark	2	—	—	—	—	—	0/2
Proboscidea								
<i>Elaphas maximus</i>	Asian Elephant	4	—	—	—	—	—	0/4
Hyracoidea								
<i>Heterohyrax brucei</i>	Bush Hyrax	1	—	—	—	—	1	—
Perissodactyla								
<i>Equus zebra hartmanni</i>	Hartmann's Mountain Zebra	4	—	1	—	—	—	2/3
<i>Tapirus terrestris</i>	Brazilian Tapir	2	—	—	—	—	—	1/1
<i>Diceros bicornis</i>	Black Rhinoceros	3	2	—	—	—	1	2/2
Artiodactyla								
<i>Lama glama*</i>	Llama	5	1	—	—	1	—	5/0
<i>Lama guanicoe*</i>	Guanaco	1	—	—	—	—	—	1/0
<i>Vicugna vicugna</i>	Vicuna	3	—	1	—	—	—	2/2
<i>Camelus bactrianus*</i>	Bactrian Camel	7	—	—	—	1	1	0/5
<i>Pudu pudu*</i>	Pudu	6	—	1	1	—	—	3/3
<i>Rangifer tarandus</i>	Reindeer	6	2(2)	1	—	—	4(4)	0/5
<i>Okapia johnstoni</i>	Okapi	3	—	—	—	—	1	1/1
<i>Giraffa camelopardalis*</i>	Giraffe	7	—	2	1	—	3(2)	2/3
<i>Tragelaphus eurycerus*</i>	Bongo	5	1	—	—	—	3(1)	1/2
<i>Tragelaphus strepsiceros*</i>	Greater Kudu	6	2	1	—	2	2(2)	2/3
<i>Bubalus depressicornis*</i>	Anoa	2	—	1	—	—	—	1/2
<i>Bos gaurus*</i>	Gaur	3	—	1	—	—	—	2/2
<i>Bison bison</i>	American Bison	2	—	—	—	2	—	—
<i>Hippotragus niger*</i>	Sable Antelope	3	—	—	—	—	—	1/2
<i>Oryx leucoryx*</i>	Arabian Oryx	3	2	2	—	—	1(1)	2/4
<i>Ovis canadensis</i>	Bighorn Sheep	20	—	5	2	4	19(19)	—
Domestic								
	Domestic Cat	—	1	—	—	—	1	—
	Pig: Miniature	3	—	—	—	—	3	—
	Tamworth	—	1	9	—	—	10	—
	Large Black	—	1	5	—	—	—	4/2
	Cattle: Friesian	2	—	2	—	—	2	0/2
	Goat: Common	6	—	—	—	—	—	0/6
	Windsor White	1	—	—	—	—	1(1)	—
	Nubian	1	—	—	—	—	—	0/1
	Sheep: Dorset Down	7	3	2	—	—	6	0/6
	Black Welsh Mountain	1	—	—	—	—	—	1/0
	Jacob's	1	—	—	—	—	—	1/0
	Rabbit	9	9	8	1	4	12	4/5
	Guineapig	12	1	2	—	—	4	1/10
	Donkey	1	2	—	—	—	3	—
	Pony: Cream	2	—	—	—	—	—	2/0
	Shetland	4	—	—	—	—	1	0/3
	Dartmoor	1	—	—	—	—	—	0/1
	Horse: Draught	—	1	—	—	—	1	—
Total Mammals:		1159	161(2)	1027	102	235	1072(35)	938

BIRDS

Casuariiformes

<i>Casuarus bennetti</i>	Bennett's Cassowary	1	—	—	—	—	1	—
<i>Dromaius novaehollandiae</i>	Emu	2	—	—	—	—	—	1/1

Apterygiformes

<i>Apteryx australis mantelli</i>	North Island Brown Kiwi	1	—	—	—	—	1	—
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Sphenisciformes

<i>Spheniscus demersus</i>	Blackfooted (Jackass) Penguin	39	—	15	3	3	—	18/15/15
<i>Spheniscus humboldti</i>	Humboldt's Penguin	2	2(2)	—	—	—	2(2)	1/1

Pelecaniformes

<i>Pelecanus onocrotalus</i>	Eastern White Pelican	5	3	—	—	2	—	0/0/6
<i>Pelecanus crispus</i>	Dalmatian Pelican	1	—	—	—	—	1	—
<i>Pelecanus occidentalis</i>	Brown Pelican	3	1	—	—	—	—	0/0/4
<i>Morus bassanus</i>	Gannet	4	—	—	—	1	—	1/0/2
<i>Phalacrocorax carbo</i>	Cormorant	6	—	—	—	1	—	1/4
<i>Phalacrocorax aristotelis</i>	Shag	3	—	—	—	—	—	2/1

Ciconiiformes

<i>Nycticorax nycticorax</i>	Night Heron	2	4	—	—	—	—	0/2/4
<i>Ardeola ibis</i>	Cattle Egret	13	—	2	—	1	—	1/2/11
<i>Ardea cinerea</i>	Grey Heron	4	—	—	—	—	—	0/0/4
<i>Ciconia abdimii</i>	Abdim's Stork	24	—	7	1	6	—	6/7/11
<i>Leptoptilos crumeniferus</i>	Marabou Stork	2	—	—	—	—	—	1/1
<i>Threskiornis aethiopicus</i>	Sacred Ibis	33	—	9	1	1	2	14/13/11
<i>Eudocimus ruber</i>	Scarlet Ibis	5	4(4)	—	—	2	—	3/1/3
<i>Platalea alba</i>	African Spoonbill	6	—	—	—	2	—	0/0/4
<i>Phoenicopterus chilensis</i>	Chilean Flamingo	39	—	—	—	—	2	13/24

Anseriformes

<i>Dendrocygna bicolor</i>	Fulvous Whistling Duck	2	—	—	—	—	—	0/0/2
<i>Dendrocygna viduata</i>	White-faced Tree Duck	12	—	—	—	4	—	1/3/4
<i>Dendrocygna arborea</i>	Cuban Tree Duck	1	—	—	—	—	—	0/1
<i>Branta sandvicensis</i>	Hawaiian Goose	3	—	—	—	—	—	1/2
<i>Branta bernicla orientalis</i>	Brent Goose	5	—	—	—	—	1(1)	3/1
<i>Cereopsis novaehollandiae</i>	Cape Barren Goose	2	—	—	—	—	—	1/1
<i>Aix sponsa</i>	Carolina Duck	5	—	9	—	1	3	4/6
<i>Aix galericulata</i>	Mandarin Duck	2	—	—	—	—	2	—
<i>Callonetta leucophrys</i>	Ringed Teal	14	3	10	6	4	3	9/5
<i>Chenonetta jubata</i>	Maned Goose	2	—	—	—	1	—	1/0
<i>Anas penelope</i>	Wigeon	3	2	—	—	1	—	2/2
<i>Anas americana</i>	American Wigeon	2	—	—	—	—	—	1/1
<i>Anas sibilatrix</i>	Chiloe Wigeon	9	—	2	1	—	—	3/5/2
<i>Anas sibilatrix</i> × <i>Aythya fuligula</i>	Chiloe Wigeon × Tufted Duck	2	—	—	—	—	—	1/1
<i>Anas strepera</i>	Gadwall	2	—	—	—	—	—	1/1
<i>Anas crecca</i>	Teal	4	—	—	—	2	—	1/1
<i>Anas capensis</i>	Cape Teal	—	2	—	—	—	—	1/1
<i>Anas flavirostris oxyptera</i>	Sharp-winged Teal	1	—	—	—	—	—	0/1
<i>Anas platyrhynchos laysanensis</i>	Laysan Teal	1	—	—	—	1	—	—
<i>Anas acuta</i>	Pintail	1	4	—	—	—	—	3/2
<i>Anas bahamensis</i>	Bahama Pintail	4	—	4	—	1	—	3/4
<i>Anas versicolor puna</i>	Puna Teal	4	—	—	—	—	—	2/2
<i>Anas punctata</i>	Hottentot Teal	2	—	—	—	—	1	1/0
<i>Anas querquedula</i>	Garganey	1	1	17	10	—	—	6/3
<i>Anas platalea</i>	Argentine Red Shoveler	1	1	—	—	—	—	1/1
<i>Anas clypeata</i>	Shoveler	2	—	—	—	1	—	1/0
<i>Marmaronetta angustirostris</i>	Marbled Teal	3	—	—	—	—	1	0/0/2
<i>Netta rufina</i>	Red-crested Pochard	5	—	—	—	—	—	3/2
<i>Aythya valisineria</i>	Canvasback	4	—	—	—	—	—	2/2
<i>Aythya ferina</i>	European Pochard	3	1	—	—	—	—	2/2
<i>Aythya fuligula</i>	Tufted Duck	4	—	—	—	—	—	1/3
<i>Aythya fuligula</i> × <i>Anas sibilatrix</i>	Tufted Duck × Chiloe Wigeon	2	—	—	—	—	1	1/0
<i>Somateria mollissima</i>	Eider Duck	13	—	4	2	2	—	6/7
<i>Bucephala clangula</i>	Goldeneye	2	—	—	—	—	—	1/1
<i>Mergus albellus</i>	Smew	2	—	—	—	—	—	1/1
<i>Mergus merganser</i>	Goosander	5	—	6	5	1	—	1/4
<i>Oxyura jamaicensis jamaicensis</i>	North American Ruddy Duck	6	—	7	7	—	—	3/3

Falconiformes

<i>Milvus migrans parasitus</i>	Black Kite (Yellow-billed race)	1	—	—	—	—	—	0/1
<i>Milvus migrans migrans</i>	Black Kite	1	—	—	—	—	—	0/0/1

<i>Haliastur indus</i>	Brahminy Kite	1	—	—	—	—	—	1/0	
<i>Neophron percnopterus percnopterus</i>	Egyptian Vulture	1	—	—	—	—	1	—	
<i>Torgus tracheliotus</i>	Lappet-faced vulture	—	2(2)	—	—	—	—	1/1	
<i>Terathopius ecaudatus</i>	Bateleur Eagle	2	2	—	—	—	2	1/1	
<i>Polyboroides typus</i>	Harrier Hawk	2	—	—	—	—	—	1/1	
<i>Butastur rufipennis</i>	Grasshopper Buzzard	1	—	—	—	—	—	0/1	
<i>Heterospizias meridionalis</i>	Savannah Hawk	1	—	—	—	—	—	1/0	
<i>Buteo buteo</i>	Buzzard	1	—	—	—	—	1	—	
<i>Buteo regalis</i>	Ferruginous Buzzard	2	—	—	—	—	2	—	
<i>Polyborus plancus plancus</i>	Common Caracara	1	—	—	—	1	—	—	
<i>Polihierax semitorquatus</i>	African Pygmy Falcon	2	1	2	1	—	1	1/2	
Galliformes									
<i>Penelope purpurascens</i>	Crested Guan	2	—	—	—	—	—	1/1	
<i>Crax fasciolata</i>	Bare-faced Curassow	2	—	—	—	—	—	1/1	
<i>Francolinus francolinus</i>	Black Francolin	2	—	—	—	—	—	1/1	
<i>Francolinus pondicerianus</i>	Indian Grey Francolin	4	—	—	—	1	—	1/2	
<i>Rollulus rouloul</i>	Crested Wood Partridge	3	—	—	—	1	—	0/2	
<i>Bambusicola thoracica</i>	Chinese Bamboo Partridge	2	—	—	—	—	—	1/1	
<i>Tragopan satyra</i>	Satyr Tragopan	2	1	—	—	1	—	1/1	
<i>Tragopan temminckii</i>	Temminck's Tragopan	—	1	—	—	—	—	1/0	
<i>Tragopan temminckii</i> × <i>T. blythii</i>	Temminck's × Blyth's Tragopan	—	1	—	—	—	—	0/1	
<i>Pucrasia macrolophus</i>	Koklass Pheasant	2	1	9	6	1	4	1/0	
<i>Lophophorus impeyanus</i>	Impeyan Pheasant	2	—	9	2	2	5	1/1	
<i>Gallus gallus</i>	Red Jungle Fowl	—	2	9	2	—	—	3/6	
<i>Gallus sonneratii</i>	Sonnerat's Jungle Fowl	1	—	—	—	—	1	—	
<i>Lophura swinhoii</i>	Swinhoe's Pheasant	3	—	—	—	1	1	0/1	
<i>Lophura ignita ignita</i>	Bornean Crested Fireback	2	—	—	—	—	—	1/1	
<i>Lophura diardi</i>	Siamese Fireback Pheasant	2	—	—	—	1	1	—	
<i>Crossoptilon crossoptilon</i>	White Eared Pheasant	2	—	—	—	—	—	1/1	
<i>Crossoptilon auritum</i>	Blue Eared Pheasant	2	1	3	2	1	1	1/1	
<i>Catreus wallichi</i>	Cheer Pheasant	2	—	—	—	—	—	1/1	
<i>Symaticus ellioti</i>	Elliot's Pheasant	2	—	15	8	1	6	1/1	
<i>Symaticus humiae</i>	Hume's Bar-tailed Pheasant	2	—	13	2	3	8	1/1	
<i>Symaticus mikado</i>	Mikado Pheasant	2	1	—	—	1	—	1/1	
<i>Symaticus soemmerringi scintillans</i>	Scintillating Copper Pheasant	1	—	—	—	—	1	—	
<i>Symaticus reevesi</i>	Reeves's Pheasant	2	—	—	—	—	—	1/1	
<i>Chrysolophus pictus</i>	Golden Pheasant	2	—	—	—	—	—	1/1	
<i>Polyplectron bicalcaratum</i>	Grey Peacock Pheasant	1	1	—	—	—	—	1/1	
<i>Polyplectron emphanum</i>	Palawan Peacock Pheasant	2	—	—	—	2	—	—	
<i>Pavo cristatus</i>	Common Peafowl	2	—	1	—	—	1(1)	1/1	
<i>Afropavo congensis</i>	Congo Peafowl	4	1	—	—	2	—	2/1	
<i>Acryllium vulturinum</i>	Vulturine Guineafowl	12	—	—	—	4	—	3/5	
Gruiformes									
<i>Grus japonensis</i>	Red-crowned Crane	2	—	—	—	—	—	1/1	
<i>Grus vipio</i>	White-naped Crane	2	—	—	—	—	—	1/1	
<i>Grus antigone</i>	Sarus Crane	2	—	—	—	1	1	—	
<i>Anthropoides virgo</i>	Demoiselle Crane	6	—	2	1	1	—	2/3/1	
<i>Anthropoides paradisea</i>	Stanley Crane	2	—	—	—	—	—	1/1	
<i>Balearica regulorum</i>	South African Crowned Crane	9	—	4	2	1	—	4/4/2	
<i>Rallus aquaticus</i>	Water Rail	1	—	—	—	—	—	1/0	
<i>Laterallus leucopyrrhus</i>	White-breasted (Red and White) Crake	2	—	—	—	1	—	1/0	
<i>Lissotis melanogaster melanogaster</i>	Black-bellied Bustard	1	—	—	—	—	—	1/0	
Charadriiformes									
<i>Haematopus ostralegus</i>	Oystercatcher	3	—	—	—	—	—	3/0	
<i>Himantopus himantopus</i>	Black-winged Stilt	1	—	—	—	1	—	—	
<i>Recurvirostra avosetta</i>	Avocet	5	—	—	—	2	—	1/2	
<i>Burhinus oedicnemus</i>	Stone Curlew	8	—	3	1	1	2	2/3/2	
<i>Glareola pratincola</i>	Collared Pratincole	1	—	—	—	—	—	1/0	
<i>Vanellus vanellus</i>	Lapwing	5	—	—	—	2	1	0/1/1	
<i>Numerius arquata</i>	Curlew	2	—	—	—	—	—	0/0/2	
<i>Tringa totanus</i>	Redshank	2	—	—	—	—	—	0/0/2	
<i>Tringa nebularia</i>	Greenshank	—	1	—	—	1	—	—	
<i>Arenaria interpres</i>	Turnstone	3	—	—	—	—	—	0/0/3	
<i>Philomachus pugnax</i>	Ruff	1	5	—	—	2	—	1/3	
<i>Larus cirrocephalus poiocephalus</i>	Grey-headed Gull	20	—	7	—	—	3	0/0/24	
<i>Larosterna inca</i>	Inca Tern	3	2	1	—	1	—	1/4	
<i>Uria aalge</i>	Guillemot (Murre)	2	—	—	—	—	—	0/0/2	
Columbiformes									
<i>Pterocles alchata</i>	Pintailed Sandgrouse	5	4	1	1	6	—	0/1/2	
<i>Pterocles bicinctus</i>	Double-banded Sandgrouse	—	5	6	6	5	—	—	

<i>Columba guinea</i>	Speckled Pigeon	24	—	12	—	3	2	0/0/31
<i>Streptopelia vinacea</i>	Vinaceous Dove	2	—	—	—	—	—	1/1
<i>Streptopelia tranquebarica humilis</i>	Dwarf (Red) Turtle Dove	1	—	—	—	—	1	—
<i>Streptopelia chinensis chinensis</i>	Chinese Necklace Dove	1	—	—	—	—	—	0/0/1
<i>Turtur tympanistria</i>	Tambourine Dove	1	—	—	—	1	—	—
<i>Phaps elegans</i>	Brush Bronzewing	1	—	—	—	—	—	0/1
<i>Ocyphaps lophotes</i>	Crested Pigeon	6	—	2	1	3	—	0/0/4
<i>Geopelia cuneata</i>	Diamond Dove	1	—	—	—	—	—	1/0
<i>Zenaida auriculata</i>	Violet-eared Dove	1	—	—	—	1	—	—
<i>Geotrygon versicolor</i>	Mountain Witch Dove	1	—	—	—	—	—	0/0/1
<i>Ducula badia cuprea</i>	Jerdon's Imperial Pigeon	1	—	—	—	—	—	0/1
<i>Ducula bicolor</i>	Pied Imperial Pigeon	1	—	—	—	—	—	0/0/1
Psittaciiformes								
<i>Eolophus roseicapillus</i>	Roseate Cockatoo (Galah)	2	—	—	—	—	—	1/1
<i>Cacatua alba</i>	White-crested Cockatoo	1	1	—	—	—	—	1/1
<i>Cacatua tenuirostris pastinator</i>	Western Slender-billed Cockatoo	2	—	—	—	—	—	1/1
<i>Nymphicus hollandicus</i>	Cockatiel	6	—	—	—	2	—	0/1/3
<i>Nestor notabilis</i>	Kea	2	—	—	—	—	—	1/1
<i>Polytelis swainsonii</i>	Barraband (Superb) Parrakeet	7	—	1	—	1	—	3/4
<i>Polytelis anthopeplus</i>	Rock Peplar (Regent Parrot)	12	—	—	—	3	—	4/2/3
<i>Polytelis alexandrae</i>	Princess of Wales' Parrakeet	4	—	2	—	1	—	1/1/3
<i>Platycercus elegans</i>	Pennant's Parrakeet (Crimson Rosella)	1	1	—	—	—	—	1/1
<i>Platycercus eximius eximius</i>	Eastern Rosella	1	—	—	—	—	—	1/0
<i>Psittacus erithacus</i>	Grey Parrot	2	—	—	—	1	—	0/1
<i>Poicephalus rueppellii</i>	Ruppell's Parrot	2	—	—	—	—	—	1/1
<i>Loriculus vernalis</i>	Vernal Hanging Parrot	2	—	—	—	2	—	—
<i>Psittacula krameri manillensis</i>	Indian Ring-necked Parrakeet	3	—	—	—	—	—	2/1
<i>Anodorhynchus hyacinthinus</i>	Hyacinth Macaw	2	—	—	—	—	—	1/1
<i>Ara chloroptera</i>	Green-winged Macaw	2	—	—	—	2	—	—
<i>Ara auricollis</i>	Yellow-naped Macaw	—	1	—	—	—	—	1/0
<i>Aratinga solstitialis</i>	Sun Conure	2	—	—	—	1	1	—
<i>Cyanoliseus patagonus byroni</i>	Greater Patagonian Conure	4	—	2	1	—	—	2/2/1
<i>Myiopsitta monachus</i>	Quaker (Monk) Parrakeet	6	—	5	—	—	—	3/3/5
<i>Brotogeris pyrrhopterus</i>	Orange-flanked Parrakeet	2	—	—	—	1	—	1/0
<i>Amazona ochrocephala</i>	Yellow-fronted Amazon Parrot	1	—	—	—	—	1	—
Cuculiformes								
<i>Tauraco persa livingstonii</i>	Livingstone's Turaco	2	—	—	—	—	—	2/0
<i>Tauraco persa corythaix</i>	Knysna Turaco	1	—	—	—	—	—	0/1
<i>Tauraco erythrolophus</i>	Red-crested Turaco	2	—	1	—	—	—	1/1/1
<i>Tauraco hartlaubi</i>	Hartlaub's Turaco	3	—	—	—	—	—	2/1
<i>Tauraco leucotis</i>	White-cheeked Turaco	8	—	—	—	1	—	1/0/6
<i>Eudynamis scolopacea chinensis</i>	Chinese Koel	1	—	—	—	—	—	0/1
Strigiformes								
<i>Tyto alba</i>	Barn Owl	5	—	—	—	—	1	1/2/1
<i>Otus bakkamoena</i>	Collared Scops Owl	2	—	—	—	—	—	1/1
<i>Otus leucotis</i>	White-faced Scops Owl	12	2	—	—	1	2	5/6
<i>Bubo virginianus</i>	Great Horned Eagle Owl	2	—	2	—	—	2	1/1
<i>Bubo bubo bubo</i>	European Eagle Owl	2	—	—	—	—	—	1/1
<i>Bubo bubo turcomanus</i>	Turkmenian Eagle Owl	2	—	2	—	—	2	1/1
<i>Bubo bubo bengalensis</i>	Bengal Eagle Owl	1	—	—	—	—	—	0/0/1
<i>Bubo capensis mackinderi</i>	Kenya Eagle Owl	2	—	2	—	—	2	1/1
<i>Bubo africanus cinerascens</i>	Abyssinian Spotted Eagle Owl	2	—	—	—	—	—	1/1
<i>Bubo africanus africanus</i>	Spotted Eagle Owl	2	—	—	—	—	—	1/1
<i>Bubo vosseleri</i>	Nduk Eagle Owl	2	—	—	—	—	—	2/0
<i>Scotopelia ussheri</i>	Rufous Fishing Owl	1	—	—	—	—	—	1/0
<i>Pulsatrix perspicillata</i>	Spectacled Owl	2	—	—	—	—	—	1/1
<i>Nyctea scandiaca</i>	Snowy Owl	2	—	—	—	—	—	1/1
<i>Ninox novaeseelandiae</i>	Boobook Owl	2	—	—	—	—	—	1/1
<i>Athene noctua</i>	Little Owl	2	—	—	—	—	—	1/1
<i>Athene brama</i>	Spotted Owlet	2	—	—	—	—	—	1/1
<i>Speotyto cunicularia</i>	Burrowing Owl	2	—	4	—	—	4	1/1
<i>Strix hylophila</i>	Rusty Barred Owl	1	1	—	—	—	—	0/1/1
<i>Strix uralensis</i>	Ural Owl	4	—	—	—	—	—	2/2
<i>Strix nebulosa</i>	Great Grey Owl	2	—	—	—	—	—	1/1
<i>Asio otus</i>	Long-eared Owl	2	—	—	—	—	—	1/1
<i>Asio flammeus</i>	Short-eared Owl	1	1	—	—	—	—	1/1
Trogoniformes								
<i>Pharomachus auriceps</i>	Golden-headed Quetzal	2	—	—	—	1	—	0/1

Coraciiformes

<i>Dacelo novaeguineae</i>	Kookaburra	7	—	3	2	—	1(1)	2/4/1
<i>Momotus momota</i>	Blue-crowned Motmot	1	—	—	—	—	—	0/1
<i>Coracias caudata</i>	Lilac-breasted Roller	2	—	—	—	—	—	0/0/2
<i>Tockus alboterminatus</i>	Crowned Hornbill	1	—	—	—	—	1	—
<i>Tockus erythrorhynchus</i>	Red-billed Hornbill	3	—	—	—	1	—	1/1
<i>Tockus flavirostris</i>	Yellow-billed Hornbill	2	1	—	—	—	—	1/1/1
<i>Penelopides parini</i>	Tarctic Hornbill	5	—	—	—	1	—	1/3
<i>Aceros undulatus</i>	Wreathed Hornbill	1	—	—	—	1	—	—
<i>Anthracoceros coronatus convexus</i>	Southern Pied Hornbill	3	—	—	—	—	—	1/2
<i>Bycanistes subcylindricus</i>	Black and White Casqued Hornbill	2	—	—	—	—	—	1/1
<i>Buceros bicornis</i>	Great Indian Hornbill	1	—	—	—	—	—	0/1
<i>Buceros hydrocorax</i>	Rufous Hornbill	2	—	—	—	—	—	1/1

Piciformes

<i>Psilopogon pyrolophus</i>	Fire-tufted Barbet	2	—	—	—	—	—	1/1
<i>Megalaima virens</i>	Giant Barbet	1	—	—	—	—	1	—
<i>Tricholaema lacrymosum</i>	Spotted-flanked Barbet	1	—	—	—	1	—	—
<i>Trachyphonus darnaudii</i>	D'Arnaud's Barbet	1	—	—	—	1	—	—
<i>Pteroglossus aracari</i>	Black-necked Aracari	2	—	—	—	—	—	1/1
<i>Pteroglossus castanotis</i>	Chestnut-eared Aracari	1	1	—	—	—	1	0/1
<i>Bailloniopsis bailloni</i>	Saffron Toucanet	2	—	—	—	—	—	1/1
<i>Ramphastos tucanus</i>	Red-billed Toucan	2	—	—	—	—	—	1/1
<i>Ramphastos swainsonii</i>	Swainson's Toucan	1	—	—	—	1	—	—
<i>Melanerpes candidus</i>	White Woodpecker	1	—	—	—	—	—	0/1

Passeriformes

<i>Procnias nudicollis</i>	Naked-throated Bellbird	1	—	—	—	—	—	1/0
<i>Pycnonotus cafer bengalensis</i>	Red-vented Bulbul	2	—	—	—	—	—	0/0/2
<i>Irena puella</i>	Fairy Bluebird	1	1	—	—	—	—	1/1
<i>Turdus olivaceus</i>	African (Olive) Thrush	4	—	—	—	1	—	0/0/3
<i>Turdoides caudatus</i>	Common Babbler	1	—	—	—	—	—	0/0/1
<i>Garrulax albogularis</i>	White-throated Jay Thrush	1	—	—	—	—	—	0/0/1
<i>Garrulax leucolophus</i>	White-crested Laughing Thrush	2	—	—	—	—	—	1/1
<i>Garrulax pectoralis</i>	Necklaced Laughing Thrush	1	—	—	—	—	—	0/0/1
<i>Garrulax chinensis</i>	Black-throated Laughing Thrush	5	—	—	—	2	—	2/0/1
<i>Garrulax sannio</i>	White-browed Laughing Thrush	2	—	—	—	—	—	0/0/2
<i>Leiothrix lutea</i>	Pekin Robin (Red-billed Leiothrix)	9	—	—	—	1	—	1/0/7
<i>Zosterops sp.</i>	White-eye	4	—	—	—	—	—	0/0/4
<i>Zosterops flava</i>	Javan White-eye	1	—	—	—	1	—	—
<i>Zosterops simplex</i>	Chinese White-eye	1	—	—	—	—	1	—
<i>Melophus lathami</i>	Black-crested Bunting	3	—	—	—	—	—	2/1
<i>Sicalis flaveola</i>	Saffron Finch	4	—	—	—	1	—	1/1/1
<i>Volatinia jacarini</i>	Jacarini Finch (Blue-black Grassquit)	1	—	—	—	—	—	0/1
<i>Sporophila torqueola</i>	White-collared Seedeater	1	—	—	—	—	—	0/0/1
<i>Sporophila luctuosa</i>	Black & White Seedeater	2	—	—	—	—	—	1/1
<i>Tiaris fuliginosa</i>	Sooty Grassquit	—	1	—	—	—	—	0/0/1
<i>Paroaria coronata</i>	Red-crested Cardinal	1	—	—	—	—	—	0/1
<i>Ramphocelus carbo</i>	Silver-beaked Tanager	2	—	—	—	—	—	1/1
<i>Ramphocelus flammigerus icteronotus</i>	Lemon-rumped Tanager	1	—	—	—	—	—	0/1
<i>Thraupis episcopus</i>	Blue Grey Tanager	1	—	—	—	—	—	0/0/1
<i>Cyanerpes cyaneus</i>	Red-legged Honeycreeper	1	—	—	—	—	—	0/1
<i>Cacicus melanicterus</i>	Mexican Cacique	1	—	—	—	—	—	0/1
<i>Gnorimopsar chopi</i>	Chopi Grackle	1	1	—	—	—	—	1/1
<i>Molothrus bonariensis</i>	Shiny Cowbird	1	—	—	—	—	—	1/0
<i>Serinus mozambicus</i>	Green Singing Finch (Yellow-fronted Canary)	4	—	—	—	1	—	1/2
<i>Carduelis chloris</i>	Greenfinch	4	—	3	—	3	—	0/0/4
<i>Carpodacus mexicanus</i>	Mexican Rose Finch (House Finch)	3	—	—	—	—	—	2/1
<i>Uraeginthus bengalus</i>	Red-cheeked Cordon Bleu	—	3	—	—	3	—	—
<i>Uraeginthus cyanocephala</i>	Blue-capped Waxbill	—	1	—	—	—	—	1/0
<i>Estrilda caerulea</i>	Lavender Finch	—	3	—	—	1	—	2/0
<i>Estrilda melopoda</i>	Orange-cheeked Waxbill	2	—	—	—	—	—	1/0/1
<i>Estrilda rhodopyga S</i>	Crimson-rumped Waxbill	—	1	—	—	1	—	—
<i>Estrilda troglodytes</i>	Red-eared Waxbill	3	—	—	—	—	—	0/2/1
<i>Amandava amandava</i>	Avadavat	1	2	—	—	1	—	1/1
<i>Amandava amandava punicea</i>	Strawberry Finch	1	—	—	—	—	—	0/1
<i>Amandava formosa</i>	Green Avadavat	2	—	—	—	—	—	1/1
<i>Amandava subflava</i>	Golden-breasted Waxbill	2	2	—	—	1	—	2/1
<i>Neochmia ruficauda</i>	Star Finch	1	—	—	—	—	—	1/0

	1	2	3	4	5	6	7
<i>Poephila guttata</i>	—	2	—	—	—	1	1/0
<i>Poephila bichenovii</i>	1	—	—	—	—	—	0/1
<i>Poephila acuticauda hecki</i>	4	—	—	—	1	—	1/2
<i>Erythrura trichroa</i>	2	—	—	—	—	—	1/1
<i>Lonchura malabarica cantans</i>	1	2	—	—	1	—	2/0
<i>Lonchura cucullata</i>	—	1	—	—	1	—	—
<i>Lonchura striata</i> (domesticated)	1	—	—	—	—	—	1/0
<i>Lonchura molucca</i>	1	—	—	—	—	—	0/0/1
<i>Lonchura maja</i>	—	1	—	—	1	—	—
<i>Lonchura pallida</i>	1	—	—	—	—	—	1/0
<i>Padda oryzivora</i>	2	—	—	—	—	—	1/1
<i>Amadina fasciata</i>	1	3	—	—	4	—	—
<i>Pseudonigrita arnaudi</i>	—	2	—	—	1	—	0/0/1
<i>Ploceus</i> sp.	—	1	—	—	—	—	0/0/1
<i>Ploceus jacksoni</i>	1	—	—	—	—	—	1/0
<i>Quelea quelea</i>	2	—	—	—	—	—	1/0/1
<i>Foudia flavicans</i>	4	—	—	—	—	—	2/2
<i>Euplectes</i> sp.	—	1	—	—	—	—	0/1
<i>Euplectes afer</i>	1	2	—	—	1	—	1/1
<i>Vidua chalybeata</i>	2	—	—	—	—	—	1/1
<i>Lamprotornis iris</i>	—	2	—	—	—	—	1/1
<i>Lamprotornis purpureus</i>	5	—	—	—	1	—	3/1
<i>Lamprotornis chalybaeus</i>	4	—	—	—	—	—	3/1
<i>Spreo superbus</i>	5	—	3	2	1	—	2/2/1
<i>Creatophora cinerea</i>	4	—	—	—	—	—	3/1
<i>Sturnus roseus</i>	3	—	—	—	—	—	2/1
<i>Sturnus contra</i>	1	2	—	—	—	—	2/1
<i>Sturnus vulgaris</i>	1	—	—	—	—	—	1/0
<i>Leucopsar rothschildi</i>	8	—	—	—	1	—	3/4
<i>Acridotheres fuscus</i>	—	1	—	—	—	—	0/1
<i>Acridotheres cristatellus</i>	3	1	—	—	—	—	3/1
<i>Acridotheres javanicus</i> S	—	1	—	—	—	—	0/1
<i>Gracula religiosa intermedia</i>	5	—	—	—	—	1	2/1/1
<i>Gracula religiosa religiosa</i>	1	—	—	—	—	—	0/1
<i>Cyanocorax cyanopogon</i>	2	—	—	—	2	—	—
<i>Corvus corax corax</i>	2	—	—	—	—	—	1/1
<i>Corvus albicollis</i>	1	—	—	—	—	1	—
Domestic							
Common Duck	2	2	5	—	1	5	1/2
Old English Game Bantam	4	—	—	—	1	—	1/2
Domestic Chicken	2	—	—	—	—	1	0/1
Total: Birds	884	108(8)	226	76	151	96(5)	895

REPTILES

Testudines

<i>Chelydra chelydra serpentina</i>	Common Snapper	—	2	—	—	—	2	—
<i>Sternotherus odoratus</i>	Stinkpot	2	—	—	—	—	—	1/1
<i>Kinosternon subrubrum</i>	Eastern Mud Terrapin	1	—	—	—	—	—	0/0/1
<i>Kinosternon scorpioides</i>	Scorpion Mud Terrapin	2	—	—	—	—	—	1/1
<i>Pseudemys scripta dorbignyi</i>	South American Ornate Terrapin	2	—	—	—	1	—	0/1
<i>Pseudemys scripta elegans</i>	Red-eared Terrapin	6	—	—	—	—	—	1/3/2
<i>Emys orbicularis</i>	European Pond Tortoise	3	—	—	—	—	—	2/1
<i>Terrapene carolina</i>	Carolina Box Terrapin	1	—	—	—	—	—	0/1
<i>Terrapene carolina triunguis</i>	Three-toed Box Terrapin	2	1	—	—	1	—	1/0/1
<i>Testudo graeca</i>	Spur-thighed Tortoise	13	2	—	—	3	2	3/7
<i>Testudo hermanni</i>	Hermann's Tortoise	4	—	—	—	—	—	2/2
<i>Malachochersus tornieri</i>	Pancake Tortoise	2	—	—	—	—	—	2/0
<i>Geochelone carbonaria</i>	Red-footed Tortoise	1	2	—	—	—	—	1/2
<i>Eretmochelys imbricata</i>	Hawksbill Turtle	3	—	—	—	—	—	0/1/2
<i>Chelus fimbriatus</i>	Matamata	6	—	—	—	—	—	0/1/5
<i>Chelodina longicollis</i>	Long-necked Terrapin	6	—	—	—	1	—	2/3
<i>Trionyx hurum</i>	Peacock Soft-shelled Turtle	2	—	—	—	—	—	1/1

Crocodylia

<i>Alligator mississippiensis</i>	American Alligator	3	—	—	—	—	—	1/2
<i>Alligator sinensis</i>	Chinese Alligator	3	4	—	—	—	—	1/2/4

Sauria

Sp. inc.	Gecko	1	—	—	—	—	1	—
<i>Teratoscincus scincus</i>	Frog-eyed Gecko	2	6	—	—	1	—	1/1/5
<i>Stenodactylus sthenodactylus</i>	Elegant Gecko	8	—	—	—	1	7	—
<i>Hemitheconyx caudicinctus</i>	African Fat-tailed Gecko	24	—	4	—	1	3	3/8/13
<i>Chondrodactylus angulifer</i>	Namib Sand Gecko	23	—	2	—	10	6	5/4
<i>Cyrtodactylus pulchellus</i>	Malayan Bent-toed Gecko	5	—	—	—	—	5	—
<i>Gekko gekko</i>	Tokay Gecko	2	4	—	—	1	—	1/4
<i>Coleonyx variegatus</i>	Western Banded Gecko	8	—	—	—	—	7	1/0
<i>Eublepharis macularius</i>	Leopard Ground Gecko	19	—	2	—	2	—	6/10/3
<i>Anolis richardii</i>	Richard's Anole	2	—	—	—	1	—	0/0/1
<i>Corythophanes cristatus</i>	Abbess Lizard	2	—	—	—	1	—	0/0/1
<i>Laemantus longipes deborrei</i>	Casque-headed Lizard	1	1	—	—	—	—	0/1/1
<i>Basiliscus vittatus</i>	Banded Basilisk	8	—	—	—	4	—	0/0/4
<i>Basiliscus plumifrons</i>	Plumed Basilisk	3	—	1	—	1	—	2/1
<i>Cyclura cornuta</i>	Rhinoceros Iguana	7	—	—	—	—	2	3/2
<i>Iguana iguana</i>	Common Iguana	1	—	—	—	—	—	0/0/1
<i>Sauromalus obesus</i>	Chuckwalla	9	—	—	—	1	4	0/0/4
<i>Agama stellio</i>	Starred Agama	—	2	—	—	2	—	—
<i>Amphibolurus vitticeps</i>	Inland Bearded Dragon	4	2	—	—	2	—	2/2
<i>Physignathus lesueurii</i>	Eastern Water Dragon	6	—	—	—	2	—	1/3
<i>Uromastyx ocellatus</i>	Eyed Dabb Lizard	—	10	—	—	2	3	0/0/5
<i>Uromastyx aegyptius</i>	Egyptian Dabb Lizard	—	10	—	—	2	—	0/0/8
<i>Uromastyx hardwicki</i>	General Hardwicke's Dabb Lizard	5	—	—	—	2	—	0/0/3
<i>Chamaelo chamaeleon</i>	Common Chameleon	—	5	—	—	3	—	0/0/2
<i>Chamaeleo dilepis</i>	Flap-necked Chameleon	2	—	4	—	6	—	—
<i>Egernia striolata</i>	Australian Tree Skink	5	—	—	—	—	—	1/1/3
<i>Sphenomorphus quoyii</i>	Golden Water Skink	2	—	—	—	1	—	1/0
<i>Corucia zebrata</i> S (Gray)	Prehensile-tailed Skink	—	1	—	—	—	—	0/0/1
<i>Trachydosaurus rugosus</i>	Shingleback	3	5	—	—	—	—	3/4/1
<i>Tiliqua scincoides scincoides</i>	Eastern Blue-tongued Skink	1	2	—	—	—	—	1/2
<i>Tiliqua scincoides intermedia</i>	Northern Blue-tongued Skink	4	—	—	—	—	—	1/0/3
<i>Tiliqua nigrolutea</i>	Blotched Blue-tongued Skink	2	5	—	—	1	—	0/2/4
<i>Mabuya quinquetaeniata</i>	Five-lined Skink	—	5	4	4	—	—	0/0/5
<i>Leiopisma telfairii</i>	Round Island Skink	4	—	—	—	1	—	0/0/3
<i>Eumeces schneideri</i>	Schneider's Skink	—	3	—	—	—	—	0/0/3
<i>Chalcides ocellatus</i>	Eyed Skink	3	—	14	—	—	6	1/1/9
<i>Gerrhosaurus major</i>	Greater Plated Lizard	3	—	—	—	—	—	2/1
<i>Lacerta agilis</i>	Sand Lizard	—	1	—	—	1	—	—
<i>Lacerta lepida</i>	Eyed Lizard	3	—	4	—	1	4	1/1
<i>Trogonophis wiegmanni</i>	Wiegmann's Burrowing Lizard	1	—	—	—	—	—	0/0/1
<i>Varanus griseus</i>	Grey Monitor	1	—	—	—	1	—	—
<i>Varanus exanthematicus exanthematicus</i>	Bosc's Monitor	5	—	—	—	2	—	1/0/2
<i>Heloderma suspectum suspectum</i>	Reticulated Gila Monster	9	—	—	—	—	—	3/4/2
<i>Heloderma suspectum cinctum</i>	Banded Gila Monster	2	—	—	—	—	—	1/1
<i>Ophisaurus apodus</i>	European Glass Snake	2	—	—	—	—	2	—
<i>Anguis fragilis</i>	Slow-worm	1	2	—	—	1	—	0/0/2
<i>Cordylus giganteus</i>	Sungazer	8	—	—	—	—	—	0/0/8
<i>Cordylus warreni breyeri</i>	Breyer's Girdled Lizard	1	—	—	—	1	—	—
<i>Pseudocordylus microlepidotus</i>	Small-scaled Girdled Lizard	1	—	—	—	—	—	0/1
Serpentes								
<i>Liasis fusca</i>	Australian Water Python	5	—	—	—	1	4	—
<i>Liasis boa</i>	Bismark Ringed Python	1	—	—	—	—	—	1/0
<i>Morelia spilotes spilotes</i>	Diamond Python	1	—	—	—	—	—	1/0
<i>Python molurus bivittatus</i>	Burmese Rock Python	2	—	4	—	—	4	1/1
<i>Python regius</i>	Royal Python	6	2	—	—	—	—	1/0/7
<i>Eunectes notaeus</i>	Yellow Anaconda	3	—	—	—	—	—	1/2
<i>Boa constrictor</i>	Boa Constrictor	8	—	25	—	—	20	1/3/9
<i>Eryx colubrinus</i>	Theban Sand Boa	—	4	—	—	1	—	0/0/3
<i>Lichanura trivirgata roseofusca</i>	Coastal Rosy Boa	3	—	—	—	1	—	0/0/2
<i>Lichanura trivirgata gracia</i>	Desert Rosy Boa	3	—	—	—	—	—	0/0/3
<i>Natrix natrix</i>	Grass Snake	—	2	—	—	—	—	0/0/2
<i>Drymarchon corais couperi</i>	Eastern Indigo Snake	1	—	—	—	—	—	0/0/1
<i>Elaphe obsoleta obsoleta</i>	Black Rat Snake	2	—	—	—	—	1	1/0
<i>Elaphe obsoleta quadrivittata</i>	Yellow Rat Snake	2	—	—	—	—	—	0/0/2
<i>Elaphe radiata</i>	Radiated Rat Snake	2	—	—	—	—	—	0/0/2
<i>Elaphe shrenckii anomala</i>	Chinese Rat Snake	2	—	—	—	—	2	—
<i>Coluber najadum</i>	Dahl's Whip Snake	1	—	—	—	1	—	—

		1	2	3	4	5	6	7	
<i>Pituophis catenifer deserticola</i>	Desert Gopher Snake	5	—	—	—	—	1	0/0/4	
<i>Pituophis melanoleucus melanoleucus</i>	Northern Pine Snake	3	—	—	—	3	—	—	
<i>Hydrodynastes gigas</i>	Boipevassu Snake	7	—	—	—	1	3	1/0/2	
<i>Heterodon nasicus</i>	Western Hog-nosed Snake	2	—	—	—	—	—	0/0/2	
<i>Coronella austriaca</i>	Smooth Snake	2	—	—	—	—	—	1/0/1	
<i>Lampropeltis getulus californiae</i>	Californian King Snake	5	—	4	—	—	2	1/1/5	
<i>Lampropeltis triangulum sinaloae</i>	Sinaloan Milk Snake	3	—	—	—	1	—	1/1	
<i>Lampropeltis triangulum hondurensis</i>	Honduras King Snake	2	—	—	—	—	—	1/1	
<i>Lampropeltis triangulum annulata</i>	Mexican Milk Snake	2	—	—	—	—	—	1/1	
<i>Lampropeltis triangulum campbelli</i>	Pueblan King Snake	2	—	—	—	2	—	—	
<i>Dasyplectis scabra</i>	Egg-eating Snake	—	2	—	—	1	—	0/0/1	
<i>Psammophis subtaeniatus</i>	Peter's Long-lined Snake	2	—	—	—	1	—	0/0/1	
<i>Dispholidus typus</i>	Boomslang	2	—	—	—	—	—	0/0/2	
<i>Oxyuranus scutellatus</i>	Taipan	3	—	—	—	—	—	1/2	
<i>Notechis scutatus</i>	Tiger Snake	2	—	—	—	—	—	1/1	
<i>Walterinnesia aegyptia</i>	Innes' Cobra	2	—	—	—	—	—	0/2	
<i>Naja melanoleuca</i>	Black & White Cobra	3	—	—	—	—	—	1/0/2	
<i>Naja mossambica</i>	Mozambique Spitting Cobra	1	—	—	—	1	—	—	
<i>Naja pallida</i>	Red Spitting Cobra	—	2	—	—	—	—	1/1	
<i>Naja naja kaouthia</i>	Monocellate Cobra	2	1	—	—	—	—	1/1/1	
<i>Naja naja naja</i>	Sri Lankan Cobra	—	3	—	—	1	—	2/0	
<i>Naja naja oxiana</i> S (Eichwald)	Central Asian Cobra	—	2	—	—	—	—	1/1	
<i>Micrurus fulvius</i>	Eastern Coral Snake	4	—	—	—	—	—	0/0/4	
<i>Dendroaspis angusticeps</i>	Common Green Mamba	2	—	—	—	—	—	1/1	
<i>Dendroaspis polylepis</i>	Black Mamba	2	—	—	—	1	—	0/0/1	
<i>Vipera berus</i>	Adder	1	2	—	—	—	—	0/0/3	
<i>Vipera ammodytes ammodytes</i>	Western Long-nosed Viper	4	—	—	—	—	—	3/1	
<i>Vipera russelli siamensis</i>	Russell's Viper	4	—	—	—	2	—	1/0/1	
<i>Bitis arietans</i>	Puff Adder	2	2	—	—	—	—	1/1/2	
<i>Bitis gabonica gabonica</i>	Gaboon Viper	2	—	—	—	—	—	1/1	
<i>Cerastes cerastes</i>	Horned Cerastes Viper	1	—	—	—	—	—	0/1	
<i>Echis carinatus sochureki</i>	Saw-scaled Viper	24	—	10	—	1	11	1/2/19	
<i>Echis carinatus ocellatus</i>	West African Saw-scaled Viper	2	—	—	—	1	—	1/0	
<i>Echis carinatus leakeyi</i>	East African Saw-scaled Viper	1	2	—	—	—	—	1/2	
<i>Agkistrodon piscivorus</i>	Cottonmouth Moccasin	—	2	—	—	1	—	0/0/1	
<i>Agkistrodon contortrix mokeson</i>	Northern Copperhead	2	—	—	—	—	—	2/0	
<i>Calloselasma rhodostoma</i>	Malayan Pit Viper	33	—	2	—	2	4	1/2/26	
<i>Trimeresurus purpureomaculatus</i>	Mangrove Pit Viper	6	3	—	—	—	2	0/0/7	
<i>Sistrurus catenatus tergeminus</i>	Western Massasauga	2	—	7	—	—	—	1/1/7	
<i>Crotalus durissus culminatus</i>	North Western Neotropical Rattlesnake	2	—	—	—	—	—	1/1	
<i>Crotalus atrox</i>	Western Diamond-backed Rattlesnake	3	—	—	—	—	—	2/1	
<i>Crotalus viridis helleri</i>	Southern Pacific Rattlesnake	1	—	—	—	—	—	0/1	
<i>Crotalus viridis oreganus</i>	Northern Pacific Rattlesnake	1	—	—	—	—	—	0/1	
<i>Crotalus mitchelli</i>	Speckled Rattlesnake	1	—	—	—	—	—	1/0	
<i>Crotalus cerastes</i>	Sidewinder	1	—	—	—	—	—	0/0/1	
Total: Reptiles		460	102	87	4	84	108	453	

AMPHIBIANS

Gymnophiona

<i>Typhlonectes compressicauda</i>	Caecilian	6	5	2	2	8	—	0/0/3
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Caudata

<i>Ambystoma maculatum</i>	American Spotted Salamander	7	—	—	—	—	—	0/0/7
<i>Ambystoma mexicanum</i>	Axolotl	17	4	—	—	14	—	0/0/7
<i>Ambystoma tigrinum</i>	Tiger Salamander	3	—	—	—	1	—	0/0/2
<i>Pleurodeles waltl</i>	Spanish Ribbed Newt	16	—	—	—	1	10	0/0/5
<i>Salamandra salamandra</i>	Fire Salamander	27	—	1	—	2	12	0/0/14
<i>Taricha torosa</i>	Rough-skinned Newt	12	—	—	—	9	—	0/0/3
<i>Triturus cristatus</i>	Crested Newt	3	—	—	—	2	—	0/0/1
<i>Triturus vulgaris</i>	Smooth Newt	—	8	4	—	—	—	0/0/12
<i>Pachytriton</i> sp.	Dog-faced Newt	9	—	—	—	3	—	0/0/6
<i>Tylotriton verrucosus</i>	Chinese Salamander	5	—	—	—	5	—	—

Anura

<i>Bombina orientalis</i>	Oriental Fire-bellied Toad	6	—	2	—	—	—	2/2/4
<i>Bombina variegata</i>	Yellow-bellied Toad	6	—	—	—	4	—	0/2
<i>Bufo bufo</i>	Common Toad	3	—	—	—	3	—	—

<i>Bufo calamita</i>	Natterjack Toad	2	—	—	—	2	—	—
<i>Bufo marinus</i>	Cane Toad	4	2	—	—	2	—	1/3
<i>Bufo punctatus</i>	Red-spotted Toad	2	—	—	—	2	—	—
<i>Bufo viridis</i>	Green Toad	3	—	—	—	2	—	0/1
<i>Ceratophrys cranwelli</i>	Horned Frog	2	—	—	—	1	—	0/0/1
<i>Colostethus trinitatus</i>	Stream Frog	—	30	14	—	9	—	0/0/35
<i>Dendrobates auratus</i>	Poison Arrow Frog	3	—	—	—	—	3	—
<i>Dendrobates truncatus</i>	Poison Arrow Frog	—	15	—	—	3	3	0/0/9
<i>Dyscophus antongilli</i>	Tomato Frog	11	—	—	—	8	—	1/2
<i>Hyla rubra</i>	Daudin's Banana Frog	3	4	—	—	2	—	0/0/5
<i>Hyla septentrionalis</i>	Cuban Tree Frog	4	5	—	—	—	3	0/0/6
<i>Hyla sp.</i>	Tropical Tree Frog	2	—	—	—	2	—	—
<i>Hymenochirus boettgeri</i>	Dwarf Clawed Frog	8	—	—	—	8	—	—
<i>Hyperolius sp.</i>	Reed Frog	1	—	—	—	1	—	—
<i>Litoria caerulea</i>	White's Tree Frog	7	—	—	—	1	—	0/0/6
<i>Litoria infrafrenata</i>	Giant Tree Frog	1	1	—	—	—	—	1/0/1
<i>Pipa pipa</i>	Surinam Toad	1	—	—	—	—	—	0/0/1
<i>Polypedates dennysi</i>	Asian Tree Frog	1	3	—	—	—	—	0/0/4
<i>Polypedates leucomastix</i>	Bamboo Tree Frog	3	—	—	—	—	—	0/0/3
<i>Pseudis paradoxa</i>	Shrinking Frog	1	—	—	—	1	—	—
<i>Pyxicephalus adspersus</i>	African Bullfrog	1	—	—	—	—	—	0/0/1
<i>Rana catesbeiana</i>	American Bullfrog	5	4	—	—	—	—	0/0/9
<i>Rana clamitans</i>	Bronze Frog	1	—	—	—	1	—	—
<i>Rana limnocharis</i>	Rice Paddy Frog	—	50	—	—	33	—	0/0/17
<i>Rana pipiens</i>	Leopard Frog	2	—	—	—	—	—	0/0/2
<i>Rana ridibunda</i>	Marsh Frog	2	—	—	—	—	—	0/0/2
<i>Rana temporaria</i>	Common Frog	3	—	—	—	3	—	—
<i>Xenopus laevis</i>	Clawed Frog	3	9	—	—	2	2	4/4
<i>Xenopus tropicalis</i>	Clawed Frog	6	—	—	—	—	—	0/0/6
Total: Amphibians		202	140	23	2	135	33	195

WHIPSNADE WILD ANIMAL PARK

MAMMALS

Marsupialia

Macropus rufogriseus fruticosa Red-necked Wallaby 446 2(2) 237 — 34 95 535/11/10

Primates

Saimiri sciureus Squirrel Monkey 18 — 1 — 2 2 1/6/8

Callithrix jacchus Common Marmoset 6 — — — — 6 —

Saguinus oedipus Cotton-headed Tamarin — 1 — — — — 0/1

Leontopithecus rosalia rosalia Golden Lion Tamarin — 2 — — — — 0/2

Pan troglodytes Chimpanzee 9 — 1 — — 3 4/3

Rodentia

Cynomys ludovicianus Prairie Marmot 74 — 160 — — — 0/0/234

Dolichotis patagonum Mara 7 3(3) 59 2 9 18 5/1/34

Chinchilla laniger Chinchilla 4 — — — — 2 0/2

Carnivora

Canis lupus Grey Wolf 20 — 5 — 3 3 8/11

Ursus arctos Brown Bear 4 — 1 — 2 — 1/2

Ailurus fulgens Red Panda 2 — 2 2 — — 1/1

Nasua nasua Ring-tailed Coati 7 — 6 — 4 — 2/7

Helogale parvula Dwarf Mongoose 8 — — — — — 4/4

Panthera leo Lion 2 — — — — — 1/1

Panthera tigris altaica Siberian Tiger — 6 — 1 — — 4 1/1/1

Panthera onca Jaguar 3 — — — — 3 —

Acinonyx jubatus Cheetah 14 3 3 — 2 4 7/7

Pinnipedia

Zalophus californianus Californian Sealion 6 — — — — — 2/4

Phoca vitulina Common Seal 1 — — — — — 1/0

Halichoerus grypus Grey Seal 1 — — — — — 0/1

Proboscidea

Elephas maximus Asian Elephant 3 — — — — — 0/3

Loxodonta africana African Elephant 1 — — — — 1 —

Perissodactyla

<i>Equus burchelli</i> *	Common Zebra (Chapman's form)	—	2	—	—	1	—	1/0
<i>Equus grevyi</i> *	Grevy's Zebra	10	1	1	—	1	3	3/5
<i>Equus hemionus</i> *	Asiatic Wild Ass (Persian form)	9	—	2	—	—	1	3/7
<i>Equus przewalski</i> *	Przewalski's Horse	11	3	1	—	—	3	4/8
<i>Rhinoceros unicornis</i>	Indian Rhinoceros	4	—	—	—	—	1	2/1
<i>Cerotherium simum</i>	White Rhinoceros	10	—	2	—	1	1	3/7

Artiodactyla

<i>Phacochoerus aethiopicus</i> *	Wart Hog	1	—	—	—	—	—	1/0
<i>Tayassu tajacu</i> *	Collared Peccary	3	—	—	—	—	3	—
<i>Hippopotamus amphibius</i>	Hippopotamus	2	—	—	—	—	—	1/1
<i>Choeropsis liberiensis</i>	Pygmy Hippopotamus	5	1	—	—	—	1	2/3
<i>Lama guanicoe</i> *	Guanaco	10	—	—	—	1	9	—
<i>Camelus bactrianus</i>	Bactrian Camel	13	1	—	—	—	4	1/9
<i>Camelus dromedarius</i>	Arabian Camel	2	—	—	—	—	1	0/1
<i>Muntiacus reevesi</i>	Reeves's Muntjac	15	—	2	—	—	—	6/6/5
<i>Dama dama</i>	Fallow Deer	51	—	4	—	8	31	6/3/7
<i>Axis axis</i> *	Axis Deer	41	—	17	5	6	1	18/24/4
<i>Axis porcinus</i> *	Hog Deer	36	—	17	4(1)	5	—	20/22/2
<i>Cervus duvauceli</i> *	Barasingha	29	—	10	4	7	—	14/14
<i>Cervus nippon</i> *	Sika Deer (Formosan form)	48	—	13	7	9	4	11/29/1
<i>Cervus elaphus</i>	Red Deer	69	10	18	—	2	21	5/69
<i>Elaphurus davidianus</i> *	Pere David's Deer	48	—	11	2	4	2	14/34/3
<i>Rangifer tarandus</i>	Reindeer	8	6(4)	4	1	1	6(2)	5/5
<i>Hydropotes inermis</i>	Chinese Water Deer	346	—	232	—	19	206	0/0/353
<i>Giraffa camelopardalis</i> *	Giraffe	3	2(2)	—	—	—	2	2/1
<i>Giraffa camelopardalis reticulata</i> *	Giraffe (Reticulated)	4	—	—	—	—	—	2/2
<i>Tragelaphus angasi</i> *	Nyala	10	4	2	1(1)	2	4	4/5
<i>Tragelaphus spekei</i> *	Sitatunga	18	—	6	2	5	5	4/8
<i>Tragelaphus strepsiceros</i> *	Greater Kudu	—	2(2)	—	—	—	—	2/0
<i>Tragelaphus euryceros</i> *	Bongo	1	1(1)	—	—	2	—	—
<i>Boselaphus tragocamelus</i> *	Nilgai	29	1	21	8	11	6	2/23/1
<i>Bos gaurus</i> *	Gaur	2	—	—	—	—	—	1/1
<i>Bos grunniens</i>	Yak	11	—	4	1	1	2	5/5/1
<i>Syncerus caffer</i> *	African Buffalo (Dwarf Forest form)	7	1	1	—	—	5	2/2
<i>Bison bonasus</i>	European Bison	8	1	3	2	—	—	2/8
<i>Hippotragus equinus</i> *	Roan Antelope	10	2	4	1	5	—	4/6
<i>Kobus ellipsiprymnus</i> *	Common Waterbuck	11	1	4	1	4	1	5/5
<i>Kobus megaceros</i>	Nile Lechwe	—	4	—	—	—	—	2/2
<i>Oryx gazella</i> *	Gemsbok	7	1	2	—	1	—	3/6
<i>Oryx taor</i> *	Scimitar-horned Oryx	25	—	6	2	1	3	6/19
<i>Oryx leucoryx</i> *	Arabian Oryx	1	3(1)	—	—	2	—	2/0
<i>Damaliscus dorcas</i> *	Bontebok	4	1	—	—	1	—	1/3
<i>Antelope cervicapra</i> *	Blackbuck	19	—	8	4	8	—	6/9
<i>Gazella thomsoni</i> *	Thomson's Gazelle	12	—	—	—	1	—	3/8
<i>Ovibos moschatus</i>	Musk Ox	5	—	3	1	—	—	2/5
<i>Ovis musimon</i>	Mouflon	27	—	7	1	10	21	0/2
<i>Ovis canadensis</i>	Bighorn Sheep	—	19(19)	—	—	—	3	6/10

Domestic

	Donkey	—	1	—	—	—	—	0/1
	Shire Horse	—	2	—	—	—	—	2/0
	Cream Pony	4	—	2	—	—	2	1/3
	Welsh Pony (Cream form)	1	—	—	—	—	—	1/0
	Oxford Sandy & Black Pig	—	1	—	—	—	—	0/1
	Ankole Cattle	1	—	—	—	—	—	1/0
	Belted Galloway Cattle	—	2	—	—	—	1	1/0
	Red Poll Cattle	—	1	1	—	—	—	1/1
	Manx Loghtan Sheep	—	2	—	—	—	—	2/0
	Lincoln Longwool Sheep	—	1	—	—	—	—	1/0
	Wensleydale Sheep	—	1	—	—	—	—	1/0
	Hampshire Sheep	—	11	—	—	1	2	1/7
	Texal × Hampshire Sheep	—	2	—	—	—	2	—
	Windsor White Goat	12	5(1)	—	—	1	3	3/10

Total: Mammals 1645 107(35) 884 51(2) 177 501(2) 1907

BIRDS**Casuariiformes**

<i>Casuarius casuarius</i>	Australian Cassowary	3	—	—	—	—	—	1/2
<i>Dromaius novaehollandiae</i>	Emu	11	—	—	—	—	4	2/2/3

		1	2	3	4	5	6	7
Tinamiformes								
<i>Nothoprocta perdicaria</i>	Chilean Tinamou	7	—	2	1	1	—	0/0/7
Sphenisciformes								
<i>Aptenodytes patagonica</i>	King Penguin	13	—	—	—	—	—	4/4/5
<i>Eudyptes crestatus</i>	Rockhopper Penguin	12	—	—	—	1	—	4/3/4
<i>Spheniscus humboldti</i>	Humboldt's Penguin	61	6(2)	15	1	6	19(2)	15/15/26
Ciconiiformes								
<i>Ciconia ciconia</i>	White Stork	13	—	4	—	2	2	2/3/8
<i>Eudocimus ruber</i>	Scarlet Ibis	—	15	—	—	3	4(4)	0/0/8
<i>Phoenicopterus ruber roseus</i>	Greater Flamingo	41	—	5	—	3	22	1/4/16
<i>Phoenicopterus ruber ruber</i>	Rosy Flamingo	54	—	3	—	1	—	23/24/9
Anseriformes								
<i>Cygnus atratus</i>	Black Swan	13	—	—	—	4	1	2/5/1
<i>Cygnus melanocoryphus</i>	Black-necked Swan	3	—	5	2	—	3	1/1/1
<i>Cygnus cygnus</i>	Whooper Swan	5	—	1	—	1	3	1/1
<i>Coscoroba coscoroba</i>	Coscoroba Swan	2	—	—	—	—	—	1/1
<i>Anser anser</i>	Greylag Goose	2	—	—	—	—	—	1/0/1
<i>Anser indicus</i>	Bar-headed Goose	36	—	23	1	1	2	14/18/23
<i>Anser caerulescens caerulescens</i>	Lesser Snow Goose	7	—	—	—	3	4	—
<i>Anser canagicus</i>	Emperor Goose	7	—	—	—	—	—	4/2/1
<i>Branta sandvicensis</i>	Hawaiian Goose	2	—	—	—	—	2	—
<i>Branta leucopsis</i>	Barnacle Goose	23	—	—	—	—	—	5/2/16
<i>Branta bernicla orientalis</i>	Brent Goose	3	1(1)	—	—	—	2	0/2
<i>Branta ruficollis</i>	Red-breasted Goose	11	—	—	—	1	1	8/0/1
<i>Cereopsis novaehollandiae</i>	Cape Barren Goose	8	—	2	—	—	8	1/1
<i>Alopochen aegyptiacus</i>	Egyptian Goose	10	—	—	—	2	—	1/1/6
<i>Tadorna cana</i>	South African Shelduck	11	—	—	—	1	2	3/2/3
<i>Tadorna variegata</i>	New Zealand Shelduck	3	—	—	—	—	3	—
<i>Tadorna tadorna</i>	Shelduck	8	—	—	—	—	1	4/3
<i>Plectropterus gambensis</i>	Spur-winged Goose	1	—	—	—	—	1	—
<i>Callonetta leucophrys</i>	Ringed Teal	—	4	—	—	4	—	—
<i>Aix sponsa</i>	Carolina Duck	14	—	—	—	—	1	7/6
<i>Aix galericulata</i>	Mandarin Duck	12	—	—	—	—	7	2/3
<i>Anas penelope</i>	Wigeon	2	—	—	—	—	—	1/1
<i>Anas sibilatrix</i>	Chiloe Wigeon	13	—	—	—	1	4	2/1/5
<i>Anas falcata</i>	Falcatated Teal	3	—	—	—	—	2	1/0
<i>Anas strepera</i>	Gadwall	3	—	—	—	—	—	1/2
<i>Anas crecca</i>	Teal	2	—	—	—	—	—	1/1
<i>Anas specularioides</i>	Crested Duck	6	—	—	—	—	—	2/3/1
<i>Anas acuta</i>	Pintail	3	—	—	—	—	—	1/2
<i>Anas bahamensis</i>	Bahama Pintail	2	4	—	—	4	1	0/1
<i>Anas querquedula</i>	Garganey	1	—	—	—	—	—	1/0
<i>Anas clypeata</i>	Shoveler	5	—	—	—	—	2	2/1
<i>Netta rufina</i>	Red-crested Pochard	7	—	—	—	—	—	3/4
<i>Aythya ferina</i>	Pochard	2	—	—	—	1	—	0/1
<i>Aythya fuligula</i>	Tufted Duck	2	—	—	—	—	—	0/2
<i>Aythya marila</i>	Greater Scaup	6	—	—	—	1	1	2/2
<i>Somateria mollissima</i>	Eider Duck	14	—	1	1	—	—	4/10
<i>Bucephala islandica</i>	Barrow's Goldeneye	2	—	—	—	—	—	0/2
<i>Oxyura vittata</i>	Argentine Ruddy Duck	1	—	—	—	—	—	1/0
Falconiformes								
<i>Gyps africanus</i>	African White-backed Vulture	1	—	—	—	—	—	1/0
<i>Gyps rueppellii</i>	Ruppell's Griffon Vulture	4	—	—	—	—	—	2/2
<i>Torgos tracheliotus</i>	Lappet-faced Vulture	2	—	—	—	—	2(2)	—
<i>Parabuteo unicinctus</i>	Harris' Hawk	—	1	—	—	—	—	1/0
<i>Buteo jamaicensis</i>	Red-tailed Hawk	1	—	—	—	—	1	—
<i>Aquila rapax</i>	Tawny Eagle	1	1	—	—	—	—	2/0
<i>Sagittarius serpentarius</i>	Secretary Bird	—	1	—	—	1	—	—
<i>Falco tinnunculus</i>	Kestrel	1	2	—	—	—	2	1/0
<i>Falco biarmicus</i>	Lanner Falcon	—	3	—	—	—	—	3/0
<i>Falco mexicanus</i>	Prairie Falcon	—	1	—	—	—	—	1/0
Galliformes								
<i>Francolinus erckelii</i>	Erckel's Francolin	1	—	—	—	—	—	1/0
<i>Lophophorus impeyanus</i>	Impeyan Pheasant	3	—	—	—	—	2	0/1
<i>Gallus gallus</i>	Red Jungle Fowl	51	5	—	—	3	29	11/10/3
<i>Lophura swinhoii</i>	Swinhoe's Pheasant	4	—	—	—	1	3	—
<i>Crossoptilon mantchuricum</i>	Brown Eared Pheasant	3	—	—	—	—	2	1/0
<i>Crossoptilon crossoptilon</i>	White Eared Pheasant	—	2	—	—	—	—	1/1
<i>Crossoptilon auritum</i>	Blue Eared Pheasant	1	—	—	—	—	—	1/0

		1	2	3	4	5	6	7	
<i>Syrmaticus mikado</i>	Mikado Pheasant	2	—	—	—	—	2	—	
<i>Chrysolophus pictus</i>	Golden Pheasant	1	—	—	—	1	—	—	
<i>Pavo cristatus</i>	Common Peafowl	176	13(1)	—	—	4	5	0/0/180	
<i>Numida meleagris</i>	Helmeted Guineafowl	1	—	—	—	—	1	—	
Gruiformes									
<i>Grus monacha</i>	Hooded Crane	1	—	—	—	—	—	0/1	
<i>Grus canadensis</i>	Sandhill Crane	2	—	—	—	—	—	1/1	
<i>Grus japonensis</i>	Red-crowned Crane	6	—	—	—	—	2	2/2	
<i>Grus vipio</i>	White-naped Crane	4	—	1	—	—	—	2/2/1	
<i>Grus antigone</i>	Sarus Crane	—	1	—	—	—	—	0/1	
<i>Grus rubicunda</i>	Brolga	2	—	—	—	—	—	1/1	
<i>Bugeranus carunculatus</i>	Wattled Crane	5	2	—	—	—	1	3/3	
<i>Anthropoides virgo</i>	Demoiselle Crane	3	—	—	—	—	—	1/2	
<i>Anthropoides paradisea</i>	Stanley Crane	6	—	1	—	1	2	2/1/1	
<i>Balearica regulorum</i>	South African Crowned Crane	8	—	—	—	5	—	3/0	
<i>Otis tarda tarda</i>	Great Bustard	5	—	—	—	—	—	3/2	
Psittaciformes									
<i>Pseudeos fuscata</i>	Dusky Lory	2	—	—	—	—	—	1/1	
<i>Eolophus roseicapillus</i>	Roseate Cockatoo	1	—	—	—	—	—	0/1	
<i>Cacatua galerita</i>	Greater Sulphur-crested Cockatoo	3	—	—	—	—	—	2/1	
<i>Cacatua sanguinea</i>	Bare-eyed Cockatoo	2	1	—	—	—	—	1/2	
<i>Alisterus scapularis</i>	King Parrot	2	—	—	—	—	—	1/1	
<i>Platycercus eximius ceciliae</i>	Golden-mantled Rosella	1	1	—	—	—	—	2/0	
<i>Psittacus erithacus</i>	Grey Parrot	3	—	—	—	—	2	0/0/1	
<i>Psittacus eupatria</i>	Alexandrine Parrakeet	1	—	—	—	—	1	—	
<i>Ara macao</i>	Scarlet Macaw	2	2	—	—	—	2	2/0	
<i>Ara chloroptera</i>	Green-winged Macaw	2	—	—	—	—	1	1/0	
<i>Cyanoliseus patagonus</i>	Patagonian Conure	1	6	—	—	1	—	1/0/5	
<i>Myiopsitta monachus</i>	Quaker Parrakeet	2	—	—	—	—	—	1/1	
Strigiformes									
<i>Tyto alba</i>	Barn Owl	5	3	—	—	1	1	3/1/2	
<i>Otus leucotis</i>	White-faced Scops Owl	2	—	—	—	—	—	1/1	
<i>Nyctea scandiaca</i>	Snowy Owl	2	—	—	—	—	—	1/1	
<i>Strix aluco sylvatica</i>	Tawny Owl	2	—	—	—	—	—	1/1	
<i>Strix uralensis</i>	Ural Owl	2	—	—	—	1	1	—	
Coraciiformes									
<i>Dacelo novaeguineae</i>	Laughing Kookaburra	—	1(1)	—	—	—	—	0/0/1	
Piciformes									
<i>Baillonioides bailloni</i>	Saffron Toucanet	2	—	—	—	—	—	1/1	
<i>Ramphastos citreolaemus</i>	Citron-throated Toucan	2	—	—	—	—	—	0/2	
<i>Ramphastos vitellinus ariel</i>	Ariel Toucan	1	—	—	—	1	—	—	
Passeriformes									
<i>Carpodacus mexicanus</i>	Mexican Rose Finch	6	—	—	—	—	—	3/3	
<i>Urocissa erythrorhyncha occipitalis</i>	Red-billed Blue Pie	1	1	—	—	—	1	0/1	
Domestic									
	Old English Game Bantam	2	—	—	—	1	—	1/0	
	Birmingham Roller Pigeon	19	22	—	—	1	12	11/17	
	Tumbler Pigeon	8	—	—	—	—	8	—	
Total: Birds		841	99(5)	63	6	63	185(8)	749	
REPTILES									
Testudines									
<i>Testudo graeca</i>	Spur-thighed Tortoise	24	3	25	—	1	17	6/12/16	
<i>Testudo hermanni</i>	Hermann's Tortoise	18	2	3	—	2	—	3/11/7	
Crocodylia									
<i>Osteolaemus tetraspis</i>	West African Dwarf Crocodile	—	2	—	—	—	—	1/1	
Sauria									
<i>Eublepharis macularius</i>	Leopard Ground Gecko	15	—	16	1	3	12	1/3/11	
<i>Basiliscus plumifrons</i>	Plumed Basilisk	7	—	1	—	1	—	0/0/7	
<i>Iguana iguana</i>	Common Iguana	4	5	—	—	1	—	1/0/7	

<i>Agama stellio</i>	Starred Agama	4	—	—	—	3	—	0/0/1	
<i>Eumeces schneiderii</i>	Schneider's Skink	4	—	—	—	—	—	0/0/4	
<i>Scincus scincus</i>	Sand Fish	5	—	—	—	1	—	0/0/4	
<i>Uromastyx aegypticus</i>	Egyptian Dabb-Lizard	2	1	—	—	2	—	0/0/1	
<i>Anolis carolinensis</i>	Carolina Anolis-Lizard	—	3	—	—	—	—	0/0/3	
<i>Anolis sagrei</i>	Anolis Lizard	—	9	—	—	7	—	0/0/2	
<i>Callisaurus draconoides</i>	Zebra-tailed Lizard	—	2	—	—	2	—	—	
<i>Phrynosoma platyrhinos</i>	Desert-horned Lizard	—	4	—	—	3	1	—	
<i>Varanus exanthematicus</i>	Bosc's Monitor	—	3	—	—	—	—	0/0/3	
Serpentes									
<i>Python molurus bivittatus</i>	Burmese Python	2	4	—	—	2	1	2/1	
<i>Python regius</i>	Royal Python	2	—	—	—	—	2	—	
<i>Epicrates subflavus</i>	Jamaican Boa	1	—	—	—	—	—	0/1	
<i>Thamnophis sirtalis</i>	Garter Snake	—	3	—	—	—	—	0/0/3	
<i>Malopolon moilensis</i>	Moila Snake	1	—	—	—	—	—	0/0/1	
<i>Cerastes cerastes</i>	Horned Cerastes-Viper	—	4	—	—	—	1	1/2	
Total: Reptiles		89	45	45	1	28	34	116	

AMPHIBIANS

Caudata

<i>Ambystoma mexicanus</i>	Axolotl	2	—	—	—	1	—	0/0/1
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Anura

<i>Bufo marinus</i>	Cane Toad	2	—	—	—	—	—	0/0/2
<i>Ceratophrys cornuta</i>	Horned Toad	2	—	—	—	—	—	0/0/2
<i>Dendrobates auratus</i>	Black/Green Poison Arrow Frog	4	—	—	—	1	1	0/0/2
<i>Dendrobates pumilio</i>	Strawberry Poison Arrow Frog	1	—	—	—	—	1	—
<i>Phyllobates sp.</i>	Poison Arrow Tree Frog	—	3	—	—	—	—	0/0/3
<i>Hyla septentrionalis</i>	Cuban Tree Frog	3	—	—	—	2	—	0/0/1
<i>Rhacophorus dennysi</i>	Giant Asian Tree Frog	—	6	—	—	—	—	0/0/6

Total: Amphibians **14** **9** **—** **—** **5** **1** **17**

SUMMARY

London Zoo

	1	2	3	4	5	6	7	Number of Species (excluding domestic)
Mammals	1159	161(2)	1027	102	235	1072(35)	938	106
Birds	884	108(8)	226	76	151	96(5)	895	242
Reptiles	460	102	87	4	84	108	453	102
Amphibians	202	140	23	2	135	33	195	32
Total	2705	511(10)	1363	184	605	1309(40)	2481	482

Estimated number of fishes and invertebrates in the Collection at 31 December 1990:
 Fishes Approx 2,600+ 290+ species
 Invertebrates (excluding some common species) Approx 13,100 130+ species
 (+ 12 colonies)

Whipsnade Wild Animal Park

Mammals	1645	107(35)	884	51(2)	177	501(2)	1907	62
Birds	841	99(5)	63	6	63	185(8)	749	87
Reptiles	89	45	45	1	28	34	116	18
Amphibians	14	9	—	—	5	1	17	7
Total	2589	260(40)	992	58(2)	273	721(10)	2789	174

Estimated number of fishes and invertebrates in the Collection at 31 December 1990:
 Fishes Approx 170+ 31 species
 Invertebrates (excluding some common species) Approx 120+ Ants 15 species

Grand Total

Zoological Society of London	5294	771	2355	242	878	1580	5270	588*
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*The species common to London Zoo and Whipsnade Wild Animal Park are counted as one.

COLLABORATIVE RESEARCH, ADVISORY AND CONSULTANT SERVICES

- AFRC Animal Breeding Research Organization, Roslin:* Collaborative studies on seasonal control of oestrogen secretion in Deer.
- AFRC Institute of Animal Physiology & Genetics Research, Babraham:* Collaborative projects on molecular biology of trophoblast interferons and on IGF gene expression in primate ovaries.
- AFRC Institute for Food Research, Norwich:* Collaborative evaluation of new methods for diagnosis of disease.
- AFRC Institute for Grassland & Animal Production, Hurley:* Collaborative studies on reproductive technology in Red Deer.
- Al-Areen Wildlife Park, Bahrain:* Collaborative study on semen preservation in Arabian Oryx.
- The Alistair Reid Snake Venom Research Unit, WHO Collaborative Centre for the Control of Antivenoms, Liverpool School of Tropical Medicine:* Advice on housing and management of venomous snakes.
- Biochemical Genetics Research Group, Clinical Research Centre, Harrow:* Collaborative project on the evolutionary biology of the enzyme, alanine glyoxylate aminotransferase.
- Bohedma Reserve, Tunisia:* Health assessment of Reserve animals, especially reintroduced Scimitar-horned Oryx.
- British Antarctic Survey:* Collaborative study on nutrients metabolism in Macaroni and Gentoo Penguins during different physiological states.
- Chapultepec Zoo, Mexico:* Advice and assistance with breeding, and advice on preparations for hand-rearing of Giant Pandas.
- CHUMA Primate & Wildlife Rescue Centre, Bangkok:* Advice on management of young primates.
- Corporation of London Veterinary Department and Animal Quarantine Station:* Advice on identification, handling and management of reptiles.
- Council of Agriculture, Taiwan:* Advice on zoo and wild animal medicine and management.
- Dalgety Plc and Anglia Higher Education College, Cambridge:* Collaborative research on chemical communication in mammals.
- Doha Zoo, Municipality of Doha, Qatar:* Management of the national zoo for the Qatar Government.
- People's Republic of China Ministry of Forestry (with International Union for Conservation of Nature and Natural Resources/World Wide Fund for Nature/North of England Zoological Society/Marwell Zoological Trust/Longleat/Glasgow Zoo):* Continuing monitoring of reintroduced Père David's Deer.
- German Primate Centre, Göttingen:* Collaborative research on primate ovarian function and development of non-invasive techniques for monitoring reproductive status in exotic species.
- Guy's Hospital, London:* Collaborative study on *in vitro* fertilisation and embryo transfer in Tigers.
- HM Customs:* Housing and advice on identification of reptiles.
- Homerton Hospital, London:* Collaborative project on dietary fats and nutrition in pregnancy.
- Hospital for Tropical Diseases, London:* Collaborative evaluation of new methods for diagnosis of disease; laboratory service for testing of serum for diagnosis of *Toxocariasis*.
- Imperial Cancer Research Fund, London:* Collaborative project on genetic control of sex determination.
- Institute of Anatomy, Free University of Berlin:* Collaborative research on structure-function relationship of primate granulosa cells.
- Institute of Biochemistry, Veterinary University, Vienna:* Collaborative studies on steroid hormone analysis in exotic species.
- International Union for the Conservation of Nature and Natural Resources:* Advice on management of Philippine Spotted Deer and Tamaral, and on introduction of Przewalski's Horse to Mongolia.
- Jersey Wildlife Preservation Trust:* Collaborative projects on artificial insemination in Lowland Gorillas and on genetic analysis of the Mauritius Pink Pigeon.
- John Radcliffe Hospital, Oxford (Nuffield Department of Clinical Medicine):* Advice on housing and management of venomous snakes.
- Kenya Wildlife Service:* Assistance with funding and organisation of conservation programmes for Black Rhinoceros and African Elephant.
- King's College [KQC], London (Department of Physiology):* Collaborative research on melatonin binding in the Wallaby.
- London Fertility Unit:* Collaborative study of human granulosa cells.
- The London Hospital (Department of Anatomy):* Collaborative studies on marsupial sexual differentiation.
- London School of Hygiene and Tropical Medicine:* Collaborative evaluation of new methods for diagnosis of disease.
- Macaulay Land Use Research Institute, Edinburgh:* Collaborative project on the development of seasonality and reproductive technology in Red and Père David's Deer.
- MAFF Experimental Husbandry Farm, Hereford:* Collaborative project on reproductive technology in Deer.
- MAFF Fisheries Laboratory, Lowestoft:* Collaborative research on fish pheromones.
- Marwell Zoological Trust:* Assistance with the development of artificial breeding techniques; collaboration with studbook keepers for karyotyping Okapi in British Zoos.
- Meat & Livestock Commission Pig Breeding Centre:* Collaborative project on sperm motility.
- National Avian Research Centre, United Arab Emirates:* Advice on nutrition of Bustards.
- National Institute for Biological Studies and Control, London:* Collaborative studies on the

- Kenya Wildlife Service:* Dr R A Brett; Dr R Hoare (on secondment, Rhinoceros and Elephant studies).
- Linnean Society of London:* Dr M A Edwards (Editorial Committee and Programmes Committee).
- London Food Commission:* Professor M A Crawford (Trustee).
- Mammal Society:* Dr J H W Gipps (Council Member).
- Marwell Zoological Trust:* Mr D M Jones (Trustee); Dr G M Mace (Member, Scientific and Animal Management Committee).
- Medical Research Council:* Professor G H du Boulay (Member, Cell Board); Professor A P F Flint (Member, Systems Boards' Grants Committee B).
- Medicina:* Dr A Voller (Editorial Board).
- National Federation of Zoological Gardens of Great Britain and Ireland:* Dr P M Bennett (Secretary, Conservation and Animal Management Committee); Miss A M Dixon; Mr R A Kock; Mr P J S Olney (Members, Conservation and Animal Management Committee); Mr M Ricketts; Mrs S D Tunnicliffe (Members, Education Working Group); Mr D M Jones (Treasurer).
- National Hospital for Nervous Diseases, London:* Professor G H du Boulay (Honorary Consultant; Trustee, Queen Square Development Foundation).
- National Marine Aquarium, Plymouth:* Dr C Andrews (Management Committee).
- National Trust:* Mr C Webster (Whipsnade Advisory Committee).
- Neuroradiology:* Professor G H du Boulay (Editor-in-Chief).
- Oxford Reviews of Reproductive Biology:* Professor A P F Flint (Editorial Board).
- Primate Society of Great Britain:* Dr D H Abbott; Dr G M Mace (Members, Captive Care Working Party); Dr J K Kirkwood; Mr A W Sainsbury (Council).
- Programme for Appropriate Technology in Health (PATH):* Dr A Voller (Technical Advisory Group).
- Radiological Research Trust:* Professor G H du Boulay (Director).
- Reproduction Research Information Services:* Dr A S I Loudon (Member, Management Board).
- Royal (Dick) School of Veterinary Studies, Edinburgh:* Dr G R Smith (External Examiner in Veterinary Microbiology).
- Royal Society of Medicine:* Dr G R Smith (Council Member, Section of Comparative Medicine).
- Royal Society for the Prevention of Cruelty to Animals:* Mr P J S Olney (Member, Wild Animals Advisory Committee).
- XIV Symposium Neuroradiologicum 1990:* Professor G H du Boulay (President).
- Tropenmedizin und Parasitologie:* Dr A Voller (Editorial Board).
- Trust for Research and Education in the Biology of Reproduction:* Professor A P F Flint (Committee).
- University of Bristol:* Dr J K Kirkwood (Visiting Lecturer, Department of Animal Husbandry).
- University of London:* Dr D H Abbott (Honorary Research Fellow, Department of Biology, University College; Visiting Lecturer, Department of Physiology, King's College [KQC] and Royal Veterinary College); Dr C M Argo; Dr A S I Loudon; Dr H J Shaw (Course Lecturers, Department of Biology, University College); Professor G H du Boulay (Emeritus Professor of Radiology, National Hospital for Nervous Diseases); Dr B R Brinklow (Honorary Lecturer, Department of Physiology, King's College; Course Lecturer, Department of Biology, University College; Visiting Lecturer, Department of Biomedical Science, Polytechnic of Central London); Dr C G Faulkes (Visiting Lecturer, Department of Physiology, King's College [KQC]); Professor A P F Flint (Member, Academic Advisory Board in Biology; Member, Board of Studies in Biology; Visiting Professor in Biology, University College; Visiting Professor, Biosphere Sciences Division, King's College [KQC]); Dr W V Holt (Honorary Lecturer in Physiology, King's College [KQC]); Mr D M Jones (Member, Board of Studies in Biology); Dr J K Kirkwood (Member, Board of Studies, Royal Veterinary College); Dr G M Mace; Dr H F Stanley (Course Lecturers, Intercollegiate Lecture Courses); Dr H D M Moore (Honorary Research Fellow, Department of Biology; Visiting Lecturer, Department of Zoology, University London); Mrs S D Tunnicliffe (Council Member, Institute of Education); Dr A Voller (Reader in Immunology of Parasitic Diseases, London School of Hygiene and Tropical Medicine; Council Member, London School of Hygiene and Tropical Medicine); Dr G E Webley (Honorary Lecturer in Physiology, King's College [KQC]; Course Lecturer, Royal Veterinary College and Department of Biology, University College).
- University of Nottingham School of Agriculture:* Professor M A Crawford (Special Professor of Applied Biochemistry and Nutrition); Professor A P F Flint (Special Professor of Molecular Biology).
- Vaccine:* Dr A Voller (Editorial Board).
- Veterinary Deer Society:* Mr R A Kock (Editorial Committee).
- Veterinary Invertebrate Society:* Mr A A Cunningham (Secretary).
- Veterinary Research Club:* Dr G R Smith (Council).
- Wildlife Link:* Miss A M Dixon (Member; Zoological Society representative); Mr M Ricketts; Mrs S D Tunnicliffe (Members, Education Group).
- Wisconsin Regional Primate Research Center, University of Wisconsin, USA:* Dr G E Webley (International Affiliate Scientist).
- World Association of Wildlife Veterinarians:* Mr A W Sainsbury (Corresponding Secretary).
- World Health Organization:* Dr A Voller (Member, Expert Advisory Panel on Parasitology; Member,

WHO/IUIS Sub-committee on Standardization of Reagents for Enzyme Immunoassays).

World List of Scientific Periodicals: Mr R A Fish (Council Member).

The World Parrot Trust: Dr P M Bennett (Board of Management).

World Pheasant Association: Mr P J S Olney (Council).

World Society for the Protection of Animals: Mr A W Sainsbury (Scientific Advisory Panel).

World Wide Fund for Nature: Dr R A Brett (Project Executive, Rhinoceros Conservation Programme, Laikipia, Africa); Mr D M Jones (Trustee and Member of Conservation Review Group, UK).

FINANCIAL STATEMENTS
Consolidated Revenue Account
for the year ended 31st March 1991

	Note	Year ended 31st March 1991 £'000s	Year ended 31st March 1990 £'000s
Income from activities	2	8,174	6,997
Cost of activities	2	12,537	11,525
Net deficit on activities		(4,363)	(4,528)
Administrative expenses		(236)	(189)
		(4,599)	(4,717)
Other operating income	3	15	18
Operating deficit for the year	4	(4,584)	(4,699)
Income from investments	6	24	80
Interest receivable	7	1,099	1,560
		1,123	1,640
		(3,461)	(3,059)
Government Grant	8	1,383	1,315
Deficit for the year		(2,078)	(1,744)
Exceptional items			
Grants for purchasing fixed assets		518	985
Surplus/(deficit) on sale of assets		(9)	84
Extraordinary items			
Payment on early termination of contract		—	(200)
Excess of expenditure over income		(1,569)	(875)
Appropriations			
From Endowment Fund	16	2,238	1,624
(To) Development Fund	17	(651)	(811)
(To)/from Other Designated Funds	18	57	(80)
(To)/from Building and Equipment Fund	19	376	(342)
		451	(484)
General Fund balance brought forward		508	992
General Fund balance carried forward		959	508

The notes on pages 69 to 81 form part of these accounts.

Consolidated Balance Sheet at 31st March 1991

	Note	£'000s	1991 £'000s	1990 £'000s
Fixed Assets				
Tangible assets	9		6,926	5,005
Investments	10		932	991
			<u>7,858</u>	<u>5,996</u>
Current assets				
Stocks	11	517		670
Debtors	12	1,320		1,732
Bank balances		5,131		9,364
		<u>6,968</u>		<u>11,766</u>
Creditors: amounts falling due within one year	13	(2,542)		(2,936)
Net current assets			<u>4,426</u>	<u>8,830</u>
Total assets less current liabilities			<u>12,284</u>	<u>14,826</u>
Creditors: amounts falling due after more than one year	14		(26)	(15)
			<u>12,258</u>	<u>14,811</u>
Funds				
Endowment	15		5,592	7,998
Development	16		3,618	3,705
Other Designated	17		1,095	1,152
Building and Equipment	18		994	1,448
General	19		959	508
			<u>12,258</u>	<u>14,811</u>

Approved by Council 9th July 1991
 PEYTON
 Treasurer
 PROFESSOR AVRION MITCHISON
 President

The notes on pages 69 to 81 form part of these accounts.

Consolidated Statement of source and application of funds for the year ended 31st March 1991

	Note	Year ended 31st March 1991 £'000s	Year ended 31st March 1990 £'000s
Application of Funds			
(Deficit) for the year before Government Grant		(3,461)	(3,059)
Government Grant		1,383	1,315
(Deficit) for the year		(2,078)	(1,744)
Items not involving the movement of Funds			
Depreciation		1,298	513
Transfers from other funds		(984)	(283)
Total absorbed by operations		(1,764)	(1,514)
Funds from other sources			
Surplus/(deficit) on sale of assets		(9)	84
Grants for purchasing fixed assets		518	985
Net decrease in investments		59	—
		568	1,069
		(1,196)	(445)
Net increase in investments		—	(84)
Purchase of tangible fixed assets	24	(3,219)	(3,268)
Extraordinary item		—	(200)
		(3,219)	(3,552)
		(4,415)	(3,997)
Movement in working capital			
Increase/(decrease) in stocks	24	(153)	486
Increase/(decrease) in debtors	24	(412)	86
(Increase)/decrease in creditors	24	25	(467)
		(540)	105
Movement in net liquid funds			
Increase/(decrease) in bank balances	24	(3,875)	(4,102)
		(4,415)	(3,997)

The notes on pages 69 to 81 form part of these accounts.

Report of the Auditors TO THE COUNCIL OF THE ZOOLOGICAL SOCIETY OF LONDON

We have audited the financial statements on pages 66 to 81 in accordance with Auditing Standards.

The financial statements have been prepared on a going concern basis. The Society continues to incur operational deficits and has a significant potential liability for repairing obligations in connection with the Regent's Park lease. Subsequent to the year end, in view of the persistent operational deficits and level of financial resources available to the Society, it has decided that the existing level of operations can no longer be sustained and intends to liquidate or curtail significantly some of its present activities. The appropriateness of the going concern basis is dependent upon the avoidance of significant liabilities arising on implementation of the aforementioned curtailment and in respect of repairing obligations in connection with the Regent's Park lease and the commencement of profitable operations subsequently.

Should the going concern basis prove to be inappropriate, adjustments would have to be made to reduce the value of the assets to their recoverable amount, to provide for any further liabilities which might arise, and to reclassify fixed assets and long term liabilities as current assets and liabilities.

As explained in Note 22, the Society has a significant potential liability for repairing obligations in connection with the Regent's Park lease. The Council is in negotiation with the Department of the Environment concerning this matter. At this time it is not possible to determine the ultimate outcome, and hence the cost, if any, which should be provided.

Subject to the above, in our opinion the financial statements give a true and fair view of the state of affairs at 31st March 1991 and the excess of expenditure over income and source and application of funds for the year ended on that date.

ERNST & YOUNG *Chartered Accountants*
London
9th July 1991

Notes to the Financial Statements

1. ACCOUNTING POLICIES

(a) *Accounting Convention*

The financial statements are prepared under the historical cost convention in accordance with applicable accounting standards.

(b) *Changes in Accounting Policies*

The Society changed its accounting policy for fixed assets and depreciation to that stated below from January 1984. Freehold land and buildings acquired prior to December 1983 are fully depreciated; other buildings, plant, vehicles and fittings and furnishings were written off in the year of purchase.

(c) *Basis of Financial Statements*

The financial statements have been prepared on a going concern basis. Subsequent to the year end, the Council has decided that the existing levels of operations can no longer be sustained and intends to liquidate or curtail significantly some of its present activities.

(d) *Consolidation*

The financial statements consolidate the results and the assets and liabilities of Zoo Operations Limited, a wholly owned subsidiary which manages the activities of the Zoological Gardens at London Zoo and Whipsnade Wild Animal Park and of the Education Department; activities formerly carried out by the Society itself, and the assets and liabilities of Pleasurerail Limited (renamed Whipsnade Wild Animal Park Limited), a wholly owned subsidiary acquired on 5th November 1990 and which is now dormant.

(e) *Form of Accounts*

The Society maintains a number of internal funds earmarked by the Society itself for specific purposes. These designated funds are:

- (i) **Endowment Fund:** This fund was created from a grant received from the Department of the Environment. The capital and income are available to help pay for the upkeep, improvement and management of the Zoological Gardens at London Zoo and Whipsnade Wild Animal Park.
 - (ii) **Development Fund:** This fund relates to expenditure incurred on new buildings, the restoration of existing buildings and changes to the infrastructure of the Society's properties carried out to improve the facilities available to the animals and to the members of the public. It is financed from donations and grants received from the public which in certain circumstances have been matched by grants from the Government.
 - (iii) **Other designated funds:** These have been given or bequeathed to the Society to be used in accordance with resolutions passed by the Council of the Society. Both the capital and the income may be spent. Until they are spent, the funds are invested in stocks, shares and deposits.
 - (iv) **Building and Equipment Fund:** The fund comprises grants received and appropriations from the General Fund which are wholly invested in tangible assets and which are released back to revenue over the expected useful life of the relevant asset by equal annual amounts.
 - (v) **General Fund:** The General Fund is the free fund of the Society. It has to provide for the maintenance, improvement and management of the Library, Publications, Institute of Zoology and membership administration as well as for the Society's requirement for working capital.
- (f) *Restricted Funds*
Restricted funds of the Society which have conditions attached to their use are not included in the balance sheet. Details of these are set out in note 20.
- (g) *Grants*
Government grants received of a revenue nature are credited to the General Fund in the year in which they are received. Grants received of a capital nature are credited to the Revenue Account and then appropriated to the appropriate designated fund and are released to revenue over the expected useful life of the relevant assets by equal annual amounts.
- (h) *Fixed Assets and Depreciation*
Fixed assets acquired by purchase or gift during the year are shown at cost or valuation depreciated on a straight line basis at rates appropriate to write off the cost over their expected useful lives. Freehold and leasehold buildings are depreciated over a range of 1 to 30 years; plant and equipment 5 to 10 years and motor vehicles 5 years.
- (i) *Investments and Investment Income*
Listed investments are included in the balance sheet at cost less diminution for permanent decline in value. Dividends and interest are accounted for when the cash is received. The amount shown includes the related tax credits which, because of the Society's charitable status, are recoverable. Interest on bank deposits is accounted for on an accruals basis.
- (j) *Stocks*
Stocks are stated at the lower of direct cost and net realisable value with the following exceptions: no value is placed on the animals, farm and garden stocks and the library; stocks of scientific publications are included at nominal valuation.
- (k) *Pension Costs*
The cost of providing pension benefits is charged to the revenue account over the period benefiting from employee's services.
- (l) *Leasing Commitments*
Assets obtained under finance leases are capitalised in the balance sheet and are depreciated over their useful lives. The interest element of the rental obligations is charged to the revenue account over the period of the lease and represents a constant proportion of the balance of capital repayments outstanding.

2. INCOME AND EXPENDITURE ON ACTIVITIES IS ATTRIBUTABLE AS FOLLOWS:

	Note	Income £'000s	Expenditure £'000s	1991 Surplus/ (Deficit) £'000s	1990 Surplus/ (Deficit) £'000s
<i>Specific activities</i>					
Zoological Gardens					
London Zoo	2(a)	4,695	6,528	(1,833)	(1,786)
Whipsnade Park	2(a)	2,033	3,003	(970)	(1,300)
Education	2(b)	162	241	(79)	(79)
Library	2(c)	2	116	(114)	(106)
Publications	2(d)	176	296	(120)	27
Institute of Zoology	2(e)	927	2,353	(1,426)	(1,337)
		<u>7,995</u>	<u>12,537</u>	<u>(4,542)</u>	<u>(4,581)</u>
<i>General activities</i>					
Members subscriptions and fees		103		103	106
Donations		149		149	8
Less: Scientific Fund transfer to Institute of Zoology		(73)	—	(73)	(61)
		<u>8,174</u>	<u>12,537</u>		
Net deficit on activities				<u>(4,363)</u>	<u>(4,528)</u>

2 (a) Zoological Gardens

	Note	London Zoo		Whipsnade Park	
		1991 £'000s	1990 £'000s	1991 £'000s	1990 £'000s
<i>Income</i>					
Admission of visitors		4,042	3,564	1,542	1,083
Catering and retail	2(f)	442	478	331	208
Miscellaneous income		110	86	103	62
Lifewatch and Friends of the Zoos		101	99	57	43
		<u>4,695</u>	<u>4,227</u>	<u>2,033</u>	<u>1,396</u>
<i>Expenditure</i>					
Staff costs		2,875	2,685	1,246	1,146
Provisions		343	336	201	197
Less: Income from animal adoption scheme		(163)	(164)	(21)	(20)
Overheads		2,354	2,116	801	657
Publicity and Advertising		835	574	656	358
Publications		—	10	—	—
Backlog maintenance		142	346	57	221
Depreciation		40	15	52	39
		<u>6,426</u>	<u>5,918</u>	<u>2,992</u>	<u>2,598</u>
(Deficit) in subsidiary Company		<u>(1,731)</u>	<u>(1,691)</u>	<u>(959)</u>	<u>(1,202)</u>
Overheads		—	(14)	3	217
Depreciation		886	219	206	52
Transfer from Endowment Fund		(108)	—	(60)	—
Transfer from Development Fund		(626)	(16)	(112)	(145)
Transfer from Building & Equipment Fund		(50)	(94)	(26)	(26)
(Deficit) in Society		<u>(102)</u>	<u>(95)</u>	<u>(11)</u>	<u>(98)</u>
(Deficit)		<u>(1,833)</u>	<u>(1,786)</u>	<u>(970)</u>	<u>(1,300)</u>

(b) Education

	London Zoo		Whipsnade Park	
	1991 £'000s	1990 £'000s	1991 £'000s	1990 £'000s
<i>Income</i>				
Education visits	107	79	41	29
Miscellaneous	14	21	—	—
	<u>121</u>	<u>100</u>	<u>41</u>	<u>29</u>
<i>Expenditure</i>				
Staff costs	155	127	26	13
Overheads	36	38	7	7
Publicity and Advertising	9	9	8	3
	<u>200</u>	<u>174</u>	<u>41</u>	<u>23</u>
Surplus/(deficit) in subsidiary Company	(79)	(74)	—	6
Overheads	—	(11)	—	—
(Deficit) in Society	—	(11)	—	—
Surplus/(deficit)	<u>(79)</u>	<u>(85)</u>	<u>—</u>	<u>6</u>

(c) Library

	1991 £'000s	1990 £'000s
<i>Income</i>		
	<u>2</u>	<u>2</u>
<i>Expenditure</i>		
Staff costs	70	67
Overheads	46	41
	<u>116</u>	<u>108</u>
(Deficit)	<u>(114)</u>	<u>(106)</u>

(d) Publications

	Journal of Zoology Symposia	International Zoo Yearbook	Zoological Record and Nomenclator	1991 Total	1990 Total
	£'000s	£'000s	£'000s	£'000s	£'000s
<i>Income</i>					
Sales	83	90	3	176	315
<i>Expenditure</i>					
Staff costs	74	50	10	134	115
Overheads	20	16	1	37	29
Printing	90	35	—	125	143
Depreciation	—	—	—	—	1
	184	101	11	296	288
Surplus/(deficit)	(101)	(11)	(8)	(120)	27

International Zoo Yearbook. Fixed costs are written off in the year in which they are incurred. Paper and printing costs are charged in the year in which each volume is published. Two volumes were published in 1990/91. (1989/90 – no volume published).

Journal of Zoology sales of £74,802 have been accounted for on an accruals basis (1989/90 sales of £271,453 were accounted for on a cash received basis; on an accruals basis sales would have been £224,997).

(e) Institute of Zoology

	Veterinary Science	Wellcome Laboratories	Nuffield Laboratories	1991 Total	1990 Total
	£'000s	£'000s	£'000s	£'000s	£'000s
<i>Income</i>					
Fees	8	1	18	27	20
Scientific Fund – Investment income (Note 18)	—	—	73	73	61
Grants Specific projects	14	469	344	827	793
	22	470	435	927	874
<i>Expenditure</i>					
Staff costs	339	365	797	1,501	1,401
Overheads	155	209	432	796	773
Depreciation	4	24	30	58	39
Transfer from Building & Equipment Fund	—	(1)	(1)	(2)	(2)
	498	597	1,258	2,353	2,211
(Deficit) on activities	(476)	(127)	(823)	(1,426)	(1,337)
Government Grant	349	174	860	1,383	1,315
Surplus/(deficit)	(127)	47	37	(43)	(22)

(f) Catering and Retail

The turnover and net contribution to the Society from Catering and Retail services were as follows:

	London Whipsnade		1991	London Whipsnade		1990
	Zoo	Park	Total	Zoo	Park	Total
	£'000s	£'000s	£'000s	£'000s	£'000s	£'000s
TURNOVER OF SERVICES						
Catering	2,412	655	3,067	2,144	423	2,567
Retail	1,376	464	1,840	1,233	361	1,594
	<u>3,788</u>	<u>1,119</u>	<u>4,907</u>	<u>3,377</u>	<u>784</u>	<u>4,161</u>
CONTRIBUTIONS TO SOCIETY						
Catering	110	196	306	212	28	240
Retail	332	135	467	266	180	446
	<u>442</u>	<u>331</u>	<u>773</u>	<u>478</u>	<u>208</u>	<u>686</u>

3. OTHER OPERATING INCOME

Income from consultancies

	1991	1990
	£'000s	£'000s
Income from consultancies	<u>15</u>	<u>18</u>

No provision has been made for taxation on consultancy income received from abroad. The Society does not believe there to be a liability to overseas taxation.

4. OPERATING DEFICIT FOR THE YEAR

After charging

Auditors' remuneration

Depreciation

Consultancy fees

Bank Interest payable

Finance charges on leased assets

	1991	1990
Auditors' remuneration	40	26
Depreciation	1,298	513
Consultancy fees	40	169
Bank Interest payable	1	—
Finance charges on leased assets	4	—
	<u>1,383</u>	<u>708</u>

	1991 £'000s	1990 £'000s
5. STAFF COSTS		
Wages and salaries	5,971	5,290
Employers National Insurance contributions	566	533
Other pension costs	401	404
	<u>6,938</u>	<u>6,227</u>
The average weekly number of employees during this period was made up as follows:		
Zoological Gardens – London Zoo	227	233
Whipsnade Park	104	110
Education	9	7
Library	4	4
Publications	8	8
Institute of Zoology	78	76
Administration	30	29
	<u>460</u>	<u>467</u>
6. INCOME FROM INVESTMENTS		
Listed investments	54	80
Permanent diminution in value of investment	(30)	—
	<u>24</u>	<u>80</u>
7. INTEREST RECEIVABLE		
Bank deposits	<u>1,099</u>	<u>1,560</u>
8. GOVERNMENT GRANT		
Revenue grant was received as follows:		
For Institute of Zoology	<u>1,383</u>	<u>1,315</u>

9. TANGIBLE FIXED ASSETS

	Freehold land and buildings £'000s	Short leasehold buildings £'000s	Plant and equipment £'000s	Motor vehicles £'000s	Leased plant £'000s	Total £'000s
<i>Cost</i>						
At 31st March 1990	939	3,469	1,536	382	58	6,384
Additions during this year	1,154	1,471	526	35	33	3,219
Disposals	—	—	—	(13)	—	(13)
At 31st March 1991	2,093	4,940	2,062	404	91	9,590
<i>Depreciation</i>						
At 31st March 1990	191	474	467	232	15	1,379
Charge for the year	186	744	301	56	11	1,298
Disposals	—	—	—	(13)	—	(13)
At 31st March 1991	377	1,218	768	275	26	2,664
<i>Net book value</i>						
At 31st March 1991	1,716	3,722	1,294	129	65	6,926
At 31st March 1990	748	2,995	1,069	150	43	5,005

Included in additions during the year is £1,053,574 (1989/90 – £NIL) incurred by the Endowment Fund and £1,753,502 (1989/90 – £2,157,286) incurred by the Development Fund.

10. INVESTMENTS

	1991 £'000s	1990 £'000s
Investments at cost, less provision		
Quoted investments	932	991
Market valuation at 31st March 1991	1,261	1,366
These investments are attributed to:		
Scientific Fund	1,237	1,342
Fantham Bequest	24	24
	1,261	1,366

11. STOCKS

Raw materials and consumables	206	247
Finished goods and goods for sale	311	423
	517	670

20. RESTRICTED FUNDS

(a) De Arroyave Fund

The capital of the fund is held by the Official Custodian for Charities. The net income was £23,597

(b) Davis Fund

The capital of the fund is held in trust by the Society but is not included on the balance sheet. The income from the fund was £161.

21. PENSION FUND

The Society participates in several Pension Schemes and employees join the appropriate scheme, depending on their employment terms. The total pension cost of the Society was £401,658 (1989/90 £404,497).

- (a) Universities Superannuation Scheme: This is a defined benefit scheme which is externally funded and contracted out of the State Earnings-Related Pension Scheme. The Fund is valued every three years by a professionally qualified independent actuary using the projected unit credit method, the rates of contribution payable being determined by the trustee on the advice of the actuary. In the intervening years, the actuary reviews the progress of the Scheme. Pension costs are assessed in accordance with the advice of the actuary, based on the latest actuarial valuation of the Scheme, and are accounted for on the basis of charging the cost of providing pensions over the period during which the Society benefits from the employees' services. Unless it is considered prudent to recognise deficiencies over a shorter period, variations from regular cost are spread over the expected average remaining working lifetime of Members of the Scheme after making suitable allowances for future withdrawals.

The Scheme provides benefits based on final pensionable salary for employees of all UK universities and some other employers such as the Society. The assets of the Scheme are held in a separate trustee-administered fund.

The latest actuarial valuation of the Scheme was at 31st March 1990. The main actuarial assumptions were an investment return of $8\frac{1}{2}\%$ per annum, salary scale increases of $6\frac{1}{2}\%$ per annum and that pensions would increase by 5% per annum.

At the date of the last actuarial valuation, the market value of the assets of the Scheme was £5,474 million and the actuarial value of the assets was sufficient to cover 90% of the benefits which had accrued to Members after allowing for the effect of future increases in their earnings. The level of contributions paid by the Society takes into account this actuarial deficiency.

- (b) Zoological Society of London Pension Fund and Zoological Society of London (1988) Pension Scheme: The Society's own self-administered occupational pension schemes are non-contributory defined benefit schemes which are externally funded and are not contracted out of the State Earnings-Related Pension Scheme. The funds are valued every three years by a professionally qualified independent actuary using the attained age method. In the intervening years, the actuary does not review the progress of the Schemes. Payments made to the schemes and charged in these financial statements are based upon actuarial advice. The assets of the schemes are held in separate trustee-administered funds.

The latest actuarial valuation of the Zoological Society of London Pension Fund was at 30th June 1987. The main actuarial assumptions are an investment return of 9% per annum, salary increases would average 7.5% per annum and that pensions would increase by 3% per annum

At the date of the latest actuarial valuation the market value of the assets was £7 million and the actuarial value of the assets exceeded the benefits that had accrued to members by 4.5%, after allowing for the effect of future increases in their earnings.

In recent years, the Society has formed subsidiary companies to carry out its trading functions. Under the terms of the Trust Deed of the Zoological Society of London Pension Fund, they cannot participate as employers. To overcome this the Zoological Society of London (1988) Pension Scheme was established from 2nd October 1988 after which all eligible new staff have joined this scheme. The Scheme has not yet been subject to a full actuarial valuation. The terms, conditions, scale of contributions, and benefits are identical to those of the Zoological Society of London Pension Fund. Council is of the opinion that the funding requirements of this new scheme are similar to those of the earlier scheme. It is intended to wind up the Zoological Society of London Pension Fund and transfer its assets and liabilities to the Zoological Society of London (1988) Pension Fund as soon as possible.

Actuarial valuation of both schemes as at 30 June 1990 have been undertaken but the results are not yet available. In the opinion of the directors, on the recent advice of their actuaries, the present level of funding is adequate.

- (c) Department of Education and Science: The Society contributes for four staff to a pension scheme administered through the Department of Education and Science, for teachers employed by the Society during their period of service.

	1991 £'000s	1990 £'000s
22. CAPITAL COMMITMENTS AND CONTINGENT LIABILITIES		
Expenditure contracted	217	1,101
Authorised but not yet contracted	29	338
	<u>246</u>	<u>1,439</u>

No provisions have been made for the significant potential liability estimated at £15 million for repairing obligations in connection with the Regent's Park lease. The Council understands that no obligation will pertain over certain buildings where operations are curtailed, and discussions continue with the Department of the Environment concerning the remaining potential obligations which are estimated at £2.5 million.

23. FINANCE LEASE OBLIGATIONS

Net amount payable		
Next year	15	9
In the second to fifth years	26	15
	<u>41</u>	<u>24</u>

24. NEW SUBSIDIARY UNDERTAKING

Fair Value of assets acquired on acquisition of Pleasurerail Limited (renamed Whipsnade Wild Animal Park Limited):

Plant and Equipment	152
Stocks	6
Debtors	13
Creditors	(17)
Cash	46
	<u>200</u>
Fair Value and Purchase Consideration	<u>200</u>

25. STATUS OF THE SOCIETY

The Society is incorporated by Royal Charter and is a registered charity, No. 208728. It is exempt from United Kingdom taxation.

LEGACIES TO THE SOCIETY

The Zoological Society of London is a registered charity (Number: 208728) and all gifts to it are completely exempt from capital gains tax and capital transfer tax.

Please consider leaving the Society a legacy in your will. The Society's many educational and conservation activities depend on the generosity of its friends and benefactors. Its world famous collection of animals and the Institute of Zoology also need financial support. Unless income can be constantly increased, there is certain to be a reduction in what the Society can achieve. A legacy would be a very real help.

Further advice on legacies and how the Society may benefit can be obtained from The Development Director, Zoological Society of London, Regent's Park, London NW1 4RY.



**THE ZOOLOGICAL
SOCIETY OF LONDON**



ANNUAL REPORT 1990–1991

