

Status Survey and Conservation Action Plan 2000–2004

Parrots

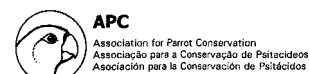
Edited by Noel Snyder, Philip McGowan,
James Gilardi, and Alejandro Grajal



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The Sultanate of Oman established the Peter Scott IUCN/SSC Action Plan Fund in 1990. The Fund supports Action Plan development and implementation. To date, more than 80 grants have been made from the Fund to Specialist Groups. As a result, the Action Plan Programme has progressed at an accelerated level and the network has grown and matured significantly. The SSC is grateful to the Sultanate of Oman for its confidence in and support for species conservation worldwide.

The Chicago Zoological Society (CZS) provides significant in-kind and cash support to the SSC, including grants for special projects, editorial and design services, staff secondments and related support services. The mission of CZS is to help people develop a sustainable and harmonious relationship with nature. The Zoo carries out its mission by informing and inspiring 2,000,000 annual visitors, serving as a refuge for species threatened with extinction, developing scientific approaches to manage species successfully in zoos and the wild, and working with other zoos, agencies, and protected areas around the world to conserve habitats and wildlife.

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The World Wide Fund for Nature (WWF) provides significant annual operating support to the SSC. WWF's contribution supports the SSC's minimal infrastructure and helps ensure that the voluntary network and Publications Programme are adequately supported. WWF aims to conserve nature and ecological processes by: (1) preserving genetic, species, and ecosystem diversity; (2) ensuring that the use of renewable natural resources is sustainable both now and in the longer term; and (3) promoting actions to reduce pollution and the wasteful exploitation and consumption of resources and energy. WWF is one of the world's largest independent conservation organisations with a network of National Organisations and Associates around the world and over 5.2 million regular supporters. WWF continues to be known as World Wildlife Fund in Canada and in the United States of America.

The Department of the Environment Transport and the Regions (DETR), UK supports a Red List Officer post at the SSC Centre in Cambridge, UK, where the SSC Trade Programme staff are also located. Together with two other Government-funded agencies, Scottish Natural Heritage and the Royal Botanical Gardens, Kew, the DETR is also financing a specialist plants officer. Further support for the centre is being offered by two NGO members of IUCN: the World Wide Fund for Nature - UK, and Conservation International, USA.

The Center for Marine Conservation (CMC) provides valuable in-kind and funding support to the marine work of SSC. It is the major funder of the Marine Turtle Specialist Group (MTSG) and has its headquarters in the United States. The CMC employs the MTSG Programme Officer, and administers funds on behalf of the Shark and Cetacean Specialist Groups. In addition a CMC staff member provides time to serve as SSC staff liaison for the marine specialist groups and the marine focal point for SSC, and supports the development of SSC's work in the marine realm. This staff member also serves as the marine focal point for the IUCN/SSC Red List Programme. CMC is dedicated to protecting ocean environments and conserving the global abundance and diversity of marine life through science-based advocacy, research and public education.

Production of the Parrot Action Plan was generously supported by:

The World Parrot Trust (WPT) was founded in 1989 to work exclusively for the conservation and welfare of parrots. Associated trusts and support groups have been formed in ten countries. Together, they have raised over US\$1.5 million and supported projects for 37 species in 22 countries. In 1995 WPT (with British Airways Assisting Conservation) funded a meeting of parrot experts in London, with the aim of proceeding with a Parrot Action Plan. The meeting was successful, and began the process resulting in the completed Action Plan. A major part of the necessary administration and funding for the Parrot Action Plan has been provided by the World Parrot Trust.

The Wildlife Conservation Society (WCS) formerly the New York Zoological Society has been dedicated to preserving the earth's wildlife and ecosystems since its establishment in 1895. WCS relies on long-term field studies to gather information on wildlife needs, and has forged numerous productive relationships with governments and local conservation organisations. WCS provided staff, communications, and administrative assistance for the production of this Action Plan. WCS also provided funding for editorial interns, and logistics for the second and final editorial meeting in New York.

The British Airways Assisting Conservation (BAAC) scheme was established in 1983 and provides logistical support for specific conservation projects, focusing on preserving the essential variety of life on Earth and encouraging the responsible use and sustainable management of the Earth's natural resources. BAAC provided air travel for delegates from Australia, Africa, Europe, and the USA to the Parrot Action Plan meeting where the framework of the plan was discussed and agreed. BA also provided travel for the final editorial meeting.

The National Audubon Society (NAS) founded in 1905 and with over 550,000 members in 518 chapters throughout the Americas, the National Audubon Society advances its mission to conserve and restore natural ecosystems, focusing on birds, other wildlife and their habitats for the benefit of humanity and the earth's biological diversity. NAS provided staff, communications, and editorial assistance for the production of this Action Plan.

The Association for Parrot Conservation (APC) was founded in 1993. Its mission is to promote the conservation of wild parrot populations through scientific research, policy recommendations, communication, and education. As a volunteer scientific organisation, the guiding principle of the APC is to promote techniques and strategies that maximise the conservation of biological diversity. APC provided time and communications support for this Action Plan.

The Research Centre for African Parrot Conservation (RCAPC) has recently been established to provide biological information that will underpin efforts to conserve the threatened parrots of Africa and its islands. As a research centre, RCAPC seeks to apply contemporary principles of conservation biology to issues in the management of parrot populations, both in the wild and captivity. Pan African collaboration and co-operation is central to this work. RCAPC was the focus for African input to the plan.

The Birds Australia Parrot Association (BAPA) is a specialist group attached to Birds Australia (formerly Royal Australian Ornithologists Union), with aims to promote an interest in parrots of the Australian region and their conservation. It is a strong supporter of the Parrot Action Plan and has provided extensive input into the sections relating to Australia, New Zealand, and the south-west Pacific region.

BirdLife International is a global alliance of non-governmental conservation organisations (BirdLife Partners) with a focus on birds who, together, are the leading authority on the status of all the world's birds, their habitats, and the issues and problems affecting bird life. BirdLife is the official Red List Authority for birds for the Species Survival Commission and keeps its information on globally threatened bird species up-to-date through its Globally Threatened Species Programme, involving the BirdLife partnership, SSC Bird Specialist Groups, other authoritative organisations, and a worldwide network of ornithologists and conservationists, co-ordinated by the BirdLife Secretariat. BirdLife's long-term aims are to: prevent the extinction of any bird species; maintain and where possible improve the conservation status of all bird species; conserve and where appropriate improve and enlarge sites and habitats important for birds; help, through birds, to conserve biodiversity and to improve the quality of people's lives; integrate bird conservation into sustaining people's livelihoods.

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Foreword

Parrots have, for centuries, been taken into our homes because of their beauty, charm, hardiness, and supposed ability to “talk”. This has created a domestic demand, involving hundreds of thousands of birds annually on a global basis, resulting in many parrot taxa having a high monetary value. The large charismatic mammals: whales, tigers, elephants, rhinoceroses, gorillas, and pandas have to contend with a host of threats directly related to their rarity and monetary value, but none of these are subject to capture for live domestic use. No other group of birds has been subjected to more exploitation, numerically and financially, than parrots.

Parrots are also exposed to hunting pressures but above all to habitat loss, alteration and fragmentation. As ecosystems around the world are destroyed or degraded, so the survival prospects of the parrots decline. And yet parrots have the potential to act as charismatic “flagship species” to highlight the urgent need to preserve habitats. In doing so habitat protection can be afforded to a multitude of species.

There is an urgent need to change the attitudes of two special interest groups. Firstly, the many millions of owners that keep parrots as pet or companion animals, or for breeding for the pet trade, should be urged to accept more responsibility for the survival of parrots in the wild and the welfare of existing captive parrots. The second category pertains to the many businesses that are unquestionably built upon the “parrot phenomenon”: the tens of millions of parrots being kept in captivity. These companies that trade parrots, their food, cages and other goods, should be encouraged to donate a proportion of their global annual income to parrot conservation. But with only one or two commendable exceptions, few of these companies donate anything to the conservation of the birds that support their wealth. If parrots are to survive, these attitudes must change.

Governments of the parrot range countries also need to address the unsustainable nature of parrot markets operating within their borders. And whilst it is difficult to propose a species for which a convincing scientific case for sustainable use can be made, current harvesting levels are threatening a number of species and should be addressed.

The few countries still allowing “quotas” of parrots for export should be required to provide appropriate scientific justification for this.

Most governments, however, seek, in principle, to protect and preserve their wildlife, and have considerable expertise at their disposal. This was clearly demonstrated when the joint compilers of this Action Plan sent out requests for updated information on threatened parrot species. The response from all quarters was swift and positive, and the result is an effective document that will guide conservation efforts for several years.

Special thanks are due to the editors, Noel Snyder, Phil McGowan, Jamie Gilardi, and Alejandro Grajal, for their extended commitment to the project and their determination to achieve the highest standards. Needless to say, the contributions of the many experts around the world were invaluable. Thanks are also due to Rod Hall MBE of British Airways Assisting Conservation (BAAC), now part of British Airways Environment Department. It was Rod’s idea to bring together the world’s leading parrot people to start this Parrot Action Plan process, and British Airways (BA) provided flights to bring ten key participants to the conference organised by the World Parrot Trust in London in 1995. BA also provided flights to Africa, and to the final review meeting in New York.

There is no shortage of field biologists interested in working with the parrots and people prepared to commit themselves to the fascinating and often urgent tasks at hand. Priorities for many of these projects emerge clearly from this Action Plan. Given that the interest and expertise exist, we must ensure that the next steps, which are the provision of the necessary funds, and the support of the relevant authorities, are taken.

The sheer enthusiasm that has carried this Action Plan to completion must be sustained. Readers may well be able to help support the many ongoing activities discussed in this Plan, or initiate action where no work is currently under way. The authors and the World Parrot Trust are available to advise and co-ordinate these efforts.

Michael Reynolds
Hon. Director, World Parrot Trust

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The plan was stimulated by a meeting chaired by Joe Forshaw, arranged by the World Parrot Trust, and extensively supported by British Airways Assisting Conservation in June 1995. The meeting was proposed by Rod Hall (British Airways Assisting Conservation) and Mike Reynolds (World Parrot Trust) as the starting point for the production of an Action Plan for the parrots of the world. This followed a previous attempt to prepare an Action Plan in the early 1990s which has been widely cited. We gratefully acknowledge the support provided by Rod and Mike throughout the compilation of this plan. At the June 1995 meeting, the Association for Parrot Conservation, BirdLife International, the Species Survival Commission, and the World Parrot Trust committed themselves to the publication of an Action Plan. These organisations have been joined by the Wildlife Conservation Society, Wildlife Preservation Trust International, National Audubon Society, Birds Australia Parrot Association, and the Research Centre for African Parrot Conservation to ensure representative coverage from all parts of the world where parrots are found. Without the commitment of any one of these organisations the Action Plan would be of limited value and their continued support is readily acknowledged.

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Noel Snyder, Philip McGowan, James Gilardi, and Alejandro Grajal

Executive Summary

Of the approximately 330 known parrot species, 95 are listed in this Action Plan. Approximately half of these occur in the Western Hemisphere and half in the Eastern Hemisphere. The majority are found in tropical regions. The proportion of extant parrot species that are threatened (28 %) is one of the highest for any major family of birds. Yet the number of parrot species that have been given careful field study to determine the best means of conservation remains low. Comprehensive conservation strategies are not yet possible for many species because not enough information is available to allow rigorous identification of causes of endangerment with confidence. Because of this relative dearth of information, Chapters 1 and 2 of this Action Plan place substantial emphasis on conservation research methods and strategies applicable to parrots in general.

Parrots face a great variety of threats, ranging from the impacts of introduced predators and competitors to habitat destruction and shooting for food. For nearly 78 species of this Action Plan, habitat destruction and fragmentation are the principal causes of endangerment. Perhaps more than any other bird group, parrots also face the considerable extra pressures of the bird trade. In this Action Plan, 36 species are threatened primarily by insufficiently controlled and unsustainable harvest from the wild. Much of this harvest is fuelled by local demand, although international trade (both legal and illegal) plays a significant role for some species. Between 1990 and 1994 nearly two million parrots were traded on the world market (TRAFFIC 1999). International trade also poses additional threats of establishment of feral parrot populations in non-native countries and the global spread of exotic avian diseases. Dealing with the problems posed by the bird trade involves addressing complex internal and external regulation dilemmas within the affected countries.

Chapters 3 through 7 concern the threatened parrots of the world. For convenience, the world is split into four regions:

- Australia, New Zealand, and the south-west Pacific,
- Asia, including continental Asia, Indonesia, and the Philippines,
- Africa, and
- The Neotropics (Americas)

Each regional account outlines broad issues that affect the parrots of the region and then discusses potential conservation solutions. In the first three regions, there are also outlines of specific projects that address the most threatened species and some other regional priorities. For the Neotropical region, the majority of priority projects are included in the “actions” section of each species account. The regional accounts are followed by individual species accounts for all threatened species. They include information on current status, distribution, threats and actions necessary to ensure continued survival.

General recommendations and conclusions include:

- An urgent need to obtain reliable information on causes of endangerment for many species that have not yet been carefully studied. Effective conservation strategies should be solidly based on reliable science.
- All solutions to the conservation problems of parrots present tradeoffs and each particular solution must be tailored to the species’ individual requirements and limitations.
- Parrots often offer special potential to serve as flagship species for the protection of crucial ecosystems.
- Parrots also offer great potential for the development of environmental education and ecotourism programmes.
- The detrimental effects of bird trade pose major threats to parrots. Developing effective solutions to these threats represents an especially high priority.
- Substantial biological, social, political and economic difficulties pose major hurdles for achieving sustainable harvest of wild parrot populations. No demonstrable successful harvesting projects with free-flying parrots have been established to date.

This plan is designed to aid managers and researchers entrusted with the conservation of parrot species to understand both how best to evaluate the threats faced by individual species and how best to design appropriate conservation strategies to counter the threats involved. It is intended as much to be an evaluation of conservation techniques as to be a set of specific recommendations for individual species.

List of abbreviations

APC	Association for Parrot Conservation	IUCN	International Union for Conservation of Nature and Natural Resources
BirdLife-IP	BirdLife Indonesia Programme	JWPT	Jersey Wildlife Preservation Trust
BA	British Airways	LIPI	Indonesian Institute of Science
BAAC	British Airways Assisting Conservation	MTI	Monterrey Technological Institute
BAPA	Birds Australia Parrot Association	NAS	National Audubon Society
BPCBR	Bosque Protector Cerro Blanco Reserve	NGOs	Non-governmental organisations
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora	NIPAS	National Integrated Protected Area System
CMC	Centre for Marine Conservation, USA	PHPA	Forest Protection and Nature Conservation
COA	Council of Agriculture, Taiwan	PHVA	Population and Habitat Viability Analysis
CONABIO	Mexican Commission on Biodiversity	PSL	Environmental Study Centres
CPRAA	Permanent Committee for the Recovery of the Spix's Macaw	RCAPC	Research Centre for African Parrot Conservation
CZS	Chicago Zoological Society	SSC	Species Survival Commission
DENR	Department of Natural Resources, the Philippines	SSKSDA	PHPA Field Offices
DETR	Department of the Environment, Transport and the Regions, UK	UMAs	Units for Wildlife Use and Conservation, Mexico
DINAMI	Ministry of Mining, Ecuador	UNEP	United Nations Environment Programme
DNA	Deoxyribonucleic acid	WCMC	World Conservation Monitoring Centre
IADB	Inter American Development Bank	WCS	Wildlife Conservation Society
IBAMA	Institute for the Environment and Natural Renewable Resources	WPT	World Parrot Trust
		WPTI	Wildlife Preservation Trust International
		WWF	World Wildlife Fund for Nature

Introduction

Parrots (Psittaciformes) are one of the most endangered groups of birds in the world, due in part to their popularity in the bird trade. Yet the bird trade is not the only threat currently facing this group, and conservation efforts on behalf of parrots must address stress factors that are as complex as those found with any other wildlife group. Unfortunately, many of the most threatened parrot species have not yet received the comprehensive field study that would allow identification of the most appropriate strategies for their conservation. Nevertheless, it is valuable to review the status of knowledge concerning the threatened parrots of the world to:

1. Provide a summary of existing knowledge.
2. Identify the most pressing gaps in information.
3. Offer some general recommendations on conservation techniques.
4. Recommend conservation actions where appropriate.

The major goal of this Action Plan is to ensure the conservation of the world's parrot species. This is to be achieved by providing researchers, managers, and local groups with practical recommendations for conducting conservation programs for the threatened parrot species and populations endemic to their regions of the world.

The Parrot Action Plan is by definition action-oriented. It is built upon the most up-to-date assessments of distribution, status, and threats to endangered parrot species, and relates these data to the considerable experience that conservation biologists have gained in attempting to prevent threatened populations from becoming extinct. The plan is not intended to be a treatise on parrot biology. For enhanced understanding, it should be read in conjunction with general treatments of parrot biology and conservation available elsewhere (e.g., Collar and Stuart 1985, Forshaw 1989, Beissinger and Snyder 1992, Joseph 1992, Garnett 1992, Collar *et al.* 1992, and Juniper and Parr 1998).

Parrots and humans

Parrots are among the most familiar of bird species to the general public, and are generally held in esteem and affection even by people uninterested in natural history or conservation. Ironically, it is our overwhelmingly positive responses to these birds that have been the root cause of the conservation woes of many species. Because of their attractive colours and abilities to imitate human speech, parrots have been kept in captivity by many different

cultures worldwide, ranging from the ancient Greeks and Romans to native tribes of the Caribbean. Captive rearing of parrots to obtain feathers for ceremonial purposes was a widespread activity many centuries ago among the native peoples of Mexico. Parrots have also been valued historically as objects of trade between cultures, leading to their distribution far beyond the boundaries of their natural ranges and the establishment of numerous feral exotic populations. Today, 95 of the approximately 330 extant species of parrots worldwide are considered at some risk of extinction (Collar *et al.* 1994). This proportion is higher than for almost all other major groups of birds.

Despite their familiarity as cage birds, most parrot species have not been the subject of detailed ecological and conservation studies. In part, this situation of relative neglect has resulted from an association of many species with remote habitats far from centres of learning. In part it is due to the difficulties in conducting studies on species that have large home ranges, are often difficult to capture for individual marking purposes, and are often canopy dwellers in tropical forests, nesting in elevated tree cavities that are challenging to reach.

A hand reared pet parrot (blue-fronted amazon).



Despite the difficulties involved in their study, parrots often present major conservation opportunities. As conspicuous and attractive birds, they can often serve as flagship species for the preservation of threatened ecosystems, and because their range needs are often large, they often can provide important justifications for the saving of quantitatively significant amounts of habitat. Their spectacular congregations at clay licks, waterholes, and mass roosts often present important potentials for ecotourism benefits for local communities, and for the development of conservation education efforts.

Threats

The plight of parrots is due to many factors. Two threats stand out as especially important; habitat destruction and fragmentation, and trapping for the bird trade. Of the 95 species considered in this Plan, habitat destruction and fragmentation endanger 78 species while trade endangers 36 species. Diminished international trade has been dwarfed by significant growth in internal trade. For many species, the threats of habitat loss and trade act concurrently, so that it is difficult to determine which threat might be the most severe. For example, 29 species are currently threatened by a combination of habitat destruction and intense trade, and eight species are threatened by combined habitat destruction and introduced predators or competitors. However, these factors are clearly not the only causes of declining parrot populations. In other cases, large-scale reductions in parrot populations have occurred in spite of the persistence of natural habitats and an absence of trade. Introduced predators or competitors have apparently threatened 16 species, while others have suffered significantly from hunting for food or feathers, or to protect crops (nine species). Though not well documented, it is also reasonably likely that introduced diseases have been a major factor in the woes of some species, for example the extinct Carolina parakeet (see Snyder *et al.* 1987). It is thought that introduced diseases possibly endanger two species, and three are possibly hybridising with related taxa.

The principle threats vary geographically, temporally, and with the specific characteristics of the species involved; introduced predators and competitors have been a major threat primarily for parrot populations on oceanic islands; hunting for food is a principle threat for relatively large species; and trade has been extremely damaging for many highly charismatic or colourful species, especially for those that are extraordinarily talented in imitating human speech. While legal international trade has been declining in magnitude for the past decade (due to CITES regulations, passage of various national regulations, and increased law enforcement activities), internal trade still remains a major problem in many countries. Illegal internal and

international trade imposes grave threats on certain parrot species.

Some parrot species represent major conservation dilemmas, as their feeding habits make them competitors for agricultural crops. Finding acceptable solutions to crop damage problems without extermination of the parrots involved is one of the most difficult aspects of conservation of a significant number of species.

Most of the specific threats faced by parrots can be traced to various human activities. Consequently, lasting conservation of many species will entail changing various human practices that directly and indirectly affect the species in question. For this reason, education efforts and generation of public awareness and support are of major importance in the conservation of most species.

Structure of the Action Plan

The second chapter of the Action Plan considers general aspects of parrot conservation, while the remaining chapters provide detailed species by species status accounts and conservation recommendations. Particular emphasis is placed on the need for sound knowledge of the problems faced by individual species and the potential conservation actions required. Such information should normally be gathered and evaluated before specific prescriptions are advanced. Premature judgements based on incorrect information can waste valuable time and resources and greatly diminish the prospects for effective conservation. This is not meant to sanction a lack of action on behalf of species that are critically threatened simply because all research answers are not yet in. For such species provisional recommendations should be developed and followed, but not as a continuing substitute for obtaining the scientifically rigorous data that will allow development of comprehensive conservation strategies.

Because resources for conservation are limited, it is extremely important to maximise the efficiency of each programme. Conservation approaches will necessarily vary among individual species. It is essential that every programme be continuously evaluated for effectiveness and that conservation actions be adaptively modified whenever success remains elusive.

Chapter 2 of the Action Plan also discusses principles that should apply to the conservation of all parrot species. Subsections include determinations of population sizes, ranges, and trends; determinations of causes of decline; and general evaluations of conservation alternatives. The principles involved are for the most part not specific to parrots, and some examples to illustrate principles are drawn from other groups. Nevertheless, emphasis is placed on the unique characteristics of parrots that pose special problems and opportunities in the application of conservation techniques.

Chapters 3 to 7 provide the most up-to-date information available on the status and distribution of, and threats to, 102 species which include 95 globally-threatened parrots, and seven removals from the original list (Collar *et al.* 1994). The species are organised into four main regions: Australia, New Zealand, and the south-west Pacific; Asia, (including continental Asia, Indonesia, and the Philippines); Africa; and the Neotropics (Americas). A general overview, including threats and conservation solutions, and detailed species accounts for all threatened taxa are provided for each region. Priority conservation projects are discussed as text boxes for Australia, Asia, and Africa. The majority of the priority projects within the Neotropical section are included in the “actions” section of each species account.

Initially, the species considered were those listed in *Birds to Watch 2: the world list of threatened birds* (Collar *et al.* 1994), which is also the official IUCN list of threatened birds (see IUCN 1996). Species included in *Birds to Watch 2* are drawn from the list of species proposed by Sibley and Monroe (1990, 1993). This list remains controversial but has been adopted by both BirdLife International and CITES. It is followed here more in the interests of standardisation than out of complete agreement with the species limits and sequence proposed.

The updated information in this Action Plan, itself a first edition, produced several changes to the original *Birds to Watch 2*. These changes fall into four categories: i) changes in the threat category for species which remain threatened; ii) removals from the Red List, which have been agreed with BirdLife International (7 species); iii) taxonomic reappraisals that suggest a threatened taxon might be most appropriately treated as a species, and hence should be added to the list (3 species); iv) species previously considered non-threatened, which are proposed here for inclusion on the Red List (4 species plus one group of populations).

Classifying species as to the degree of threat is a controversial endeavour, as it is commonly extremely difficult to predict how likely extinction may be, especially in cases where detailed studies of individual species have been lacking. Various efforts have been made to base classifications on numerical criteria for population sizes and trends and on range sizes. Although no numerical scheme has yet achieved consensus support of the conservation community, this Action Plan follows the IUCN Categories of Threat (IUCN, 1994). The Categories utilised are Extinct in the Wild, Critically Endangered, Endangered, and Vulnerable (see Appendix 2).

General Principles for Parrot Conservation

Preliminary remarks

The overriding goal of parrot conservation should be the maintenance of viable wild populations of all species within their native ranges and natural ecosystems. Captive populations are not an end-point of conservation efforts. Although in extreme cases it may be necessary to depend on an intermediate stage in captivity to achieve viable wild populations, as a rule wild populations should be sustained continuously if at all feasible. In large part, this is because the difficulties in re-establishing wild populations from captivity can be especially daunting for species such as parrots in which many important behavioural characteristics are learned and can be quickly modified or lost under captive conditions (see Snyder *et al.* 1996). By retaining a strong focus on wild populations at all stages of the conservation process, the chances of simultaneously sustaining the species and preserving essential habitat are maximised. Reduction of fundamental causes of endangerment in the wild must remain the primary goal of conservation efforts.

Defining viable wild populations is not a simple task. Criteria for viability can include both genetic and demographic considerations, and can involve time scales ranging from a few years to the indefinite future. It is difficult to justify any particular minimum population size as a goal applicable to all parrot species, considering the variations among species in overall range, natural population fluctuations, life history parameters, and sensitivity to environmental threats. Nevertheless, there is probably broad agreement that viable wild populations should have the following characteristics:

1. Populations remain stable (or increase) over time,
2. Subpopulation numbers remain stable (or increase) over time,
3. The range of the species remains stable (or increases) over time, and
4. Populations are large enough and subdivided enough to minimise threats posed by inbreeding and catastrophic events.

Implicit in this last characteristic is a general goal of maintenance of multiple self-sustaining subpopulations of the species in as wide a geographic distribution as is feasible. In cases where abundant demographic data are available for a species, it is also sometimes possible to define viable populations in terms of probabilities of extinction (e.g., <5% in 100 years), based on modelling studies. Application of these concepts will vary among

species, but should include consideration of both short- and long-term time scales.

Status assessment

Without accurate status assessments – specifying population sizes, ranges, and trends – there is no reliable way to determine which species deserve conservation attention and no way to measure progress in conservation programmes. All three characteristics are important, as a single determination of population size and range provides only an instantaneous “snapshot” of a species, and cannot reveal very much about its conservation status. A tiny population that is stable or increasing is a very different conservation entity than a tiny population that is rapidly declining, and repeated monitoring efforts are necessary to determine just which situation exists. All populations fluctuate to a greater or lesser extent, and distinguishing between short-term fluctuations due to chance events and long-term trends is of major importance. The measures employed for population recovery must be tailored to the severity of the crisis.

Just as single, short-duration assessments of population size and range have limited utility in determining whether populations are declining, they are also generally inadequate for identifying either the causes of population decline or appropriate conservation measures on more than a provisional basis. What appear to be obvious causes of decline, sometimes turn out on careful study to be only minor problems, while truly important causes can sometimes be missed in short-term assessments. Thus, while population size and range assessments are essential in conservation efforts, they can be easily misinterpreted if they are not carried out at biologically meaningful intervals and if they are not coupled with comprehensive biological studies.

The dangers involved in failing to follow all these paths simultaneously can be seen clearly in an example from another group of birds – the California condor (*Gymnogyps californianus*). This species was known to occur in very low and declining numbers for a period of decades, but research on behalf of the species was limited largely to surveys of population size and range until the 1980s, when comprehensive biological studies were begun (see Snyder and Snyder 1989). These latter studies quickly revealed that the presumed main cause of decline, habitat destruction, was in fact a minor problem in the near term, while the most important cause, mortality from lead

poisoning, had not been recognised or addressed. Because the conservation efforts of many decades, primarily habitat protection, had failed to address the principal cause of decline, the species continued to decline and eventually reached such low numbers that captive breeding was the only remaining viable near-term conservation option. The important point of this discussion is that had the proper biological studies been initiated earlier, there is a real chance the species' decline could have been reversed in the wild and without the enormous expense associated with current efforts (well over US\$1 million annually).

Although various methods for monitoring parrot populations are available, the utility of these methods is not uniform among species because of species differences in behaviour and ecology. Among the methods that have been used with various parrots are roost counts, nest enumerations, river transects, mark-resighting studies, and fixed lookout counts. All have weaknesses of one sort or another, and only direct field experience is likely to reveal the most useful and practical techniques for a particular species. All methods have key assumptions that need to be met for applications to be reliable (see Casagrande and Beissinger 1997).

Roost counts have been used with good success in achieving population counts for some species [e.g., the Bahama parrot (*Amazona leucocephala bahamensis*) (Gnam and Burchsted 1991), and the Puerto Rican parrot (*Amazona vittata*) (Snyder *et al.* 1987)], but proper use of

such counts necessitates finding all significant roosts for the population in question and determining which time of year the birds tend to clump most consistently in roosts. Preferably, all roosts should be monitored simultaneously, although this requirement can be relaxed for species whose roost-use tends to be stable over long periods.

Unfortunately, some species do not clump together in obvious roosts, while others approach and leave roosts in the subcanopy, making them difficult to enumerate accurately. Others change roost locations so frequently that it can be difficult to keep current on roost locations. Thus, while roost counts can be a very good method with species that do not present the above problems, it is not a method that can be used effectively with others.

Nest enumeration is currently being employed in status work on the maroon-fronted parrot (*Rhynchopsitta terrisi*), a species that nests colonially in cliffs (Enkerlin *in litt.* 1997). As with roost counts, success in using this method as a population monitoring technique depends on locating all significant colonies of the species and determining which time of year is best for counting. The maroon-fronted parrot also roosts communally, but frequent changes in roost locations make monitoring of roosts difficult. Moreover, the habitat of this species is sufficiently difficult to access that getting close enough to count some roosts poses severe logistic problems. Nevertheless, results of roost counts to date show clearly that a large fraction (perhaps on the order of 80%) of the population does not show up in nest enumerations. While long-term monitoring of the size of the nesting population appears to be a relatively practical goal and may prove to be an important component of efforts to follow the overall health of the population it appears unlikely to track total population numbers closely on a year to year basis, because of large fluctuations in food supplies with this species. Nest enumerations may well give more useful population trend information on the basis of longer time spans. The optimal monitoring strategy with this species appears to be efforts to utilise both roost counts and nest enumerations, despite the practical difficulties in roost counts.

For species that nest in dispersed fashion, nest enumeration often has little potential for overall monitoring of populations because it is often extraordinarily labour-intensive to locate nests for such species. Nevertheless, nest enumeration has proved useful in tracking the population health of the dispersed-nesting golden-shouldered parrot (*Psephotus chrysopterygius*), which utilises termite mounds for breeding (which can be located with some efficiency). The density and distribution of nests of this species are monitored annually over 250 square kilometres of terrain as a measure of effectiveness of conservation actions (Garnet and Crowley 1995).

Counts of birds assembling at clay licks or waterholes can also be useful, particularly when they can be converted into density figures or total population counts. Such

Maroon-fronted parrot, *Rhynchopsitta terrisi*, Mexico.



Ernesto Enkerlin



World Parrot Trust

Macaws provide a colourful spectacle for tourists at a clay lick in Peru.

conversions, however, require knowledge of the areas serviced by such features and the frequency of visitation by individuals. Waterhole counts tend to be most useful for species in relatively arid habitats, especially during the dry season when the number of water sources is minimal, forcing the birds to concentrate on relatively few sites. However, since individuals may visit water sources more than once a day or move between water sources, to extrapolate such counts to population counts some individual birds must be marked (for example with radio-tags) to ascertain frequency of visits. As with roost counts and nest enumerations, efforts have to be made to locate all water holes in use and to monitor them simultaneously. Counts at clay licks, coupled with individual identifications of birds achieved through photography, have been used to generate population density figures for certain macaws (Munn 1992).

Moving transects (line transects), such as counts from boats along rivers, can give useful indices of abundance of some species. They are often very difficult to convert into accurate population estimates, however, as the areas serviced and the detection efficiencies can be difficult to specify. Moreover, behavioural characteristics of some species may strongly bias their detectability by such methods. Nevertheless, such counts can be used to compare species abundances in different areas of similar habitat, to gain trend information on specific populations, and to document seasonal changes in habitat use (Munn 1992, Renton 1994, Robinet *et al.* 1996).

Under some circumstances, counts from stationary locations can give useful monitoring data, particularly if stations are established along important flight lines. The problems here are that parrots are often highly patchy in distribution, and it is often difficult to establish how representative the observation points are and what areas are effectively covered in the counts. Such counts are often most useful as indexes of abundance if carried out over long periods of time, but they are difficult to convert into absolute abundances accurately. Flight lines of species can change, seasonally or more permanently, relative to

changes in distributions of food supplies, so counts in fixed locations can give spurious trend information if not coupled with other indices of abundance. Point surveys can often be expected to be more biased than line transect counts, but there are circumstances where they are a preferable technique (see Casagrande and Beissinger 1997).

Mark-resighting techniques are potentially useful with some species (Casagrande and Beissinger 1997), but such methods are highly labour-intensive compared to other methods and often are impractical because of difficulties in capturing birds for marking. In addition, there can also be an increased risk of predation for marked animals in some species (see Saunders 1988).

The aforementioned methods are not the only methods that might be applied to parrots. For example, variable circular plot methodology has been used in many studies in Asia and Africa, and offers a number of advantages in some contexts. However this method, like some others, often yields such wide variability for population sizes that it is sometimes of limited value in monitoring population trends.

Although it is highly desirable and valuable to develop techniques that may give accurate total population counts for any endangered species, this may simply not be feasible for some parrots. In such cases, it may alternatively be possible to devise ways of indexing abundance that can give reliable trend information over the long term. This is usually the most important information for conservation purposes. Additionally, relative differences in density between areas may be important, and even order of magnitude estimates for poorly known species may be better than no estimates at all. Mail surveys have been used successfully to monitor declines in populations of species that were once common and widespread in Western Australia. This method is cheap, quick, and well suited to species that are readily recognised and familiar to amateurs (see Mawson and Long 1996). In addition, information on trade volume can sometimes be used to infer population trends, provided certain assumptions about harvest intensity and reporting uniformity are met.

The literature on bird censusing is large, and the reader should consult general reviews on bird censusing methods, such as Ralph and Scott (1981), Davis (1982), Verner (1985), Taylor *et al.* (1985), Seber (1986), and Bibby *et al.* (1992) for a critical discussion of other methods that may have value with some species. Accurate censusing of wild bird populations remains one of the more difficult tasks confronting researchers and conservationists. There is no one universal method for estimating bird abundances and densities, and appropriate methods vary according to species, time, and location. The desire to find a single technique that might work well for all parrot species will surely remain unfulfilled.

Regardless of how accurate the population and trend estimates may be for any species, conservation efforts

must proceed on the best available information. Actions on behalf of critically endangered species should not be postponed simply because of uncertainties as to exact population size and trends.

Determining causes of population decline

If monitoring efforts with a species show that it is under continuous decline, it is important to establish causes of the decline through more detailed demographic investigations. This is usually accomplished via quantitative evaluations of both reproduction and mortality. Stresses on species may arise in either sphere, or in both, and if effective conservation is to take place, it is essential that the major factors causing decline are identified so that they can be countered effectively.

Intensive research to determine causes of decline may entail some risks to individuals of the species. But, the risks to populations are the most important concern, and they cannot be reduced reliably without a comprehensive understanding of the causes of decline. It is a fundamental mistake to adopt a policy of always minimising risks to individuals, if in so doing one remains ignorant of the true causes of a species' decline. As a concrete example of faulty risk analysis, the California condor programme was hobbled for decades by fears that intensive research would be too risky for individuals. Thus radio-telemetry of condors was delayed until the population was almost lost, and yet it was only through radio-telemetry that lead poisoning, the most important cause of decline, was finally identified (see Snyder and Snyder 1989). Up to that point,

conservation strategies for the species were aimed in the wrong direction and the species continued to decline rapidly toward extinction.

When dealing with endangered species, every action or lack of action carries risks. It is essential that programmes retain a focus on overall risk reduction for populations, which often entails small, carefully monitored risks for individuals. Often, the worst enemy in conservation programmes can be mistaken assumptions about the causes of decline. As Caughley (1994), and Caughley and Gunn (1996) discuss, failure in conservation management efforts often traces to lack of sufficient information about basic natural history features of the species in question and incorrect identification of main causes of endangerment.

Current debates over conservation of Lear's macaw (*Anodorhynchus leari*) provide an instructive example of how concerns for individuals can be in conflict with concerns for populations (see Munn 1995a). Major conservation efforts on behalf of this species have been mobilised on the assumption that inadequate food supplies have been a crucial limiting factor. Yet, it is not certain that food scarcity has been as important as assumed, and Munn has called for intensive research to clarify the situation. However, the detailed studies of nesting birds that appear to be necessary to resolve the issue have been vigorously opposed by parties concerned about possible impacts of intensive research on nesting individuals. More recent information (Reynolds 1997) suggests that at least at present the major limiting factor for Lear's macaw may be poaching for the bird trade. If so, efforts to increase food supplies at best may fall far short of what it is needed to preserve the species.



Adult pair and juvenile Lear's macaw, *Anodorhynchus leari*, Brazil.

Biodiversitas



Gideon Cilimo

Hand-reared kakapo "Hoki", *Strigops habroptilus*.

Reproduction

Reproductive studies normally entail locating adequate samples sizes of potential nesting pairs and determining both the fraction that fail to breed and the success rates of the ones that do. In some species, such as the kakapo (*Strigops habroptilus*), Puerto Rican parrot (*Amazona vittata*), yellow-headed parrot (*A. oratrix*), and many macaws, major problems lie in failures to lay eggs; while in others, problems may lie mainly in poor success of egg-laying pairs (Snyder *et al.* 1987, Munn 1992, Elliott 1996, Enkerlin *in litt.* 1997). Thus, it is important to study both factors.

In some species which show low breeding effort (frequent failures to lay eggs), the problem can be traced to low availability of nest sites. This can sometimes be remedied by providing additional sites. For example, red-tailed black-cockatoos (*Calyptorhynchus banksii*), which are believed to face low nest-site availability, have quickly occupied artificial sites (Emison *et al.* 1994b). In other species where such problems have been suspected, however, artificial sites have not been accepted, and it has been necessary to improve deficient natural cavities to attract nesting birds (e.g., red-fronted parakeet *Cyanoramphus novaezelandiae* – see Hicks and Greenwood 1989). In still other species which reject artificial sites, even massive provision of improved natural sites has not cured chronic problems with low breeding effort (e.g., the Puerto Rican parrot). Here, causes of low breeding effort have remained elusive, perhaps lying with food limitations of one sort or another, or with other factors such as unbalanced sex ratios in extremely small populations.

Poor nest success can be determined only by comprehensive nest monitoring efforts, which normally will include periodic nest inspections to determine growth

and development characteristics of nestlings and to determine if the nestlings are affected by parasite or disease problems. With basic precautions, such inspections can usually be done without significant negative effects on nesting success, and the benefits obtained from the information gathered normally far exceed any risks entailed.

Species affected by food limitations may show slow-growth effects or brood-reduction effects. For instance in south-western Australia the growth rates of a food-stressed and declining population of Carnaby's cockatoo (*Calyptorhynchus latirostris*) were lower than those in a stable one (Saunders 1986). Species affected primarily by nest predation problems will generally exhibit total losses of broods, and here it may be necessary to initiate intensive nest observations to determine the culprits and possible means of thwarting them. Habitat deterioration problems are perhaps most likely to manifest themselves in effects on food supplies or nest availability, and thus be reflected in low reproductive effort, reduced clutch size, poor nestling growth rates, and/or low fledging success.

In many regions the primary nest predator will turn out to be man, as revealed by damage to nest sites or other clues (e.g., spike marks on trees). But in some species, where nest contents are easily accessible from entrances, few signs of human depredations may be evident even when such depredations are a major problem. Other principal threats to nest success include non-human nest predators and competitors, such as various snakes and lizards, pearly-eyed thrashers (*Margarops fuscatus*), brush-tailed possums (*Trichosaurus vulpecula*), and feral rats and cats. On occasion nest parasites such as various bot flies and soldier flies can be a major stress. In some instances the impacts of such natural and unnatural enemies can prove adequate in themselves to account for population declines. Island parrots (e.g., the kakapo *Strigops habroptilus*) have proved to be especially susceptible to nest losses caused by introduced predators.

Mortality

Mortality studies are often more difficult, expensive, and time-consuming to conduct than reproductive studies, but especially with very long-lived species, good quantitative estimates of mortality rates may be crucial for diagnosing whether the species is stressed by excessive mortality. A number of techniques have been used successfully. For example, many species exhibit strong fidelity in nesting territories, and if individuals can be recognised by idiosyncratic characteristics or by artificial marks, such as bands, adult turnover rates in known territories can be determined over a period of years (see Snyder *et al.* 1987). Although such rates are not strictly equivalent to adult

mortality rates (as there may be some movement of birds out of known territories to unknown locations) they can provide a good upper boundary on adult mortality rates and in many cases are very close to adult mortality rates.

Mortality rates of fledgling birds can sometimes be determined by close study of family groups, as fledglings of some species remain closely associated with their parents for long periods – sometimes to the beginning of the next breeding season. By determining the numbers of young fledging in a reasonable sample of territories and by later determining the numbers of surviving young, mortality rates of fledglings can be calculated in a straightforward manner.

However, in some species young do not stay with their parents for long after fledging, or families disperse from breeding territories soon after fledging and do not return as families later. For such species the above method cannot be used, and determining fledgling mortality rates may necessitate marking samples of young (e.g., with radiotags) to follow their survival directly. Similarly, survival rates of adults in species that do not exhibit territory fidelity may not be determinable without marking techniques. Radio-telemetry attachments have now been tested on many of the larger parrots with success, and units

are now available that have lifetimes of several years. Radio-telemetry, however, is a relatively expensive technique and entails some risks associated with capture and handling of birds. Where it is possible to gain mortality information without it, this is sometimes a preferable option. However, radio-telemetry is often the only way to determine exact causes of mortality, and can also often provide other very useful information (e.g., on range use, foraging behaviour, and migration behaviour) that often cannot be obtained by other means.

Another technique that has been used successfully to obtain mortality rate information is patagial tags (see Rowley and Saunders 1980, Saunders 1988, and Smith and Rowley 1995), although risks and benefits of these tags vary for different species. Banding (ringing) is useful as a marking technique for only certain species, as in many parrots feathers cover the tarsus sufficiently to obscure vision of bands, except when birds are in the hand. Banding with standard flat bird bands also poses risks of damage to legs in many species because of shape of the tarsus, and should always be tested carefully with captives before widespread implementation.

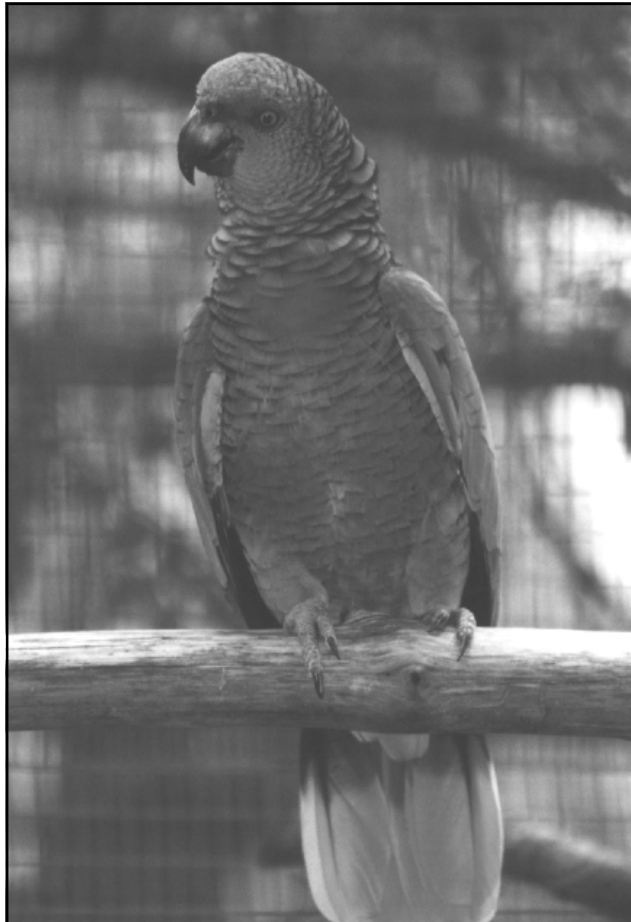
Adults and fledglings do not represent all age classes in a population, but they can normally be expected to represent the groups with the lowest and highest mortality rates, respectively. Mortality rates of intermediate-aged birds can sometimes be inferred from accurate data on population figures, reproductive rates, and mortality rates of adults and fledglings (see Snyder *et al.* 1987). They can also be determined directly by means such as radio-telemetry.

Expected mortality rates for the species under study can be estimated by comparisons with other species with similar demographic characteristics, such as age of first breeding, clutch size, etc. If the rates with the species in question appear excessively high, it is crucial to identify specific causes of mortality, and here radio telemetry may be essential. With some species hunting or trapping for the bird trade may cause excessive mortality. With others, there may be unusual situations regarding disease, toxic materials, or exotic non-human predators.

Demographic analyses

Once basic demographic information is available for a species, including good quantitative data on age of first breeding, reproductive effort and success, and age-specific mortality rates, it becomes possible to pinpoint where the primary weak points in the life equation lie. Population viability analyses (PVAs) can be useful at this point in helping identify which aspects of the life equation need primary attention in conservation actions and in setting goals to be achieved in reducing stress factors. PVAs can also help reveal which demographic characteristics need

St Lucia Parrot, *Amazona versicolor*, at Government aviaries St Lucia.



Nick Reynolds

the most accurate quantification to achieve reliable conclusions.

However, PVAs should be conducted only after population size and demographic parameters, and their year-to-year variations, have been determined with reasonable accuracy (Beissinger and Westphal 1998). Good information on frequency, severity, and effects of catastrophic events, such as hurricanes, is also needed for species vulnerable to such events. These various data are available for extraordinarily few species overall, let alone parrot species, so at the present time conservation efforts for the vast majority of parrot species cannot be expected to benefit from PVAs.

Poor population data and inaccurate estimates of demographic parameters pose substantial risks of generating erroneous conclusions regarding population viability (Reed *et al.* 1998). PVAs based on such data can potentially redirect resources toward unwarranted conservation actions with a false sense of confidence that these actions rest on rigorous science. From both a cost and risk standpoint, scarce conservation resources are generally better allocated to accumulation of good demographic data than to premature PVA symposia.

When enough data are accumulated to make PVA analyses legitimate and worthwhile, they should be conducted using a variety of models. Because alternative PVA models vary in their assumptions and internal structure, and can provide markedly different results from the same set of demographic data (Mills *et al.* 1996), the results must be interpreted conservatively.

With many declining parrot populations, the principal problem is likely to be excessive mortality. Parrot species are often (but not always) characterised by delayed sexual maturity and long life expectancies, and population size is typically influenced far more by changes in adult mortality than by changes in reproductive rates. In fact, if mortality problems can be reduced with such species they may be able to recover reasonably rapidly, even if reproductive statistics are relatively poor. Preliminary data suggest that such a situation may apply to the case of the St Lucia parrot (*Amazona versicolor*), a species that was suffering greatly from hunting mortality until massive education and legal efforts were made on its behalf starting in the late 1970s. Studies in recent years suggest that reproduction in this species is quite modest, as many pairs do not lay eggs and egg-laying pairs produce few fledglings. Nevertheless the species is clearly recovering steadily, and populations are being re-established in various parts of the island where parrots have been absent for many years. The effective cessation in hunting pressure on this species has very likely reduced mortality rates to very low levels and appears to have been the principal direct conservation action benefiting the species.

For some long-lived species where excessive mortality is not the major problem, inadequate reproduction can

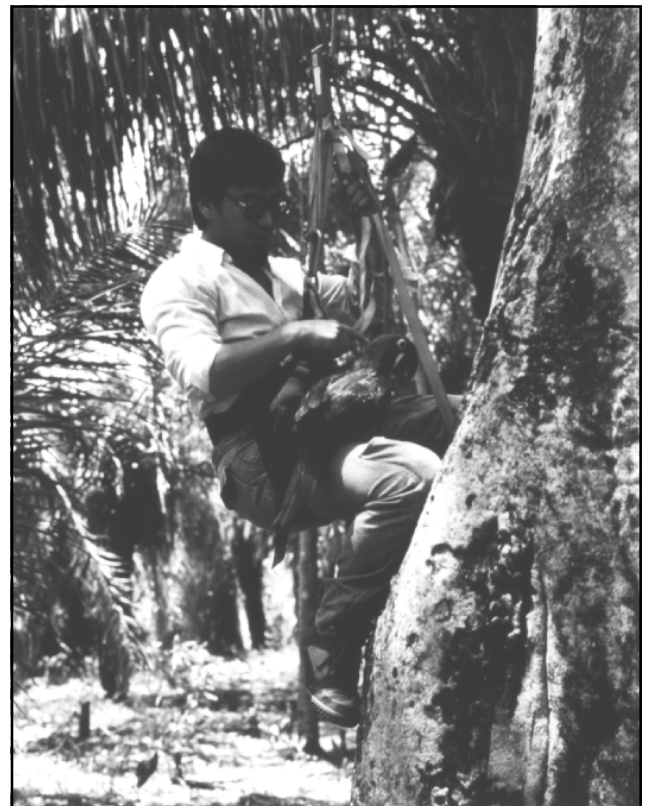
be masked by the very longevity of individuals. Population declines may not be obvious for many years until they finally become relatively rapid as senescence of individuals increases, a situation that may apply, for example, to certain populations of Carnaby's cockatoo (*Calyptorhynchus latirostris*).

Designing conservation actions

This Action Plan strongly endorses the formation of capable advisory recovery teams to develop recommendations for conservation efforts with threatened parrots, especially with respect to the process of making choices among conservation alternatives. Recovery teams are not the same thing as occasional international symposia of outside experts to provide input on species conservation, but are locally-based functional teams that work to design research and conservation strategies on a continuing basis. There is a growing literature on how such teams should be set up to achieve efficiency and progress in recovery (see Clark and Westrum 1989, Clark *et al.* 1994, Westrum 1994), and it is crucial that teams are set up properly if they are to function productively.

Principles to be followed here include the concepts that all major parties with a stake in conservation of the species and all major researchers involved with the species should

Carlos Yamashita checking hyacinth macaw (*Anodorhynchus hyacinthinus*) chick.



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be participants. Teams should be charged with designing effective conservation efforts for the species as their major goal and should be insulated as much as possible from the influences of special interests. Although their role obviously cannot be to usurp authority from responsible government wildlife agencies, their purpose should be to provide these agencies with the best independent advice relating to conservation of the species in question on a continuing basis. To this end teams should not be dominated by government agencies and should include the best biological expertise available. Teams should not be expected to produce immutable “recovery plans” but to generate focused documents at appropriate intervals that reflect changing knowledge about the species in question and the best ways to conserve them.

Notwithstanding the values of well-constituted recovery teams, it is important to recognise the fact that success in recovery programmes often traces in large measure to on-the-ground efforts of particularly well-motivated and skilful individuals. There is no formula for locating such individuals, but when they are discovered by whatever means, their importance can often outrank most other factors in the conservation process. Truly talented conservation “maestros” (see Westrum 1994), deserve to be given a high level of independence and authority in programmes. Programmes left in the care of pedestrian workers or unmotivated managers can easily fail even with the best of advice from well-constituted advisory groups.

Although a variety of general techniques have been used to assist the conservation of threatened parrots, not all techniques will be effective for every species or in every local situation. Ideally, in implementing a conservation programme for any species, the techniques selected should meet the following criteria:

1. They should be appropriate to the biology of the species in question and be effective in promoting survival and recovery;
2. They should be economical;
3. They should be compatible with the local human political, economic, and social environment; and
4. They should benefit multiple species and promote biodiversity conservation in general.

To be effective actions, the solutions chosen must address the basic causes of decline operating within the species. If, for example, problems are primarily ones of mortality due to hunting or poaching, these stresses will have to be reduced by whatever effective means can be devised. No amount of habitat protection will be adequate to save such species in itself, and while habitat protection is normally a very positive aspect of conservation in the long run, in the short run it can sometimes represent a diversion from crucial efforts to reduce sources of mortality.

Conservation actions vary greatly in cost, and where choices are available, cost-effectiveness is an important

consideration. For many years, captive breeding was proposed as an important aspect of conservation of the Lesser Antillean amazons (e.g., Berry 1980, Jeggo 1980, Noegel 1980). But captive breeding is relatively expensive, especially because of the long time-scales often involved, and full-scale programmes to implement this technique were never established with these species. Instead, major efforts were made to counter the principal perceived threats to these species through enhanced education, habitat protection, and law enforcement initiatives (see Butler 1992). These efforts were both economical and effective, and populations of all four amazons in the Lesser Antilles are now believed to be increasing significantly.

To the extent that habitat protection turns out to be important in conserving a species, one can expect to see major benefits for many other associated species in pursuing this goal. Properly designed education programmes that emphasise the ecosystem dependencies of charismatic species can also be expected to benefit many other sympatric species. In contrast, other conservation techniques may have no spin-off benefits for other species. For example, captive breeding per se helps only the species in question, and thus represents a less favourable technique in many contexts, especially if it draws resources away from more productive techniques. Captive breeding at best represents only an interim and partial solution to species preservation. For it to be successful, it has to be tightly coupled with other actions that ensure survival of the species in the wild. It is true that under some circumstances captive breeding can attract funds toward *in situ* efforts that would not otherwise be available, but it should not represent an end in itself and should always be properly integrated with efforts actually leading to wild population conservation.

Politically viable solutions are ones that come to enjoy widespread public support, and in this sense it is almost always advisable for there to be a significant public education component in any species’ conservation programme. Often national and local pride can be the key element for generating the necessary political support, but politically viable solutions need to be very carefully crafted in the local social context and can be very difficult to achieve if there is no significant local participation in the conservation programme.

With the aforementioned caveats in mind, the specific strengths and weaknesses of various major conservation techniques that have been used and suggested for parrots are discussed in more detail below.

Habitat preservation and restoration

The great majority of endangered parrots face some degree of threat from habitat change, destruction, and fragmentation, so habitat preservation and restoration clearly represent the most fundamental and important



Paul Jepson

Logging in the Low Forests of Tanimbar, Indonesia.

overall solution to problems of endangerment of the group. Further, where choices in conservation strategies are available, it is reasonable to favour those that do the most good for the maximum number of species. Often this means that habitat protection and/or restoration should be a priority feature of the strategies adopted. However, where species are suffering most from factors additional to habitat degradation, such as trade or hunting, habitat protection alone cannot be expected to provide a full solution. Many parrot species are, in fact, relatively tolerant of habitat degradation per se, and can persist in highly modified habitats if stress factors such as trade, hunting, and loss of specialised nest sites can be controlled (see Beissinger and Snyder 1992, Enkerlin-Hoeflich 1995, Munn 1995b).

Thus, while parrot declines are commonly correlated with habitat deterioration, one should not simply assume that this proves a primary cause and effect relationship without further supporting data, as increases in many other stress factors are also commonly correlated with the declines, and in some cases these other stresses may be more important than habitat factors. However, it is important to recognise that important effects of habitat degradation can sometimes be very difficult to detect, as habitat degradation can stress the welfare of endangered parrots indirectly through primary effects on other competitor species, predators, parasites, diseases, etc. For

example, Garnett and Crowley (1997) suggest that habitat changes may be significantly increasing the vulnerability of golden-shouldered parrots (*Psephotus chrysopterygius*) to predation by pied butcherbirds and that this may be an important factor in the decline of the species.

In cases where habitat deterioration has been a primary cause of a species' decline, and adequate habitats no longer exist, it may be necessary to implement habitat restoration efforts, commonly focused on recreating critical habitat features missing from wild or semi-wild environments. These efforts may be focused on expanding crucial food supplies, nest sites, roost sites, or water supplies. A good understanding of the limiting factors faced by the species in question is essential for determining and remedying such deficiencies. Not all parrots are nest site limited, food limited, roost-site limited, or water supply limited, so habitat restoration efforts cannot be expected to benefit all species.

Quite often, parrots are among the most charismatic species to be found in ecosystems under threat, and they can serve as a successful focus for habitat preservation efforts, attracting public support more easily than other less charismatic species, yet providing habitat protection for many of these less charismatic species simultaneously. Thus the Puerto Rican parrot (*Amazona vittata*) has proved to be a crucial flagship species in preventing the cutting of rainforest habitat in the Caribbean National Forest in Puerto Rico, and has provided protection for numerous other plant and animal species as a consequence. Because long-term survival of all species is ultimately tied to adequate amounts of suitable habitat, habitat protection and/or restoration should be pursued as a component of almost all parrot conservation programmes. Even in circumstances where the species in question is not a strict habitat specialist, or where habitat protection alone will not address the immediate causes of decline, habitat protection is normally warranted. And in some cases, habitat protection alone may be adequate in itself to assure survival of a species.

Efforts to prioritise habitat protection efforts in such a way as to benefit the largest numbers of species, be they parrots in part or not, make considerable sense, but are not the only factor to be considered. Habitat protection efforts sometimes succeed because the appeal of only a single charismatic species is sufficient to attract the support of a few key donors or politicians who would be reluctant to support biodiversity conservation per se. It can thus be debated whether more biodiversity conservation will be accomplished in the long run by concentrating on protecting habitats for as many charismatic species as possible or by concentrating on trying to sell biodiversity on its own merits independent of the existence of charismatic species.

In pursuing habitat protection, it is important that all important habitats used by the species in question receive attention. Wintering habitat is as crucial as breeding

habitat in migratory species, and habitat used on migratory routes may also be essential for survival. Determining what habitats are essential for the species and why, is a necessary precondition for successful design of a habitat protection plan. This determination needs to be made for each important subpopulation of the species. Radio-telemetry can often be one of the quickest ways to gain this information in species that move substantial distances during the annual cycle [e.g., great-green macaw (*Ara ambigua*) in Central America].

Habitat protection can be pursued in a variety of ways, including outright land purchase, development of appropriate management strategies for publicly owned lands, and purchase of conservation easements. The costs of habitat protection vary enormously, but this approach is often more cost effective in the long run than are other more intensive conservation solutions (see Balmford *et al.* 1995). When efforts to conserve habitat are properly integrated with other conservation actions, such as development of education programmes and ecotourism programmes, they sometimes can pay for themselves.

The most common mistake with habitat protection efforts is that once targeted areas are formally gazetted as reserves, meaningful conservation actions may be halted, and the crucial steps of funding comprehensive management plans and providing adequate resources for continuing management and protection efforts are neglected. Paper parks do little to conserve species. Recent efforts to protect habitat have generally attempted to integrate conservation and development objectives. Biosphere reserves, multiple-use areas, buffer zones, and large-scale planning units such as regional conservation areas are all efforts designed to link biodiversity conservation with social and economic betterment of local communities (Wells and Brandon 1992). Without such

linkage, many habitat protection efforts may ultimately fail. In Australia parrot conservation is increasingly being undertaken on private lands, integrating sound conservation management with best practices in agriculture (Garnett and Crowley 1995).

In exceptional circumstances, habitat manipulation may be required to protect highly specialised species, although this may not benefit other species. For example, regular burning of the heathland may be necessary to maintain some populations of the ground parrot (*Pezoporus wallicus*) in southern Australia, even though the burning regimes may be detrimental for certain other species.

Education, laws, and law enforcement

A large fraction of the conservation problems faced by parrots trace to direct and indirect impacts of mankind, and the solutions to these problems commonly lie in changing attitudes of people toward the species and/or the ecosystems that it occupies. In part this effort may involve changing laws, or changing the willingness of people to obey existing laws. The penalties for not obeying laws need to be meaningful and applied in a just fashion. But much more importantly, people need to come to understand and support the need for such laws as being in their own best interests in the long term.

Two widespread threats for which education and legal action are frequently crucial components of conservation are illegal bird trade and hunting. While laws prohibiting such activities are easy to pass and are on the books in most all countries, enforcement often proves difficult, especially where the illegal activities remain socially acceptable at the local level. Bird trade, both international



The "Jacquot Express" educational bus. A focus for the conservation of the St Lucia parrot (*Amazona versicolor*).

David Woolcock

and domestic, continues to be a pressing threat for many species (Collar and Juniper 1992) despite legal efforts to curtail and regulate it [e.g., the 1992 Exotic Wild Bird Conservation Act of the USA and the Convention on International Trade in Endangered Species (CITES)].

CITES lists all parrot species on its appendices. But, while it has evidently been an important force in controlling and curtailing legal trade in threatened parrots (judging from recent substantial declines in the overall volume of reported international parrot trade), it has not been uniformly successful in curbing illegal international trade in some highly valued species. In some cases, CITES listing may even have exacerbated trade problems for particular species. The profits involved in trade have led to widespread parrot smuggling and, so long as these profits exist, the solution to the trade problem may be elusive.

By analogy with successful historical efforts to end the plume-bird trade, the most effective solution could be a campaign to destroy demand by concerted education efforts, especially within avicultural societies, aimed at ending the social acceptability of private ownership of endangered parrots. However, given the long history of keeping parrots in captivity, their strong attractions as pets and status symbols, and the public's general inability to distinguish endangered from non-endangered species, this could be a very difficult task. Stiff penalties for convicted traffickers, and wide publicity given to their transgressions can be a significant deterrent. IUCN/UNEP/WWF Caring for the Earth (1991) has urged countries to legislate against private ownership of internationally threatened species except under tightly controlled conditions. But, so long as the private ownership of such birds remains socially acceptable, the problem will probably remain in spite of such efforts.

Where international bird trade is a major component of the problem, efforts to reduce trade in threatened parrots need to be mounted in both exporting and importing countries. However, it is essential to recognise that for many species, a very large fraction of the trade problem is internal within source countries and is not an international issue. The enforcement capabilities of many source countries for parrots have not been comprehensive enough to provide effective deterrence to parrot harvest, although such capabilities are improving rapidly in some countries. In addition, as governments have increased their enforcement efforts, they have faced new problems in how to handle volumes of confiscated birds (see Re-introduction section below).

To some extent, commercial captive breeding may have the potential to reduce the profits obtainable in trade and reduce pressures on wild populations. Indeed, deliberate efforts to reduce the market price for Naretha blue bonnets (*Psephotus haematogaster narethae*) by captive breeding have more than halved the retail price for this species in just three years (Peter Mawson *in litt.* 1997).

Similar efforts are now also being tried with Carnaby's cockatoo (*Calyptorhynchus latirostris*). Nevertheless, the costs of captive breeding tend to be much higher than those of wild harvest. So long as substantial cost disparities remain, wild harvest will likely continue. In view of the small amounts of money that are sufficient to motivate parrot harvest by poor rural people (who face virtually no costs in the process), commercial captive-breeding efforts cannot be expected to depress prices enough to remove this motivation unless conducted under major subsidy to cover the economic costs necessarily involved. In the absence of subsidy, commercial captive breeding operations must have price levels that exceed costs to be able to survive.

It must also be recognised that the conservation problems of some parrot species stem from perceived overabundance rather than scarcity. Crop depredations by parrots have been a relatively common problem, and control programmes for parrots have been formally and informally instituted in many countries (see Bucher 1992). In many instances, these control efforts have not been based on sound ecological studies, and have been driven by exaggerated perceptions of damage. At local levels, even rare parrot species can be the targets of control efforts (e.g., the red-fronted macaw *Ara rubrogenys*, as a pest of maize crops in Bolivia). Designing appropriate management efforts, laws, and education efforts, as they may apply to pest species, pose some of the most difficult conservation problems to be faced with parrots, and achieving politically viable solutions that permit both survival of these species and satisfactory minimisation of depredations can be a challenge. Crop substitutions (e.g., seedless oranges for seeded varieties) can sometimes provide adequate solutions, but crop substitutions are not always economically attractive.

Whether the problems are primarily due to trade, hunting, or other human impacts, education efforts are often among the most important components of successful conservation programmes. For a good appreciation of the potential impacts of such efforts, the reader should consult Butler (1992) and Jacobson (1995). When compared to other conservation options, education efforts can often be surprisingly economical and effective, and can successfully promote biodiversity conservation well beyond the particular species in question.

The case of the St Lucia parrot (*Amazona versicolor*) is a prime example where effective conservation has resulted from a combination of education efforts, changed regulations, and comprehensive law enforcement (Butler 1992). Although chances for recovery had formerly appeared slim, largely because of widespread shooting (Wingate 1969), the numbers and range of this parrot have now increased substantially, and the species can no longer be considered Critically Endangered. The parrot has become a principal feature in expanding ecotourism on the island, and the Forestry Department has become a

major income earner for the government as a result. This entire effort has been accomplished with only a minimum of costs, and it stands as a model effort that could potentially be replicated in other locales with other parrot species.

In designing education programmes of the sort that have worked well in St Lucia, it is important to keep in mind a number of general principles to maximise success:

1. Programmes should be locally implemented. Long term reliance on external technical assistance does not provide local conservationists/educators with lasting tools to enact or continue their work; and when external assistance is necessary it must contain a training component to ensure that efforts can be sustainable. Programmes must help identify and work with local institutions and businesses to provide tangible financial and/or material support for the campaigns. Local involvement builds local and national pride.
2. Programmes should promote optimism and positive attitudes. When people get the feeling of hopelessness, they lack the incentive to change. Programmes that build pride and focus on what can be achieved at the individual level are more likely to succeed. Education and training must emphasise a problem-solving approach, so that people can be empowered to make connections between their behaviour and possible impacts on the environment.
3. Programmes should promote co-operation and collaboration. The problems caused by environmental degradation and resource misuse are so complex and pervasive that they can only be tackled when individuals, local communities, national governments, and international donor agencies work together. Environmental education programmes should foster such co-operation and strive to involve as many people and agencies as possible. Often, rather than being imposed from the outside, education programmes should be based on local knowledge and understanding, and build on existing philosophies of environmental care. Any programme that relies exclusively on external aid is doomed to failure when its funds are exhausted. Where feasible, partnerships should be developed between similar programmes or projects in adjacent areas to maximise available financial and technical resources.
4. Programmes should help the targeted audience discover and understand not just the symptoms of any given environmental problem but also their underlying causes. An education programme on declining parrot populations should, for example, also focus attention on the root causes of habitat destruction, the effects of human population growth and consumption, etc. It must strive to relate the role of the individual to such causes and stress the positive results that can be achieved through changing behaviour.
5. Programmes should provide new skills. If real change is to be achieved, it is important to teach both “why”

and “how”, and to train local people in new skills and techniques. Where new conservation initiatives are needed, efforts should be made to maximise local participation in both design and implementation of these initiatives (see Saunders 1990a).

6. Programmes should incorporate a diverse range of outreach techniques, each targeted to a specific group. No one technique will affect change across all age and socio-economic groups. Successful education campaigns are a mosaic of many activities each carefully aimed at a specific group. The formal education system (primary, secondary, and to a lesser extent tertiary education) is a formidable institution in most countries of the world. Traditionally, teachers are regarded as pillars of society, and like other community leaders, exert considerable influence. Because of this, and because curriculum is at the heart of formal education, it is important that environmental education programmes make inroads into this system. Environmental education should be included in, and should run throughout, the other disciplines of the formal education curriculum to foster a sense of responsibility for the state of the environment and to teach students how to monitor, protect, and improve it.

Nevertheless, reaching out to children is not enough, and successful programmes must also target the entire public sector to get the message across to farmers, resource users, and the local leaders that write the legislation, enforce the laws and influence behaviour. To this end, lectures, town meetings, posters, billboards, theatre, song, dance, and church sermons can all play a role; a good programme should encompass both “formal” and “informal” approaches (see Butler 1992).

7. Programmes should incorporate assessment mechanisms to monitor and evaluate changes in knowledge, attitudes, and behaviour. Recognising that public attitudes can influence political decision-making, it is important that environmental education programmes incorporate mechanisms to analyse clearly and document their successes. These can be used to fine tune campaigns and encourage decision makers to rally to the cause.
8. Programmes should be replicable, with success documented and disseminated to others in the field. There is a natural tendency among people “to do one’s own thing”, but time is the enemy of conservation. By using proven methods, it is often possible to save time in achieving the goals of saving endangered species and their natural environment. The techniques and success of programmes with a proven track record must be documented and disseminated to other conservationists. This is not to deny the potentials for valuable innovations, but to ensure that successful lessons and techniques are remembered and utilised whenever and wherever appropriate.

Ecotourism

Many species of parrots are large and spectacular, and have good potentials to serve as a focus for ecotourism development. As a conservation technique, ecotourism can give economic benefits to local communities and cause them to value and protect the ecosystems on which the parrots depend. However, potentials for ecotourism do not extend equally to all parrot species, as many lack the charisma to make them major attractions, while others are too unpredictable in movements to allow reliable viewing in specific locations. Thus while the maroon-fronted parrot (*Rhynchopsitta terrisi*) offers excellent potentials for ecotourism because of its concentrated nesting in spectacular and consistently-used cliff colonies, the same potentials do not exist for the maroon-fronted parrot's close relative, the thick-billed parrot (*R. pachyrhyncha*). Although spectacular enough in appearance, the thick-bills nest in dispersed fashion in trees, and are notable for their erratic presence in specific areas. Thick-billed parrots also nest in a range currently troubled by widespread cultivation of illicit drugs, rendering the safety of ecotourism in some question and presenting some difficulties in attracting tourists to the area.

Perhaps the most successful example of ecotourism centred on parrots is that developed for viewing of large macaws at clay licks of south-eastern Peru (Munn 1992). The clay-lick spectacle is reliable and massive and a proven tourist attraction, despite the difficulties of getting to the area (which may actually be part of the attraction). Further, it represents a major income-producing phenomenon for local communities and has been practical to connect with the need to preserve the rainforest habitat of the species involved. Overall, ecotourism represents the third most

important economic activity for south-eastern Peru (Munn 1992), and this potential may continue to grow.

Wherever charismatic parrots exist and concentrate for whatever reasons (clay licks, waterholes, waterfalls, colonial nesting sites, reliable roosting sites, etc.), the possibility of ecotourism needs to be considered as a conservation option. But this needs to be done with full knowledge of the weaknesses and risks of this approach. If implemented improperly, ecotourism can lead to regrettable consequences of a variety of sorts, including degradation of the very resources on which it depends and disruption of local human cultures (see Brandon 1996).

Of principal concern is the proper distribution of economic benefits to be derived from the ecotourism. If the benefits do not stay substantially in local communities, then one cannot expect to see the development of local support for preservation of the ecosystems involved. Even if the benefits do remain largely local, the connection with needs for ecosystem protection may be missed without proper education efforts, or may simply be ignored if benefits are not substantial enough (see Brandon 1996). Unfortunately, in many cases of ecotourism development, the benefits have wound up primarily in the hands of extranationals or nationals that are far removed from the actual scene. Proper structuring of the economic benefits is something that should be addressed at the very outset of ecotourism development, and not simply be left to chance. To minimise exploitation and corruption as much as possible, the economic benefits should be controlled and realised by local communities as a whole rather than by individuals.

Another weakness of the ecotourism approach is the fact that it can be expected to be vulnerable to unpredictable fluctuations in international economies, changes in



Party with cameras at hyacinth macaw site in Piani, Brazil.

L. Porter

currency exchange rates, and changes in perceptions of the risks of visiting various parts of the world. A few well-publicised bombings and kidnappings have the potential to sabotage the basic viability of tourism wherever it is developed for whatever purposes. Nevertheless, it is clear that many developing countries are turning to ecotourism as a major economic benefit (e.g., Costa Rica). In many cases, it works reasonably well to generate income, even if it does not always benefit conservation efforts.

Thus far, the overall track record of ecotourism in aiding conservation has been disappointing, although positive potentials still exist, assuming structural changes can be implemented in the way the industry generally operates (see Brandon 1996). The main problem to be corrected is that economic returns do not substantially benefit local communities in many cases. In addition, visitor fees to protected areas, at least for non-nationals, are often underpriced and could easily be increased to generate more substantial benefits. Another change that can make a significant difference is gaining the co-operation of governments in channelling funds raised from public reserves back into reserve maintenance and protection.

Captive breeding

Captive breeding has served a crucial function in the recovery of a number of species of critically endangered wildlife, and has a role to play in the recovery of certain parrots. However, there are significant limitations to this technique when it is used to breed birds for ultimate release to the wild. In general, the technique is advisable only as a short-term measure when other preferable conservation options are not immediately available. Employed properly in recovery programmes, captive breeding can provide a critical boost for some severely threatened populations. Employed improperly, it can lead to greatly increased recovery costs and risks rather than benefits. It is important, therefore to identify when captive breeding should or should not be used as a recovery measure and how it should be implemented.

Captive breeding also has other values that are less directly related to species recovery, such as providing birds for exhibit, conservation education, and fund-raising purposes. Captive populations can also provide an important resource for fundamental biological research and research training which cannot be accomplished with wild individuals. The precautions that should be observed in captive breeding for recovery purposes (i.e., release to the wild) are different from and more stringent than those that are acceptable for captive breeding for these other purposes.

When captive breeding is properly integrated into a species recovery programme, it can offer a number of advantages. Most importantly, it can serve as a safety net



Echo parakeet chick, *Psittacula eques*. Captive breeding has been part of the recovery programme.

World Parrot Trust

for species whose wild populations face a high probability of extinction. With species that breed readily in captivity, it is sometimes possible to greatly increase the rate of reproduction through techniques such as multiple-clutching and speed the recovery of wild populations through releases of captive-bred birds. Releases can serve a number of purposes such as increasing extant populations, correcting sex-ratio imbalances (if these are determined to be unnatural and detrimental), re-establishing extirpated populations, and/or establishing new populations in natural or altered habitats (see Greenwood 1996 for discussion of the echo parakeet *Psittacula eques* programme). Captive breeding can sometimes also make it possible to minimise losses of genetic diversity from critically threatened populations and minimise chances of catastrophic loss of populations.

Captive populations have an important role to play in species recovery when pressures on wild populations are so large in the short term that there is no way to sustain wild populations. In such cases, captive breeding can provide a short-term reprieve, buying time for preparation of re-introduction sites that may permit re-establishment of wild populations.

Nevertheless, the potentials of captive breeding in aiding species recovery are limited by a number of important considerations (see Derrickson and Snyder 1992, Snyder *et al.* 1996):

1. **Difficulties in breeding certain species.** Most psittacines have been bred in captivity, but sustained and quantitatively adequate captive production has remained an elusive goal for many species (see Clubb 1992). For others, satisfactory production has been attained only by hand-rearing. Unfortunately, hand-reared birds are generally of lesser value than parent-reared birds for re-introduction purposes, and in some

cases they may be impossible to re-establish in wild environments.

2. Difficulties in re-introducing many species to the wild.

Re-introduction programmes for vertebrates to date have been relatively unsuccessful when limited to captive-bred stock – averaging 11–38% successful in recent major surveys by Beck *et al.* (1994) and Griffith *et al.* (1989). Re-introductions of captive-bred parrots often face problems with behavioural deficiencies resulting from a large component of learning in parrot behavioural repertoires and a difficulty in producing adequately normal behaviour in captive environments. Unless captive-bred individuals are re-introduced by fostering to wild pairs or are released in predator-free or predator-deficient environments, many re-introductions may fail because of problems such as inadequate flocking behaviour and poor habitat recognition abilities (see Snyder *et al.* 1994). The bottleneck in using captive breeding successfully in species recovery often lies in problems in re-introduction rather than in captive breeding itself.

3. High costs in facilities and personnel. The costs of properly-run captive-breeding programmes, including isolated, well-sited facilities, comprehensive disease control, and the manpower needed to maintain and care for adequate-sized captive populations, are substantial, sometimes running on the order of a half million dollars US per year. Over the time needed for conservation programmes, such costs can sometimes far exceed those of other potential conservation methods. Techniques such as habitat preservation (which automatically benefits far more species than the single parrot species under consideration) are often far more economical (see Balmford *et al.* 1995).

4. Disease risks. Parrots are susceptible to over 30 known pathogens and disease syndromes, many of which are widespread in captive collections and some of which cannot be reliably detected in carrier birds by presently available tests or standard quarantine procedures. Of course, diseases also occur in wild populations. However, wild populations are relatively well adapted to deal with indigenous diseases through natural immunities. The greatest risks occur when species are exposed to novel, exotic diseases. Such exposure risks are especially great whenever birds are transported or held in large numbers in multispecies, especially *ex situ*, environments. Unless captive breeding is conducted under carefully controlled conditions, the risks of disease to captive, re-introduced, and wild populations are substantial. Ideally, to minimise these risks, captive breeding of endangered parrots for recovery purposes should occur in:

- a) closed, single-species facilities,
- b) facilities within the natural range of the species,
- c) facilities in which staff do not have contact with

other species of wildlife, either professionally or avocationally,

- d) facilities that are sited as much as possible in areas free from arthropod disease vectors and feral populations of exotic birds,
- e) facilities where established protocols include rigorous disease prevention methodologies, such as scrub downs of personnel entering the facilities, and regular health examinations of captive stock.

To minimise the chances of introducing disease problems into wild populations, captive-breeding stocks for recovery of endangered parrots should generally be assembled directly from wild populations or from stocks held in closed single-species facilities with good records of disease prevention, and should not be formed from stocks that have been held in open multispecies facilities. Birds intended for re-introduction should be subjected to state-of-the-art disease screening when entering or leaving captive-breeding facilities, even though such screening cannot be expected to reveal the presence of all diseases of importance.

Observing the above standards is often expensive, but should be recognised as one of the inherent costs of comprehensive captive breeding conducted for recovery purposes (Wilson *et al.* 1994). The consequences of not observing such precautions include substantially increased risks of permanent establishment of new disease stress factors in already threatened wild populations and, in some cases, extinction or near-extinction of wild populations (see Jacobson 1993; Woodford and Rossiter 1994).

5. Managing genetic and behavioural changes. When captive populations are established for conservation and recovery purposes, the preservation of extant genetic variation and species typical behaviour assumes paramount importance. Over the past decade, considerable attention has been given to the preservation of genetic diversity in small populations. Modern, conservation-oriented breeding programmes attempt to ameliorate the genetic effects of inbreeding, drift, and adaptation to the captive environment through the deliberate and careful control of reproduction, population size, and population demography (Foose and Ballou 1988, Lacy 1987, Allendorf 1993). This is a challenging task, however, given:

- a) the practical limitations in controlling population size and reproduction,
- b) the dynamic nature of evolutionary forces in small populations,
- c) the types of genetic variation to be maintained, and,
- d) the uncertain nature of selection in the captive environment (see Lande 1988, Simberloff 1988).

In low-fecundity taxa, like most parrots, careful preparation of stud books and pedigree breeding to equalise progeny number in family lines can minimise genetic drift and adaptation to captivity (Allendorf 1993). However, it must be recognised that breeding programmes for endangered parrots have often failed to secure consistent reproduction and have been unable to equalise progeny numbers in family lines or pursue any other consistent genetic strategies, even after years of effort. Further, some stocks in captivity have been genetically debased by ill-advised cross-breeding with other races and do not constitute acceptable stocks for release on genetic grounds (see Triggs and Daugherty 1996).

Much less attention has been given to the preservation of species-typical behavioural traits. Behavioural traits, especially those that are learned or culturally transmitted, are prone to rapid loss in captivity. The behavioural repertoires of many parrot species include many learned components, and problems with behavioural deficiencies have already been encountered in attempts to re-introduce captive-bred individuals of several species to the wild (see Wiley *et al.* 1992, Snyder *et al.* 1994). Because the cultural transmission of information across generations appears to be essential for the survival of wild populations of some highly social species such as parrots (Toft 1994), breeding programmes for re-introduction must focus careful attention on behavioural management in the captive environment. Clearly, this aspect of captive management deserves much more scientific investigation than it has received, and will have to be undertaken on a species-by-species basis.

6. **Problems in ensuring continuity of programmes.** Captive breeding represents a relatively unstable and input-intensive approach to conservation that is difficult to sustain over the several decades often needed for the recovery of endangered species. Changes in personnel, institutional priorities, and financial resources can frequently leave long-term programmes without adequate support and expertise. The Puerto Rican parrot captive programme, for example, has suffered several periods of substantial difficulty in maintaining optimal efficiency over the more than 25 years of its existence. Of course, problems with continuity are not unique to captive breeding programmes, and can affect complex *in situ* conservation efforts as well.
7. **Pre-emption of other, better techniques.** Captive breeding can sometimes pre-empt attention and resources from better, long-term conservation solutions. The existence of a captive population can give the impression that the species is “safe” and allow agencies to ignore long-term solutions that are often more difficult politically, though much more effective and beneficial biologically (see discussion and examples in Snyder *et al.* 1996).

Because of the risks and limitations of captive breeding, it should be invoked as a species recovery approach only under carefully defined circumstances. The decision to start captive breeding for this purpose should be made only on a case-by-case basis and only following a comprehensive evaluation of conservation alternatives at the field level. It should not be made simply because some individuals are already in captivity and numbers of the species seem relatively low. Further, it should not be made when resources to conduct captive breeding comprehensively and humanely are unavailable.

In general, captive breeding can be justified as a desirable recovery approach when: (1) species are so rapidly approaching extinction that they cannot be expected to survive without intensive intervention of some sort and either effective conservation alternatives are clearly unavailable in the short term or sufficient time to investigate alternatives does not exist; or (2) all or nearly all individuals of a species are already in captivity and it is deemed worthwhile to attempt re-establishment of wild populations; or (3) other conditions prevail that make captive breeding and re-introduction absolutely essential for preservation of the species in the wild.

When captive breeding should begin for species in decline is often a point of vigorous controversy. Clearly, waiting too long before starting will risk genetic deterioration and potential failure in developing adequate husbandry techniques, especially if technology for captive breeding of the species or closely related species has not previously been researched. However, starting too soon can represent unnecessary expense, can accentuate genetic and behavioural management problems, and can focus resources in non-crucial directions, pre-empting other approaches that can offer potentials for more stable, long-term benefits.

Population trends are often far more important than absolute numbers in making decisions as to whether and when captive breeding is warranted. Steeply declining species are cause for special concern, and care needs to be taken not to wait too long in establishing captive populations if effective alternatives are unavailable. In making such decisions it is crucial to recognise the difference between ephemeral short-term population fluctuations and pervasive long-term population trends. Well-constituted recovery teams weighing the many factors that need to be considered are probably the best mechanism for determining whether and when captive breeding is needed for a particular species. The decision should not be delegated to parties, such as private captive breeders, who have a personal stake in the captive breeding.

Captive-breeding programmes for species recovery should not be established independent of efforts to develop alternative, long-term conservation solutions for wild populations. In general, wild populations should be sustained at the time captive populations are established

so that research into limiting factors can take place and problems in the wild can be identified and corrected. Also, existing wild populations can present a valuable link for re-introduced individuals.

Finally, captive breeding efforts for species recovery should proceed only when endorsed by the governments of the countries involved. Although extranationals may be useful in helping launch such programmes and in providing training, programmes should primarily involve participation by local conservationists. It is crucial that birds involved in captive breeding efforts be under the control of integrated conservation programmes so that disputes as to ownership of birds and as to the management and fate of birds do not disrupt progress toward conservation goals. Captive and wild populations of a species must be managed as one interactive entity under control of a single conservation authority.

Re-introductions

Re-introductions, in the broad sense of re-establishing or bolstering wild populations with releases of birds held in captivity, can utilise either wild-caught or captive-reared stocks. Potentially, such releases can enhance the status of endangered parrots in several ways:

1. When releases are made in former habitat of the species, they can either re-establish the species or significantly increase its range in the wild and by so doing increase the overall security of the species.
2. When releases are made into weakened wild populations of the species, they can reinvigorate the wild populations through increasing genetic diversity and correction of imbalanced sex ratios.

3. In carefully selected cases, the potential also exists to establish wild populations in formerly unoccupied habitat when habitat in the original range is no longer adequate for survival of the species. Here, the re-introduction programme for the kakapo (*Strigops habroptilus*) comes immediately to mind (Merton 1997).

Wiley *et al.* (1992) presented a review of a variety of parrot re-introductions from prehistoric times to the early 1990s and should be referred to for background information. For a discussion of criteria for re-introduction in general see Kleiman *et al.* (1994) and IUCN (1998), and for a more specific treatment of avian re-introductions see Black (1991).

In general, re-introduction programmes have received a tremendous amount of publicity in recent years, and have been proposed for many species without a careful consideration of whether re-introductions are truly appropriate. Re-introductions should serve a direct conservation benefit for wild populations and pose a minimum of risks. They should have a clearly defined conservation goal and be terminated once that goal is reached. Continuous release programmes that never achieve self-sustaining wild populations of the target species are not legitimate re-introduction programmes from a conservation standpoint. However, legitimate re-introduction programmes may include carefully designed surrogate release efforts using less critically endangered species as models to develop techniques to use subsequently on a target species. Because of certain risks posed (see below) releases should not be undertaken solely for the purpose of disposing of confiscated birds or excess captive-reared birds.

While improvements in technology can be expected, the success rate of re-introductions of captive-bred animals



Thick-billed parrot
Rhynchopsitta pachyrhyncha.
Experimental re-introductions
of captive bred thick-billed
parrots were largely
unsuccessful.

to the wild has not been impressive to date. Using rigorous criteria, Beck *et al.* (1994) reported an overall success rate of only 11% in some 145 re-introduction programmes utilising captive-bred stocks, mostly involving vertebrates, while Griffith *et al.* (1989) reported a 38% success rate using different criteria for success. Success rates have generally been much higher for translocations of wild-caught animals from one region to another [e.g., 75% in the study of Griffith *et al.* (1989)]. This difference in success very likely traces in large measure to behavioural deficiencies of captive-bred stocks relative to wild-raised stocks.

Examples of well-documented parrot re-introductions are few, which makes it difficult to evaluate success rates of captive-bred vs. wild-caught stocks. However, experimental releases of thick-billed parrots (*Rhynchopsitta pachyrhyncha*) in Arizona indicated that wild-caught birds survived much better than captive-reared birds (Snyder *et al.* 1994). Nevertheless, short-term success has been achieved in releases of hand-reared macaws (*Ara ararauna*, *A. chloroptera*, and *A. macao*) and yellow-shouldered parrots (*Amazona barbadensis*) into local healthy populations from which they were taken (Munn 1994, Sanz and Grajal 1998). Much of the difference in success rates between these studies may trace to the extent of predator pressure faced by the released birds in the different situations. The potentials for success in releases of captive-reared birds are presumably maximised if releases are conducted in low-predation environments hosting existing wild populations of the species concerned.

As a general guideline, re-introductions should utilise wild-caught stocks in preference to captive-reared stocks, especially when a proposed release is not into an existing wild population from which naive captive-reared birds can learn appropriate behaviour. One of the most successful ways to link captive-reared birds to wild populations is through fostering of eggs or nestlings into wild nests (Snyder *et al.* 1987), a technique that demands close co-ordination of captive and wild-population efforts. Unfortunately, fostering opportunities may often be limited in endangered species programmes, and reliance may have to be placed on releases of flighted birds in many instances. Cross-fostering of eggs or nestlings into nests of other species can pose severe problems of imprinting the released birds on inappropriate species and subsequent problems with hybridisation (e.g., Harris 1970). It should normally be avoided.

Three risks of re-introductions need to be emphasised: (1) disease contamination, (2) unintended ecological effects, and (3) cultural/genetic pollution of wild populations. Re-introductions can pose severe risks to wild populations by the inadvertent introduction of exotic diseases (see Woodford and Rossiter 1994, Snyder *et al.* 1996). Re-introductions should utilise stocks that can be confidently assessed as disease-free, and use of disease-suspect stocks

should be entirely avoided, particularly when releases are being made into existing wild populations. Many parrot diseases have long latency periods and are virtually impossible to detect in carrier individuals, so releases of birds in which the histories of exposure to disease are unknown are unwise. Thus, confiscated birds should be avoided in general, as should birds from open multi-species captive environments, especially those held in facilities outside the range of the species.

Wild-caught birds are a relatively safer source for re-introduction, especially with respect to exotic diseases, but only if they are held separately from other stocks before release and undergo adequate quarantine with thorough pre-release screening for diseases that can be detected by available tests. Captive-bred birds from closed, single-species facilities within the natural range of the species are also good candidates for release from a disease standpoint, provided there has been an exemplary history of disease prevention at the facilities. However, even in isolated facilities shielded from contact from other species, disease problems can emerge if rigorous food handling practices are not practised and if staff servicing captives have contact with other birds outside the facilities.

Unintended ecological effects are a special concern when releases are attempted outside the historical range, as here the species is being placed in an environment where other species have not evolved any adaptation to deal with it. Harmful distortions of ecological relationships can easily occur under such conditions, as has been demonstrated repeatedly around the world with feral populations of exotic pest species. Releases into non-native regions should only be considered under extreme circumstances, as previously recommended by the IUCN (1987). Yet the technique has been used with apparent success and absence of detrimental side effects with a variety of bird species island to island in the New Zealand region (see Armstrong and McLean 1995).

A third risk of re-introductions is that when captive-bred stocks are used they may introduce genetic and cultural traits evolved in captivity into a wild population where such traits are not adaptive. Through learning and interbreeding, these traits may be of harm to the wild populations, especially if the wild populations are highly depressed in numbers relative to the numbers of released individuals. Such problems have been especially of concern in releases of hatchery-reared fishes (e.g., Fleming 1994, Philippart 1995), but there is no reason to expect such effects would not occur in parrots as well. An intact culture, where behaviours are transmitted through learning between generations, appears to be essential for the survival of populations of highly social species such as parrots (Toft 1994).

A consideration of the potential benefits and risks of re-introductions leads to the following general recommendations regarding parrot re-introductions:

1. Re-introduction should not be considered as a conservation option until the factors causing endangerment or extirpation of the population in question have been corrected or are being corrected. This means that a thorough ecological study should be conducted to determine what factors may be limiting the particular species, and programmes directed at reversing limiting factors should be implemented before any consideration is given to re-introductions. If wild populations still exist, correction of limiting factors may be sufficient to achieve recovery without any need for re-introductions. This should be evaluated prior to initiation of any releases.
2. The potential release site should be thoroughly evaluated. If birds of the species to be released exist at the site, the population should be studied, the carrying capacity estimated, and a re-introduction plan developed around that population. Attention should be paid to re-introducing only the appropriate subspecies. If birds are to be released into an area where there is no existing wild population, great care should be given to assessing the suitability of the habitat and the possible effects of the release on other species.
3. Release programmes should follow all national and international laws, treaties, and regulations. It is imperative that all permits are in order so the success of the programme will not be jeopardised by improper paperwork.
4. Appropriate levels of co-operation and collaboration with local interests must be secured. Success of re-introduction can be expected to depend heavily on involvement of local people in release and monitoring efforts and in keeping local communities informed about the programme and gaining their support through educational programmes conducted simultaneously with and prior to the releases.
5. Sufficient numbers of birds to give reasonable hope of success should be available for release. A certain level of mortality will take place in any release, so there is no benefit in releasing such a small number of birds that normal flocking behaviour and/or pairing is unlikely to occur.
6. Stock for release should be chosen from disease-free sources and be shielded from exposure to exotic pathogens by proper siting of holding facilities. Release candidates should also all be sexed and screened for known diseases prior to release.
7. Adequate pre-release acclimatisation and training must be implemented. Conditioning prior to release should include flight training, socialisation within flocks, acclimatisation to local conditions, and experience with local foods. Whenever possible, releases should provide subsidies of food and water until birds are fully competent in the wild. Predator aversion training may

be necessary with captive-reared birds, though should be unnecessary with wild-caught birds.

8. Resources should exist to monitor the results of releases comprehensively and to conduct quantitatively adequate follow-up releases. All birds should be banded and, finances permitting, have microchips implanted. If possible, a portion of released birds should be radio-tagged, at least during experimental phases, since this is the most effective way to monitor the success of the release.

Confiscated birds

Although the above recommendations regarding re-introductions are straightforward and reasonable, many recent release efforts with parrots have been initiated without conforming to these recommendations. In particular, releases have become a common way to dispose of confiscated birds in many Latin American countries. These releases often are made into populations for which the releases pose unnecessary risks and no clear potential benefits, and without comprehensive monitoring of results. Some of the programmes initiated have been designed precisely to rehabilitate and release confiscated birds and are financed by international organisations or by scarce conservation resources of government agencies. Most often, these programmes have involved common, rather than endangered, species, but the risks posed are not limited to the common species released.

The reason many of these programmes have been started is that with increased law enforcement activities, the governments of many countries have been faced with a difficult problem of what to do with birds confiscated from illegal trade. The options for dealing with these birds are unfortunately limited, and all have drawbacks. Primary options include:

1. Donations or sale to zoos and other similar institutions,
2. Donations or sale to research institutions,
3. Auction to anyone willing to purchase them,
4. Release to the wild, and
5. Euthanasia.

Donations or sale to zoos and other similar institutions provide an obvious and generally acceptable solution to the disposal problem for confiscated animals. However, the capacities of such institutions to absorb the quantities of birds available are generally minimal. The species available from confiscations are often ones that have only limited exhibit potential, and zoos simply do not have the space or desire to handle large numbers of such animals. Furthermore, because confiscated animals usually have unknown histories of exposure to disease, such institutions take a gamble on bringing them into



Citron-crested cockatoos, *Cacatua sulphurea citrinocristata*. Confiscated birds have often been exposed to other captive birds, sometimes from around the world. Experience has shown that they are often carriers of serious avian diseases.

Margaret Kinnaird

their facilities, even after quarantine and screening for known diseases.

Donations or sale to research institutions similarly provide an obvious and generally acceptable solution, but in general these institutions are even less capable than zoos of absorbing the quantities of birds available. While this option should be encouraged, it cannot be expected to provide a full solution to the problem.

Auction to anyone willing to buy is another solution that has been commonly employed in the past, but it often results in the birds being bought back by the very people from whom they have just been confiscated. At auction prices, these people are still able to make substantial profits on the birds on resale, and since they are now legal as a result of auction, they can move them freely in commerce. This has obviously not been a very beneficial way to dispose of confiscated birds. Auction also represents a source of disagreement between authorities in different countries, especially when the status of the species or authorised uses are different between the country of origin and the country in which confiscation takes place. At most, auction should be encouraged as a solution only when a floor to sale prices is established that is at or close to retail value.

Release to the wild has been recently adopted as a preferred way to dispose of confiscated parrots by many governments. Most of the releases that have been conducted have not been for the purpose of re-establishing wild populations, nor have they been needed for bolstering wild populations—they have been implemented simply to dispose of birds that agencies do not know what to do with. Unfortunately, releases of confiscated birds pose serious risks of disease introduction into formerly disease-free

wild populations. Unfortunately, the diseases involved are often ones for which no diagnostic tests exist. There is no reliable way to avoid the potential of introducing serious diseases into wild populations when such birds are released. Whether such disease problems have been developing in many of the confiscated bird release programmes is unknown, because there has been virtually no follow-up study done after releases. While the releases being conducted allow participants to feel they are doing something worthwhile, in most cases they only represent added risks for wild populations and often inhumane death for released birds. Only in the very unusual circumstances where history of disease exposure of confiscated birds is known and is determined to be benign, where there is a true conservation need for releases, and where there are resources for a comprehensive release programme is it advisable to utilise confiscated birds in releases.

Unfortunately, determining the history of disease exposure to be benign in confiscated birds is usually impossible. Such a determination is generally limited to cases where confiscations have been made right at the source of birds, before they are moved to other links in the chain of commerce. Confiscations are rarely made at this level, and even confiscations made directly from people harvesting birds from the wild may involve disease-compromised birds, as for example birds exposed to poultry diseases in the homes of the collectors involved. In practical terms, nearly all confiscated birds should be considered highly suspect, regarding disease considerations.

Euthanasia is a relatively simple method of disposing of confiscated birds and poses no risks to wild populations, but this solution can pose serious political risks of

opposition from segments of the public that oppose such methods on principle. Where this solution can gain political support, it represents a preferable solution to releases to the wild. In any case, where birds have been exposed to or suffer from untreatable diseases, euthanasia is clearly warranted.

Thus, while this Action Plan cannot propose a universally applicable solution to the problem of disposal of confiscated birds, release to the wild is normally the least favourable conservation option and should generally be avoided.

Sustainable harvest

Parrots, by virtue of their bright colours, their capacities to imitate human speech, and their adaptability to captive conditions, have been favoured as human pets as far back as historical records extend. Unfortunately, this very popularity has been a major cause of the conservation woes of psittaciforms worldwide. As human populations have grown, wild parrot populations have been overharvested in many regions, many to the point of local extirpation and some to the verge of total extinction. In their review of conservation status of parrots in the New World, Collar and Juniper (1992) concluded that approximately half of the 42 threatened species in the region were endangered primarily or secondarily by trade.

The prices commanded by the larger and more colourful species have commonly represented a significant source of income for rural human populations. Revenues from harvesting parrots have not usually been sole sources of income, but have been valued as supplementary income to be gained when opportunities arise. Unfortunately, the harvest has rarely been conducted on anything approaching

a sustainable basis, largely because the resource has usually been a “commons” where any forbearance in harvest is perceived only as money in someone else’s pocket.

In theory, the economic values commanded by parrots might represent a means to their conservation if the socio-economic environment could be restructured enough to promote truly *sustainable* utilisation of wild parrot populations. If implemented properly and conservatively, sustainable harvesting could provide advantages for conservation, aviculturists, the pet industry, and local human populations. Conservation could gain by the maintenance of healthy wild populations of parrots, and by the accruing of economic values to the habitats occupied by the parrots, which could result in conservation of many associated species. For example, if parrots could be sustainably harvested from tropical rainforests, this would provide another commodity that might help to make extractive reserves more economically valuable than clearing forest for timber harvest, cattle grazing, or intensive crop production. For many species of parrot, sustainable harvesting would require that substantial areas of land be maintained as mature forest. Aviculturists could purchase new genetic stock for their breeding programmes from birds harvested sustainably. The pet industry would have a steady but small flow of legally imported birds already conditioned to captivity. Finally, the profits from these programmes could be directed to the local people in need of ways to support themselves.

No demonstrably successful sustainable harvesting projects with free-flying parrots have been established to date. Because most parrots have low reproductive potentials and long life spans, they are highly vulnerable to overharvesting, and conservative approaches to harvesting appear warranted. These include approaches such as harvesting only nestlings and not adults, and



African grey parrot, *Psittacus erithacus*.

harvesting primarily nestlings that are produced in excess of natural productivity as a result of management programmes. Maximising sustainable nestling harvest levels requires management to achieve robust numbers of nesting pairs, which may in some cases approach the carrying capacity of the environment.

The biological characteristics of some parrot species appear to lend themselves to sustainable harvesting programmes. For example, brood reduction occurs regularly in some parrot species, so it should be possible to practice early partial brood removals (last-hatched chicks) without greatly affecting productivity in these species. Further, even where brood reduction may not be a regular phenomenon, biological data suggest that there is a potential to harvest some parrots in a sustainable manner if overall productivity can be increased through the use of nest boxes (Beissinger and Bucher 1992a,b; Stoleson and Beissinger 1997). However, these approaches to sustainable harvest are not applicable to many parrot species, as they lack regular brood reduction, are not nest-site limited, or are reluctant to accept nest boxes. Sustainable harvest of such species may be difficult without development of other means of increasing reproduction or reducing mortality of wild populations.

Realising the potential benefits of trade requires a degree of control over harvesting that promises to be difficult and expensive to achieve. Solving the biological problems associated with sustainable harvest of parrots is challenging enough, and presupposes that sensitive and reliable means of population monitoring may be available for the species in question. Even more challenging are the associated social, political, and economic problems. Examples of the latter include:

1. Illegal laundering of non-sustainably harvested birds through the programmes;
2. Continued poaching of birds by people outside of the programmes; and
3. A tendency for programmes to skimp on the costs of monitoring wild populations and to overharvest to maximise short-term profits.

If there is to be a trade in parrots, it must be conducted on a sustainable basis. A commonly accepted biological basis for sustainable use of renewable resources is that harvest should not take more than excess individuals over the numbers needed to replenish the population and should not have negative effects on other components of the ecosystem. The best way to determine what harvest levels are sustainable is to conduct continuing detailed biological studies of the natural history, demography, movements, and population size and trends of the species to be harvested. Quotas set without such information will have little biological justification.

Further, national and international regulation of harvest and trade must shift from the practice of national

quotas to local harvest quotas based on scientific management plans. Using national quotas to regulate harvests does not tie harvest levels into local conditions and provides no impetus for ecosystem conservation. Harvest quotas must be developed on a site-by-site basis, with harvest levels linked directly to local changes in population productivity and habitat conditions.

Unfortunately, without truly effective controls over harvesting programmes, attempts at sustainable harvesting run a significant risk of exacerbating conservation problems, rather than solving them. Once species are viewed primarily as items of legal trade, the primary concerns in free capitalistic economies commonly become maximising short-term profits, rather than ensuring long-term sustainability (Hawken 1993). Historically, attempts to harvest wildlife resources for profit include numerous examples of overexploitation and of species driven to the verge of extinction (see Geist 1988, Ludwig *et al.* 1993, Talbot 1993).

One of the few apparently successful wildlife harvesting efforts, from the standpoints of sustainability and conservation, is butterfly ranching. Butterfly ranching, however, has two unusual characteristics:

1. It is often cheaper and easier to ranch butterflies than to collect them from the wild by other means; and
2. The trade quality of ranched butterflies is much better than that of wild-caught butterflies (both with respect to parasite incidence in pupae and wing damage in adults).

Both of these factors greatly decrease economic incentives to “launder” wild-caught stocks through ranching programmes or to invest efforts in harvesting wild stocks outside ranching programmes.

In contrast, non-ranching parrots may be much less costly to harvest than sustainably ranching parrots because they do not entail monitoring costs, nest box costs, etc. This is especially true when finding of nests is incidental to other economic activities, such as herding livestock, and does not represent a substantial additional time investment. Further, non-ranching parrots can be of equal trade quality to ranching parrots when they are harvested as nestlings. They can be as tame and as good speakers as ranching parrots, and in fact have no intrinsic features to allow their differentiation from ranching parrots. Thus, despite legal ranching efforts, there may be substantial economic incentives favouring continued illegal harvesting of wild parrots and substantial difficulties in detecting illegal non-ranching parrots in trade.

It is possible to reduce the attractiveness of laundering birds by setting up systems of bird identifications based on various DNA techniques. However, such techniques substantially increase costs of operations, and unless governments want to subsidise operations, these costs presumably would have to be borne by the ranchers themselves, reducing their abilities to compete with illegal

harvest. Presumably all nesting individuals in ranching operations would have to be DNA sampled to make such systems work, and with many species this could present formidable practical problems because of difficulties in capturing adult birds for sampling.

Other concerns posed by sustained harvest as a means of parrot conservation include:

1. An inherent tendency of this approach to work against alternative approaches that seek reductions in human uses as a means toward conservation;
2. A fear that placing primary importance on economic values of wild parrots as a means to their conservation will lead ultimately to a distortion of wildlife management efforts to favour only those species with high trade values at the expense of efforts to sustain general biodiversity values; and
3. A fear that once sustainable harvesting schemes are in place, the primary goal of operations can be expected to shift from conservation to maximising profits and sustaining employment of participants, even if this means overharvesting resources. History has shown that governments can be expected to be generally sympathetic to these latter goals and to be under great pressure to value them more than conservation goals.

Sustainable harvesting for an international export trade poses the additional risk of continued export of wildlife diseases to foreign countries. It also increases the potentials for establishment of additional feral populations of exotic parrots in foreign countries. These are extremely important threats, especially when exported species have the potential to become pests in non-native countries. Despite these risks, pressures continue to surface for Australia to export pest cockatoo species as an alternative to other control measures. The prudent assumption that should be made is that any species exported in numbers to a foreign country may have the potential to establish feral populations in that country.

The above problems, coupled with the substantial problems in solving the biological, social, political, and economic difficulties associated with effectively controlling sustainable harvest, raise substantial concerns as to whether this option might be successfully implemented with parrots. Demonstrated mechanisms to control such problems do not currently exist and promise to be challenging to develop. Until such mechanisms are developed, however, attempts to implement sustainable harvesting for parrot conservation seem likely to result in greater problems than they solve.

Unfortunately, the various monitoring and management efforts that must be practised for sustainable harvest of parrots to work all represent substantial costs. Pressures to forgo or minimise these costs and to overharvest in order to maximise profits or even to compete with illegal trade in the same species could eventually undermine any initially successful sustainable harvesting ventures.

At best, sustainable harvest would appear to have relevance only to the select group of species that are popular in trade and in countries that have the administrative and enforcement capacities to effectively regulate trade. At worst, it could result in greatly diminished conservation prospects for many harvested species. Because of the risks and uncertainties involved, species with low numbers locally or globally should not be considered candidates for sustainable harvest until their wild populations have recovered to healthy levels. Thus at the present time it is unwise to attempt sustainable harvest as a recovery technique for threatened psittacines and this Action Plan does not recommend such attempts.

Strong hopes should not be placed in sustainable harvesting as a conservation strategy until several demonstration projects can prove the feasibility of controlling anticipated problems. Substantial funds will be needed to find ways of enforcing harvest and trade regulations in such projects in both exporting and importing countries. Comprehensive enforcement can be expected to be a necessity before potential exploiters will take harvest regulations seriously, and in many countries such enforcement may be an unrealistic goal.

Furthermore, even if solutions to many of the above problems might be achieved, sustainable harvesting schemes may have difficulty surviving economically because of the tendency for single products to fluctuate greatly in value through time. Economics of the live-bird trade are governed by the vagaries of supply and demand. As a species becomes readily available, whether through poaching or successful captive breeding or sustainable harvesting, demand for that species tends to decline and the price falls, often dramatically. In a free market international economy, it is doubtful that any sustained harvest programme or export scheme can be maintained in the long term; supply and demand for the harvested or exported species will likely not be under the full control of local participants. Where profits are to be made, supplies can be expected to increase from all possible sources. But, as supplies increase, prices and thus profits will drop, potentially to levels that will not support comprehensive harvest operations, especially with the costs of scientific management included. In part this outcome can be anticipated because many of the birds produced and sold in aviculture are priced below their real cost. Many aviculturists sell these birds simply to reduce the economic losses in their collections and not to gain a profit. Sustained harvest efforts will have to compete with birds from such sources as well as birds from illegal wild harvest produced at very low cost.

In overview, sustainable harvesting of parrots for trade should not presently be proposed for threatened species, although this conclusion does not preclude the possibility that this technique might have some future role in conservation of such species. Sustainable harvest can only serve a conservation purpose if robust parrot populations

and long-term habitat preservation result. But, it cannot contribute to species or habitat conservation without availability of sound ecological information and effective methods to regulate harvesting and trade. Solving the economic and political problems associated with sustainable harvest promises to be a formidable task.

Summary of conservation options

Most conservation programmes for parrots will utilise more than one conservation technique. The combination best suited for a particular species must be determined on a case by case basis and reflect the limiting factors faced by that species. In designing an optimal mix of techniques, it is important to keep in mind the advantages and disadvantages of various choices, and to ensure that the programme furthers overall goals of economic effectiveness, benefiting associated species, and political viability.

As a general view, nearly all conservation programmes will benefit from comprehensive habitat protection and education components. Some will be well suited to development of ecotourism, while others will not. Relatively few will benefit from captive breeding and re-introduction approaches, and at the present time it is wise to be extremely cautious about attempting sustainable harvesting schemes.

Other more specific conservation remedies will undoubtedly be needed for the conservation of many species, as determined from comprehensive biological studies. The threats facing parrots are diverse. While the issues of trade and habitat deterioration loom as overarching threats to the group as a whole, they are by no means the only problems. The best solutions will vary with the species, and the local social, economic, and political context.

Good biological knowledge about the species in question and thorough local involvement in designing and carrying out conservation programmes are essential for success. No one can successfully plan, let alone implement, a conservation programme for a species from afar. Nevertheless, productive international partnerships can often speed and facilitate the conservation process, particularly where sufficient resources are unavailable at the local or regional level.

Some final remarks

Endangered species programmes commonly represent excellent opportunities for international collaboration, but at the same time they pose considerable challenges for all involved parties (Foster 1993). Some of the failures in conservation programmes can be traced to breakdowns in collaborations and understanding between extranational scientists/conservationists (mostly with good intentions and frequently also good data and good financial resources) and local scientists/conservationists (also with good intentions, but sometimes lacking technical expertise, and usually lacking financial resources). Differences in expectations and resources are commonly involved. Scientists and organisations from developed countries are often confronted with a highly-competitive publication-driven environment that to some extent demands priorities in actions that are not entirely focused on effective conservation actions. Scientists/conservationists in developing countries, who are commonly underpaid and over-committed to too many conservation projects, often have difficulty understanding why so much effort goes into scientific research, which is sometimes perceived as relatively trivial, compared with the needs for action based on intuitive appreciation of the nature of species' problems. Tensions can easily arise from basic conflicts over how much documentation is needed before actions should be initiated.

In addition, there are clearly cases where persuasive apostles of particular conservation approaches are able to convince local participants and colleagues that certain courses of action (e.g., alluring re-introduction programmes) are necessary conservation actions, when they may not be. Once these programmes are started, they may be self-perpetuating with little or no benefits for conservation. We believe strongly that the best safeguards against abuse lie in major efforts to achieve mutual understanding and respect among all parties and in maximising participation by diverse points of view in recovery efforts. In any conservation programme there should always be an open forum for discussion of potential strategies that involves all interested parties and a process of consensus development based on reasoned argument and the best data available.

Threatened Parrots of the World

This Plan is the result of extensive consultation with field experts from around the world, and as such it is possibly one of the widest collaborative efforts towards the conservation of endangered Psittacines. The parrot species included in this Plan were originally selected from the list of species and the accounts of their status and threats in *Birds to Watch 2* (Collar *et al.* 1994). With the updated information and input from field experts and literature reviews, the list of globally threatened with extinction parrots was updated using the IUCN Red List Categories and Criteria (IUCN, 1994).

Through consultation with conservation biologists familiar with the species in the wild and recent literature both the list of species and the information contained in each species account have been revised and updated as completely as possible. This has led to several changes in the list of threatened parrot species, all of which have been agreed to by BirdLife International (which maintains the world list of threatened birds on behalf of the Species Survival Commission of IUCN-The World Conservation

Union). These changes are amendments to the 1996 IUCN *Red List of Threatened Animals* (IUCN 1996), the bird listings for which were taken from *Birds to Watch 2* (Collar *et al.* 1994). These changes have been made as a result of new information from the field (e.g., great-green macaw *Ara ambigua*), additional information being used in the threat classification (e.g., glossy black-cockatoo *Calyptorhynchus lathami*), or even changes in taxonomy used (e.g., Norfolk Island parakeet *Cyanoramphus [novaezelandiae] cookii*). All of these changes are fully documented here. Please note that the qualifying criterion A has been amended where appropriate. This is necessary because of an addition to that criterion between the publication of *Birds to Watch 2* and the adoption of the categories and criteria by IUCN. The qualifying criteria A1b, c, and d now become A1c, d, and e; this also applies to criterion A2b, c, and d. (For a full explanation of the IUCN Red List Categories and Criteria see Appendix 2.) The result is an up-to-date assessment of the threat status of the world's parrots (Table 1).

Parrot Action Plan meeting 1995. With the help of BAAC, parrot experts and enthusiasts gathered together to talk through the Plan. Those present: from left to right (standing) – Noel Snyder, USA; James D. Gilardi, USA; Alejandro Grajal, Venezuela; Nigel Collar, UK; Joseph M. Forshaw, Australia; Rod Hall MBE, UK; Frank Lambert, UK; Mariano Gimenez-Dixon, Mexico; David Waugh, UK; Roland Wirth, Germany, Mike Reynolds, UK. From left to right (seated) – Phil McGowan, UK; Mike Perrin, South Africa. Not present: Colin Bibby, UK; Charles A. Munn, USA.



Table 1. Threatened parrots of the world. Threatened species are listed alphabetically by scientific name within each region and are followed, where appropriate, by: 1) threatened taxa for which there is evidence that they may be distinct species or otherwise might be candidates for inclusion on the List, and 2) species removed from the List. Critically Endangered species are shown in **bold**. Where two English names are given, the first is that widely used in the range country and the second, in parentheses, is the name used in *Birds to Watch 2* (Collar *et al.* 1994). *Denotes changes from *Birds to Watch 2* (and, therefore, the 1996 IUCN Red List of Threatened Animals).

English name	Scientific name	Distribution	Threat category
AUSTRALIA, NEW ZEALAND, AND THE SOUTH-WEST PACIFIC			
Baudin's cockatoo (White-tailed black-cockatoo)	<i>Calyptorhynchus baudinii</i>	South-west Western Australia	Vulnerable
Carnaby's cockatoo (Slender-billed black-cockatoo)	<i>Calyptorhynchus latirostris</i>	South-west Western Australia	Vulnerable
Red-throated lorikeet	<i>Charmosyna amabilis</i>	Fiji	Vulnerable
New Caledonian lorikeet	<i>Charmosyna diadema</i>	New Caledonia (France)	Endangered
Antipodes parakeet	<i>Cyanoramphus unicolor</i>	Antipodes, New Zealand	Vulnerable
Horned parakeet	<i>Eunymphicus cornutus</i>	New Caledonia (France)	Vulnerable
Swift parrot	<i>Lathamus discolor</i>	Eastern Tasmania and south-east mainland Australia	Vulnerable
Orange-bellied parrot*	<i>Neophema chrysogaster</i>	South-western Tasmania, and coastal Victoria and eastern South Australia	Critically Endangered
New Zealand kaka	<i>Nestor meridionalis</i>	New Zealand	Vulnerable
Night parrot	<i>Pezoporus (=Geopsittacus) occidentalis</i>¹	Thought to be central Australia	Critically Endangered
Princess parrot (Alexandra's parrot)	<i>Polytelis alexandrae</i>	Western Australia, Northern Territory, and north-western South Australia	Vulnerable
Superb parrot	<i>Polytelis swainsonii</i>	New South Wales and northern Victoria	Vulnerable
Golden-shouldered parrot	<i>Psephotus chrysopterygius</i>	Cape York Peninsula, Queensland	Endangered
Kakapo*	<i>Strigops habroptilus</i>	Codfish, Little Barrier, Mana, Maud, and Stewart Islands, New Zealand	Critically Endangered
Kuhl's lorikeet	<i>Vini kuhlii</i>	French Polynesia and Kiribati	Endangered
Blue lorikeet	<i>Vini peruviana</i>	French Polynesia and Cook Islands (NZ)	Vulnerable
Henderson lorikeet	<i>Vini stepheni</i>	Henderson Island (UK)	Vulnerable
Ultramarine lorikeet	<i>Vini ultramarina</i>	Marquesas Islands, French Polynesia	Endangered
Possible species			
Forbes' parakeet	<i>Cyanoramphus (auriceps) forbesi</i>	Mangere and Little Manger Islands in Chatham Islands New Zealand	Critically Endangered
Orange-fronted parakeet	<i>Cyanoramphus (auriceps) 'malherbi'</i>	Arthur's Pass and the Lake Sumner/Lewis Pass area, South Island, New Zealand	Critically Endangered
Red List removals			
Glossy black-cockatoo*	<i>Calyptorhynchus lathami</i>	Queensland, New South Wales and Victoria, Australia	Lower Risk
Norfolk Island parakeet*	<i>Cyanoramphus (novaezelandiae) cookii</i>	Norfolk Island (to Australia)	Considered a subspecies
Scarlet-chested parakeet*	<i>Neophema splendida</i>	Southern inland Australia	Lower Risk
ASIA – CONTINENTAL			
Intermediate parakeet	<i>Psittacula intermedia</i>	Northern India	Vulnerable
ASIA – INDONESIA			
White cockatoo	<i>Cacatua alba</i>	North Moluccas	Vulnerable
Moluccan cockatoo (Salmon-crested cockatoo)	<i>Cacatua moluccensis</i>	Seram and satellite islands, Moluccas	Vulnerable
Yellow-crested cockatoo	<i>Cacatua sulphurea</i>	Lesser Sundas, Sulawesi and Masalembu Islands	Endangered
Blue-fronted lorikeet	<i>Charmosyna toxopei</i>	Buru	Vulnerable
Black-winged lory	<i>Eos cyanogenia</i>	Islands in Geelvink Bay, Irian Jaya	Vulnerable
Red-and-blue lory	<i>Eos histrio</i>	Miangas, Talaud and Sangihe Islands	Endangered
1. A widely accepted taxonomic revision places the night parrot in a different genus and we follow this revision: the generic name under which it appeared in Collar <i>et al.</i> (1994) is given in parentheses.			

Table 1 ... continued. Threatened parrots of the world.

English name	Scientific name	Distribution	Threat category
Sangihe hanging-parrot	<i>Loriculus catamene</i>	Sangihe Island	Endangered
Wallace's hanging-parrot	<i>Loriculus flosculus</i>	Flores	Vulnerable
Purple-naped lory	<i>Lorius domicella</i>	Seram and Ambon, Moluccas	Vulnerable
Chattering lory	<i>Lorius garrulus</i>	North Moluccas	Vulnerable
Salvadori's fig-parrot	<i>Psittaculirostris salvadorii</i>	Northern Irian Jaya	Vulnerable
Iris lorikeet	<i>Psitteuteles iris</i>	Timor and Wetar	Vulnerable
Pesquet's parrot	<i>Psitttrichas fulgidus</i>	New Guinea	Vulnerable
Black-lored parrot	<i>Tanygnathus gramineus</i>	Buru	Vulnerable
Red List removal			
Blue-naped parrot*	<i>Tanygnathus lucionensis</i>	Philippines, Talaud islands in Indonesia, and islands off Sabah, Malaysia	Lower Risk
ASIA – PHILIPPINES			
Philippine cockatoo	<i>Cacatua haematuropygia</i>	Now possibly as few as 10 islands in the Philippines	Critically Endangered
Green racquet-tail*	<i>Prioniturus luconensis</i>	Luzon and Marinduque, Philippines	Vulnerable
Blue-headed racquet-tail	<i>Prioniturus platenae</i>	Palawan Province, Philippines	Vulnerable
Blue-winged racquet-tail	<i>Prioniturus verticalis</i>	Sulu archipelago, Philippines	Endangered
Red List removals			
Luzon racquet-tail*	<i>Prioniturus montanus</i>	Luzon, Philippines	Lower Risk
Mindanao racquet-tail*	<i>Prioniturus waterstradti</i>	Mindanao, Philippines	Lower Risk
Blue-naped parrot*	<i>Tanygnathus lucionensis</i>	Philippines, Talaud islands in Indonesia, and islands off Sabah, Malaysia	Lower Risk
Mindanao lorikeet*	<i>Trichoglossus johnstoniae</i>	Mindanao, Philippines	Lower Risk
AFRICA			
Black-cheeked lovebird	<i>Agapornis nigrigenis</i>	South-west Zambia	Endangered
Echo parakeet	<i>Psittacula eques</i>	South-west Mauritius	Critically Endangered
Possible species			
Cape parrot	<i>Poicephalus (robustus) robustus</i>	Eastern Cape, Natal Midlands, and eastern Transvaal in South Africa	Vulnerable
Species proposed for consideration for inclusion on the Red List			
Rüppell's parrot	<i>Poicephalus rueppellii</i>	Central and north-western Namibia and extreme southern Angola	To be considered
NEOTROPICS			
Black-billed parrot	<i>Amazona agilis</i>	Jamaica	Vulnerable
Red-necked amazon	<i>Amazona arausiaca</i>	Dominica in the Lesser Antilles	Vulnerable
Yellow-shouldered amazon	<i>Amazona barbadensis</i>	Dry coastal scrub of Venezuela and outlying islands of Margarita, La Blanquilla, and Bonaire	Vulnerable
Red-tailed amazon	<i>Amazona brasiliensis</i>	Brazil's Serra do Mar	Endangered
Yellow-billed parrot*	<i>Amazona collaria</i>	Jamaica	Vulnerable
St Vincent amazon	<i>Amazona guildingii</i>	St Vincent in the Lesser Antilles	Vulnerable
Imperial amazon	<i>Amazona imperialis</i>	Dominica in the Lesser Antilles	Vulnerable
Yellow-headed parrot	<i>Amazona oratrix</i>	Mexico and Belize	Endangered
Red-spectacled parrot	<i>Amazona pretrei</i>	Araucaria forests of south-east Brazil	Endangered
Red-browed amazon	<i>Amazona rhodocorytha</i>	Lowland hardwood areas of Brazil's Atlantic forest	Endangered
Hispaniolan parrot*	<i>Amazona ventralis</i>	Hispaniola	Vulnerable
St Lucia parrot	<i>Amazona versicolor</i>	Saint Lucia in the Lesser Antilles	Vulnerable
Vinaceous amazon	<i>Amazona vinacea</i>	Submontane 'mixed' regions of Brazil's Atlantic forest	Endangered
Red-crowned parrot	<i>Amazona viridigenalis</i>	North-eastern states in Mexico	Endangered
Puerto Rican parrot	<i>Amazona vittata</i>	Forested parts of Puerto Rico	Critically Endangered

Table 1 ... continued. Threatened parrots of the world.

English name	Scientific name	Distribution	Threat category
Yellow-faced amazon	<i>Amazona xanthops</i>	Cerrado (dry woodland) of interior eastern Brazil	Vulnerable
Hyacinth macaw	<i>Anodorhynchus hyacinthinus</i>	Pantanal of Brazil and Bolivia, and North-eastern Brazil	Vulnerable
Lear's macaw	<i>Anodorhynchus leari</i>	Raso da Catarina, Bahia State, Brazil	Critically Endangered
Great-green macaw*	<i>Ara ambigua</i>	Lowland wet forests between eastern Honduras and western Colombia, western Ecuador	Vulnerable
Blue-throated macaw	<i>Ara glaucogularis</i>	Seasonally flooded Beni Lowlands (Llanos de Moxos) of Central Bolivia	Endangered
Blue-winged macaw	<i>Ara maracana</i>	Gallery forest and forest edge in parts of Brazil, eastern Paraguay, and northern Argentina	Vulnerable
Military macaw	<i>Ara militaris</i>	Mexico, Colombia, Venezuela, Peru, and Bolivia	Vulnerable
Red-fronted macaw*	<i>Ara rubrogenys</i>	Arid intermontane valleys of south-central Bolivia	Vulnerable
Golden-capped parakeet	<i>Aratinga auricapilla</i>	Semi-deciduous forests of the Paraná River Basin, Brazil	Vulnerable
Socorro parakeet	<i>Aratinga brevipes</i>	Socorro Island in the Revillagigedo Islands of Baja California, Mexico	Vulnerable
Hispaniolan parakeet	<i>Aratinga chloroptera</i>	Hispaniola, including the offshore islands	Vulnerable
Cuban parakeet	<i>Aratinga euops</i>	Cuba	Vulnerable
Rufous-fronted parakeet	<i>Bolborhynchus ferrugineifrons</i>	Forest-páramo ecotone of the Central Andes of Colombia	Endangered
Grey-cheeked parakeet	<i>Brotogeris pyrrhopterus</i>	Deciduous and dry forests of south-west Ecuador and north-western Peru	Endangered
Spix's macaw	<i>Cyanopsitta spixii</i>	Caatinga woodland and scrub of the dry region of north-east Brazil	Critically Endangered
Yellow-faced parrotlet	<i>Forpus xanthops</i>	Riparian thickets and desert scrub of the upper Marañón valley in north-central Peru	Vulnerable
Golden parakeet	<i>Guarouba (Aratinga) guarouba</i>	Northern Brazil	Endangered
Rusty-faced parrot	<i>Hapalopsittaca amazonina</i>	High Andean forests of Colombia and Venezuela	Endangered
Azure-winged parrot (Fuentes's parrot)	<i>Hapalopsittaca fuertesi</i>	Andean forests of the west slope of the central Andes of Colombia	Critically Endangered
Red-faced parrot	<i>Hapalopsittaca pyrrhops</i>	High cloud forests near Páramo on the East Andean slopes of Ecuador and Peru	Endangered
Golden-plumed parakeet	<i>Leptosittaca branickii</i>	Cloud forests of central Colombia, Ecuador and southern Peru	Vulnerable
Yellow-eared conure	<i>Ognorhynchus icterotis</i>	Wax palm forest in the Central Cordillera of Colombia and Northern Ecuador	Critically Endangered
White-breasted parakeet	<i>Pyrrhura albipectus</i>	Upper tropical and subtropical forest of south-east Ecuador	Vulnerable
Flame-winged parakeet	<i>Pyrrhura calliptera</i>	Upper montane forest and páramo on the central eastern Cordillera of Colombia	Vulnerable
Blue-throated parakeet	<i>Pyrrhura cruentata</i>	Atlantic forest of Brazil	Vulnerable
El Oro parakeet	<i>Pyrrhura orcesi</i>	Very humid upper tropical forest on the west slope of the Andes of south-west Ecuador	Vulnerable
Santa Marta parakeet	<i>Pyrrhura viridicata</i>	Premontane to montane forests of the Sierra Nevada de Santa Marta, Colombia	Vulnerable
Thick-billed parrot	<i>Rhynchopsitta pachyrhyncha</i>	Pine forests in mountain areas of northern Mexico	Endangered
Maroon-fronted parrot	<i>Rhynchopsitta terrisi</i>	Pine forests in mountain areas of northern Mexico	Vulnerable

Table 1 ... continued. Threatened parrots of the world.

English name	Scientific name	Distribution	Threat category
Brown-backed parrotlet	<i>Touit melanonota</i>	Mid-altitude humid forests of Rio de Janeiro, São, Paulo and Bahia, Brazil	Endangered
Spot-winged parrotlet	<i>Touit stictoptera</i>	Upper tropical and lower subtropical montane forests of Colombia, Ecuador, and northern Peru	Vulnerable
Golden-tailed parrotlet	<i>Touit surda</i>	Humid lowland forests of north-eastern and south-eastern Brazil	Endangered
Blue-bellied parrot*	<i>Triclaria malachitacea</i>	Atlantic forest of south-eastern Brazil	Vulnerable
Species proposed for consideration for inclusion on the Red List			
Yellow-naped parrot	<i>Amazona auropalliata</i>	Mesoamerica	To be considered Vulnerable
Cuban amazon	<i>Amazona leucocephala</i>	Cuba, the Bahamas Islands, and Cayman Islands	To be considered Vulnerable
Northern Central American populations of the scarlet macaw	<i>Ara macao cyanoptera</i>	Southern Mexico through Central America	To be considered Endangered
Saffron-headed Parrot	<i>Pionopsitta pyrilia</i>	Humid montane forest and cloud montane forest of Venezuela and Colombia	To be considered Vulnerable

Structure of species accounts

The accounts themselves are arranged alphabetically by scientific name within each region and, where appropriate, include taxa which might be added to the list once further field data or taxonomic evidence becomes available. Accounts are also presented for any species that have been removed from the List. Under the species name, we list all those who have contributed to the text, which in some cases amounts to writing virtually the entire account. The basis for many accounts is *Birds to Watch 2* and where no contributor is listed, the information presented is essentially that contained in *Birds to Watch 2*. We have gone to great lengths to include all contributors, and can only apologise if there are errors of omission: none were intended. Similarly, we hope that we have represented fairly the information that the contributors so generously provided. For each account, information is given under the following standard set of sub-headings:

Conservation status: The species' Red List category and criteria are given, along with its appendix listing under CITES and any information on the level of protection afforded by national legislation of range countries. This last category of "National Protection Status" was sought for every species, but is only included where information was available.

Distribution and status: Provides details of the range countries, and more detailed information, if available, on localities, altitudes, habitats in which the species has been recorded, and population size. In many cases little reliable data exists; in the most extreme cases we relate the numbers of individuals recorded during occasional encounters.

Threats: Factors that are known or suspected to have caused a past or present decline in numbers are given. Information relating to trade is provided here, but should be treated with caution because of the nature of the CITES reporting procedure. Annual Reports of CITES Parties should be submitted by 31st October of the year following that in which the transaction occurred. However, late submission is quite common, resulting in possible under-reporting of international transactions. In contrast, over-reporting is also possible as Annual Reports often do not state whether the data were derived from records of specimens actually traded or from permits issued (it is often the latter). Furthermore, information in Annual Reports may not be provided in sufficient detail (e.g., the information on confiscated specimens) or information may simply be lacking, such as that on the source of the birds (i.e., wild caught or captive-bred) and the purpose (e.g., trade or personal effects etc.). In addition, it is worth noting that CITES refers to all international transactions in CITES-listed species as "trade"; but this may not refer to "trade" in the usual commercial sense. Thus the transfer around the globe of a pet parrot as the family changes residence every two years could be recorded as "trade" particularly if the authorities do not note the source of the parrot and purpose of the transaction. But the movement of this parrot would have no bearing on commercial trade.

Action: This section includes action necessary (ongoing in some cases) to ensure the survival of the species. In many cases clarifying the status, distribution, and factors affecting the species is required before conservation programmes can be proposed. This section is omitted from accounts for species proposed for inclusion and those now down-listed.

The accounts for taxa that are proposed as candidates for the Red List, those that may yet prove to be distinct species, and those species which have been removed from the List, also include one or other of the following:

Reason for taxonomic uncertainty: The work that has led to the proposal that the subspecies (two cases) or colour morph (one case) be given species status is mentioned here.

Reason(s) for removal from the Red List: The supporting evidence for the revision of the species' conservation status (six cases) or why it is not thought to be a species (one case). Where the species' status has been revised, the species has been placed in the all-embracing category "Lower Risk", which includes the subcategories "conservation dependent", "near threatened", and "least

concern". Because of the work required simply to evaluate the threatened species, the Lower Risk species have not been assigned categories, although they may well qualify as near threatened. The species occurring in the Philippines are exceptions as they are considered Lower Risk, near threatened in a recent extensive review of the conservation status of the country's birds (Collar *et al.* 1998).

Priority Projects: These text boxes are offered for the Australian, Asia, and Africa sections to highlight specific project for immediate action. In the Neotropical section, most priority projects were included in the "actions" section of each species account. Regional projects are also suggested in the Neotropical overview (see multi-species remarks for *Amazona rhodocorytha* and *Ognorhynchus icterotis*), so the text boxes were omitted.

Australia, New Zealand, and the South-west Pacific

Overview

Stephen Garnett

The parrot fauna of Australia, New Zealand, and the islands of the south-west Pacific east from New Guinea is the most diverse in the world. Over half the world's parrot genera occur in a region that extends from sub-Antarctic Antipodes Island to the equatorial forests of New Guinea, over most arid regions of Australia and out to some of the most isolated islands of the Pacific. Most species occur in Australia and New Guinea and are not currently considered threatened: only eight out of 53 species in Australia and two out of 46 in New Guinea are listed in this Action Plan. In the island nations of the Pacific, however, the proportion of threatened species is much higher and in both historic and prehistoric times many have already become extinct. Even those species that are still relatively secure will be threatened in the future unless effective conservation policies are implemented. Table 2 provides a list of the threatened parrot species of Australia, New Zealand, and the south-west Pacific.

Threats

Habitat alteration

Habitat alteration is the main threat to all parrots in continental Australia. Since the arrival of Europeans 200 years ago there has been extensive clearance of habitat and, even where natural habitat remains, there has been disruption of fire regimes that were established during 60,000 or more years of Aboriginal occupation. For some species, such as Baudin's *Calyptorhynchus baudinii* and Carnaby's *C. latirostris* cockatoos of south-west Australia, the changes have resulted in a decline in the abundance of nest sites (Saunders *et al.* 1982, Smith 1991). This will also gradually affect the populations of other parrot species (Mawson and Long 1994). Some, such as Major Mitchell's cockatoo *Cacatua leadbeateri* (Rowley and Chapman 1991), are already scarce, others that are currently super-abundant, such as long-billed corellas *C. tenuirostris* (Emison *et al.* 1994a) and galahs *C. roseicapilla* (Rowley 1990) will also be affected in the long-term. The ancient trees that bear hollows large enough for nesting cockatoos have either been cut down or are dying of old age, and in surviving

habitat remnants, grazing by sheep and introduced rabbits is preventing recruitment of new cohorts to take their place.

For Carnaby's cockatoo (Saunders 1991), as well as the superb *Polytelis swainsonii* (Webster 1988) and swift parrots *Lathamus discolor* (Brown 1989) of the much-diminished grassy woodlands of south-east Australia, it is the decline of feeding habitat that is a problem. In a land of depauperate soils, most pockets of fertility were long ago cleared for crops leaving only the land deemed too poor for agriculture for the parrots. The change has been to the advantage of some species. Galahs have been increasing their distribution for a century (Rowley 1990). Others took longer to adapt. Long-billed corellas almost disappeared when their principal food was all but eliminated by rabbits. Now that the corellas have learnt to eat an exotic weed, its distribution is exploding (Emison *et al.* 1994a). Similarly the turquoise parrot *Neophema pulchella*, once thought extinct, is now thriving on seed of an introduced South African daisy (Quin and Baker-Gabb 1993) and is returning to much of its former range.

A smaller proportion of the tropics and arid zone has been cleared but most of it has been grazed for over a century by domestic stock, such as cattle and sheep, feral herbivores, including rabbits, horses, goats and camels, and native herbivores such as kangaroos (that have prospered as a result of the increased availability of surface water). There have also been dramatic changes in fire regimes as pastoral burning practices have replaced those practised by Australian Aboriginals. Both grazing and fire may have contributed to the largely unexplained scarcity of the night *Pezoporus occidentalis* (see Box 1) and princess parrots *Polytelis alexandrae* of Australia's dry interior, and are playing a major role in the decline of the golden-shouldered parrot *Psephotus chrysopterygius* (Garnett and Crowley 1995: see Box 2). At the south-east end of the country, fire is also important for maintaining the diversity of grass and heathlands that are required by the orange-bellied parrot *Neophema chrysogaster* (Brown and Wilson 1984b: see Box 3) and ground parrot *Pezoporus wallicus* (Meredith *et al.* 1980).

Habitat loss and predation

Habitat loss is also a major problem for parrots of the tropical forests of the south-west Pacific islands. Though few of these species are as yet listed as threatened, so fast are

the forests being logged that listing may not long precede extinction. For New Zealand and the more isolated islands of the south-west Pacific, however, predation is an even more urgent problem. For all five of New Zealand's threatened parrots (see Box 4 for discussion on taxonomic status of two *Cyanoramphus* taxa) the principal problem is actual or potential predation by introduced mammals; brush-tail possums *Trichosurus vulpecula* and rats *Rattus exulans*, *R. norvegicus*, and *R. rattus* take eggs or young while cats *Felis catus* take adult kakapo *Strigopshabroptilus*. Rats are also the most likely cause of extinction elsewhere in the Pacific, both before and after Europeans arrived.

Hunting

The parrot declines in the Pacific have also been exacerbated by hunting by people for food, feathers, and the pet trade. Hunting for food is primarily a problem for parrots in New Guinea and has reduced the populations of palm cockatoos *Probosciger aterrimus* near settlements. Pesquet's parrot *Psittichas fulgidus*, on the other hand, is hunted more for its red and black plumage than for food and demand is likely to follow the exponential increase in the human population of the New Guinea highlands where the feathers are used to purchase brides. Compared with most parts of the world, the pet trade is a relatively minor problem in Australia and New Zealand where there are strict export controls. Though the trade is more vigorous elsewhere, particularly in the Solomon Islands (R. Heinsohn pers. comm.), it is so far a proven threat only to the highly threatened subspecies of the horned parakeet *Eunymphicus cornutus uvaensis* on Ouvéa (Robinet *et al.* 1995).

Conservation solutions

Australia and New Zealand have well-organised and relatively well-funded conservation programmes for most threatened species. This is not to say their problems are solved – the rescue of the few elderly kakapo (see Box 5) or the mobile and erratic swift parrot will require research and innovative conservation management of the highest order. In New Zealand much of the conservation management is intensive. The kakapo in particular is the subject of detailed research by a substantial team of conservation managers (G. Elliott pers. comm.) but conservation of the kaka *Nestor meridionalis* also involves the protection of individual nests and possum poisoning. In most cases the work is undertaken on land dedicated to conservation. This differs from Australia, where most of the habitats of threatened parrots occur on private land, and many conservation programmes involve negotiation with private landholders to manage their holdings in ways that are sympathetic to the parrots. This does not involve the landholders making

a profit from the sale of parrots harvested from their land (as is sometimes advocated), but rather subsidising land management techniques that favour parrots.

In Australia and New Zealand the political will and relatively ample resources exist to tackle the problems of parrot conservation. Conservation of parrots elsewhere in the region will require outside funding. A recovery plan is being implemented on Ouvéa for the Critically Endangered subspecies of horned parakeet, and work on Pesquet's parrot and the palm cockatoo is starting in Papua New Guinea. But, there is a critical need to initiate research and conservation management of the *Vini* (see Box 6) and two of the Pacific *Charmosyna* lorikeets (see Box 7). As in Australia, the best approach is likely to be working with local landowners to manage their land in a way that will allow economic development to proceed without destroying the parrots or their habitat. This is the approach being taken in Papua New Guinea, where "Integrated Conservation and Development" projects are being adopted on a trial basis in two areas with assistance from various American conservation funding bodies. The dedication of conservation reserves is likely to be a less viable option, partly because most land has traditional owners for whom buying and selling their birthright is a foreign concept, and partly because there are rarely adequate resources to manage reserves after they are acquired. This co-operative approach at a local level must be combined with negotiations at a governmental level to counter the major problem of the loss of tropical forests in the region, whilst recognising the importance of logging revenue to regional development. Finally, the effects of trapping, particularly in places such as the Solomons and New Guinea, need to be assessed and managed before the populations plummet, as have those of the yellow-crested cockatoo and red-and-blue lory in neighbouring Indonesia (P. Jepson pers. comm.).

Priority projects in Australia, New Zealand and the south-west Pacific

- **Rediscovery and proposal of a recovery plan for the night parrot in central Australia.** (Box 1)
- **Recovery plan for the golden-shouldered parrot in Queensland, Australia.** (Box 2)
- **Recovery Plan for the orange-bellied parrot *Neophema chrysogaster* in south-eastern Australia (1998–2002).** (Box 3)
- **Clarification of the taxonomic status of the highly threatened orange-fronted and Forbes' parakeets from New Zealand.** (Box 4)
- **Recovery plan for the kakapo in New Zealand.** (Box 5)
- **An overall conservation strategy for the *Vini* lorikeets of the South Pacific islands.** (Box 6)
- **Status assessment of the New Caledonian lorikeet.** (Box 7)

Box 1. Rediscovery and proposal of a recovery plan for the night parrot in central Australia.

John Blyth

Aim: To find at least one population of the enigmatic night parrot and make recommendations for its long-term conservation.

Justification: Only six reliable records were made of the night parrot *Pezoporus* (formerly *Geopsittacus*) *occidentalis* across the whole of its historical range in inland Australia between 1935 and 1984 (Blakers *et al.* 1984). This range must have extended across some 2,000,000 square kilometres mainly in Western Australia, Northern Territory, and South Australia, but also into western New South Wales, south-west Queensland, and north-west Victoria. There have been no confirmed reports of live birds since that time, despite several co-ordinated and intensive searches (see Blyth *et al.* 1998), although there are several unconfirmed reports (especially near Cloncurry in western Queensland and outside its supposed historical range). A single corpse has been found, however (Boles *et al.* 1994). In particular, two large-scale searches were made during 1996 in response to local reports: one in suitable habitat to the south of its known distribution and one in the deserts of Western Australia, but neither found night parrots. Several smaller scale searches were also made, but also without success. It has recently been suggested that the species is nocturnal as well as nomadic which, if true, may explain why it is so difficult to find.

Project description: Designing a conservation programme for this species is complicated by the significant problems encountered in finding even one population. All mainland states and the Northern Territory have contact numbers for information and any survey planned for this species would clearly benefit from discussion with the appropriate person. Support should be offered to ongoing initiatives, such as the public information campaign run by the Northern Territory Threatened Species Network.

Any efforts in Western Australia should be undertaken within the framework of the state Department of Conservation and Land Management's Interim Recovery Plan. The Interim Recovery Plan is designed to search the most promising areas and offer co-ordination and support to other interested parties in the state. Amongst the most likely areas for immediate searches is a re-survey of the Western Australia western desert region. Several historical records were made from this area as well as one promising but unconfirmed recent report, and it may be that searches made whilst major hummock grasses are seeding provide the best opportunity of finding this species. Surveys by other agencies would clearly profit from liaison with the Department of Conservation and Land Management for advice on survey design as any new insights into the species' ecology may have considerable implications for future searches.

Contact: John Blyth.

Box 2. Recovery plan for the golden-shouldered parrot in Queensland, Australia.

Stephen Garnett

Aim: To achieve down-listing to Vulnerable within 15 years by stopping the decline in the area of occupancy, expanding its range into areas formerly occupied, and increasing confirmed numbers to more than 2,500 pairs at the start of the breeding season.

Justification: The golden-shouldered parrot *Psephotus chrysopterygius* occurred throughout the Cape York Peninsula in northern Queensland, Australia where it inhabits tropical savanna. It is now restricted to a small fraction of this area and may not exceed 1,600 breeding pairs. Two breeding populations are known, in the central Cape York Peninsula south of Musgrave, and in south-west Chillagoe. Parts of the species' range have not been surveyed adequately as access is difficult or impossible for much of the year. It is believed that the main factor causing this range contraction is a change in the burning regime whereby there are now considerably fewer hot fires. This has resulted in woody suckers failing to be burnt to ground level and there are now more trees in the wet season feeding and breeding areas. This is thought to have led to an increase in predation as predators have become more successful.

Project description: Extensive habitat management should be undertaken and the species' response assessed. Detailed information on this relationship would then be used to form the basis of a management plan. Experimental procedures would include the manipulation of the fire regime in selected sites; assessment of the response to supplementary feeding during the wet season; and reduction of tree density around nest sites to reduce the frequency of predation. Each of these experimental actions, if successful, would allow the golden-shouldered parrot to expand into new areas and halt the decline in numbers at known sites.

In addition, monitoring of populations should continue on an annual basis on Artemis Cattle Station to determine the effectiveness of management and at five-year intervals at specified remote parts of the southern and northern populations to measure overall population trends. The lead organisation is the Queensland Department of Environment with input from the Queensland Natural Resources, Environment Australia, and non-governmental ornithological societies.

Contact: Leasie Felderhof.

Box 3. Recovery Plan for the orange-bellied parrot *Neophema chrysogaster* in south-eastern Australia (1998–2002).

Mark Holdsworth and Peter Menkhorst

Aim: The long-term objective of this recovery effort is to down-list the species to Lower Risk, conservation dependent (LR, cd) within 30 years. The objective of this plan is to improve the conservation status of the species so that it no longer meets the IUCN criteria for Critically Endangered and can be down listed to Endangered within 5 years by increasing the size of the wild population to exceed 250 mature individuals.

Justification: The orange-bellied parrot *Neophema chrysogaster* was formerly abundant throughout its range in Australia, where it occurred from the York Peninsula in South Australia to Bruny Island in southern Tasmania, and from Geelong in Victoria to Sydney in New South Wales. Since the 1920s, however, its range and abundance have continually decreased such that the breeding range is now a narrow coastal strip of south-west Tasmania and its winter range has shrunk to the east of the Murray River in South Australia and west of Jack Smith Lake in South Gippsland, Victoria. It is extinct in New South Wales. In winter the species is found in a variety of open habitats, such as salt marshes, dunes, and shrublands, within 10km of the coast. The reduction in extent and quality of this habitat is thought to be the main cause of decline over the last century (e.g., Menkhorst *et al.* 1990, Caspersen 1995). Numbers are now estimated at fewer than 200 mature individuals in the wild, mostly in one breeding population. Recovery plans were first initiated in 1984 (Brown and Wilson 1984a), and the decline in numbers seems to have halted subsequently. However, the species remains threatened by the loss of winter habitat (especially the destruction of the salt marsh feeding areas), predation by foxes and cats, competition from other species that eat seed, disease, loss of genetic variation, and catastrophes (such as storms during migration). The actions proposed here are designed to increase both numbers and the sizes of the areas occupied.

Project description: A co-ordinated programme that involves government agencies, non-governmental organisations, threatened species and land management groups, and the general public is vital to restore the population of the orange-bellied parrot. As such, a Recovery Coordinator should assist the existing Recovery Team in implementing and overseeing the following actions:

- i) Restoring, creating, and supplementing migratory and winter feeding habitat in locations traditionally used by the species in Tasmania, Victoria, and South Australia. In addition, the breeding population will continue to be intensively managed to ensure breeding potential is maximised and to assist with population monitoring.
- ii) Reducing the risks of predation by eliminating introduced predators and identifying factors that limit food availability so that grazing animals, such as sheep and rabbits, can be managed accordingly.
- iii) Finding sites where “missing” birds over-winter. More birds have been counted in summers than in winters, indicating that there are currently unknown winter locations. There is, therefore, a need to find these sites, and potential sites both within and outside the known wintering range should be searched.
- iv) Continuation of the captive breeding and release of healthy birds in both winter and summer. Allied to this is the development of a Psittacine Circoviral Disease vaccination to improve the fitness of birds.
- v) Maintenance and expansion of public awareness concerning the plight of the species through continued community education initiatives and a co-ordinated media strategy. The success of this component is important in maintaining the orange-bellied parrot as an issue in development-planning near to key wintering sites.

Contacts: Mark Holdsworth and Peter Menkhorst.

Box 4. Clarification of the taxonomic status of the highly threatened orange-fronted and Forbes' parakeets from New Zealand.

Charles Daugherty and Kerry-Jayne Wilson

Aim: To clarify the taxonomic status of the orange-fronted and Forbes' parakeets in New Zealand.

Justification: The orange-fronted parakeet was considered a distinct species *Cyanoramphus malherbi* until 1985 when it was proposed that it be treated as a colour morph of the yellow-crowned parakeet *C. auriceps* (Taylor 1985). Recently, however, protein (allozyme) electrophoresis study has led to the suggestion that it be restored to specific status (Triggs and Daugherty 1996, but see Taylor 1998). The data were not felt to be conclusive and larger samples and more sensitive genetic analyses are required before a firm conclusion can be drawn. If this form is in fact a species, then it is endangered as it is now known only from the Arthur's Pass/Lake Sumner area in northern South Island. It was previously recorded from localities throughout New Zealand (Triggs and Daugherty 1996), although records from North Island are thought dubious (K-J. Wilson *in litt.* 1997).

Forbes' parakeet *Cyanoramphus (auriceps) forbesi* has been considered a subspecies of the yellow-crowned parakeet *C. auriceps*. Recently it was proposed that it be elevated to specific status (Triggs and Daugherty 1996). In the early 1970s, fewer than 30 individuals survived on Mangere and Little Mangere Islands and hybridisation with the red-crowned parakeet *C. novaezelandiae*, reported in 1970 (Taylor 1975), has affected an unknown proportion of the population. Consequently, there are two issues here. The first is determining which taxonomic status is most appropriate for this species and the second is assessing the degree of genetic introgression of red-crowned parakeet genes into the Forbes' parakeet gene pool (Triggs and Daugherty 1996). Unravelling these two issues is likely to be difficult. If it is a species, then it is one of the most threatened parrot species in the world.

Project description: Comparisons of the base pair sequences in the rapidly evolving parts of the mitochondrial deoxyribonucleic acid (DNA) provide an objective way of comparing degrees of genetic difference between populations within the same species, by reference to another recognised species that is closely related (i.e., the control or outgroup). Given uncertainty over the taxonomic status of several *Cyanoramphus* populations (such as in the Auckland Islands), it is desirable to investigate the genetic variation in the genus so that appropriate units for conservation can be determined. Ideally, blood or other fresh tissue samples from many individuals in each group are required to provide a sufficient sample from their populations for these DNA tests. To achieve this in these cases, it will probably also be necessary to amplify minute and degraded DNA samples from moulted feather shafts collected in the wild, and museum skins. The use of material from Forbes' parakeets collected before hybridisation began (and hence "pure") is crucial to determining the level of hybridisation with the red-crowned parakeet.

Contacts: Charles Daugherty, and Kerry-Jayne Wilson.

Box 5. Recovery plan for the kakapo in New Zealand.

Graeme Elliott

Aims: To establish at least one viable, self-sustaining, unmanaged population of kakapo as a functional component of the ecosystem in a protected habitat, and to establish two or more other populations which may require ongoing management.

Justification: In pre-human times, kakapo *Strigops habroptilus* were found throughout the three main islands of New Zealand. Following Polynesian and European settlement, their range was much reduced by forest clearance and predation by introduced cats, dogs, rats, and mustelids. Since the 1970s, kakapo have been known only from Fiordland in the South Island, where they became extinct in approximately 1987, and Stewart Island. In 1977, a previously unknown population of about 200 kakapo was discovered on Stewart Island, but following very high rates of predation by feral cats these birds were transferred to three relatively predator-free islands during the 1980s and 1990s. In 1997, there were 54 known kakapo on three islands, and possibly a few surviving birds on Stewart Island. Two of the relatively predator free islands support populations of the Polynesian rat which have substantially reduced kakapo productivity by preying on recently hatched chicks. In addition, kakapo reproductive rates are very low because they breed as infrequently as once in five years in response to the availability of fruits produced by masting tree species, and because many kakapo are now very old and their fertility is probably declining.

Project Description: Conservation management of kakapo is occurring in three parts:

1. Minimising mortality.
2. Maximising the hatching and survival of chicks and eggs.
3. Investigating ways of increasing breeding frequency.

There are no predators capable of killing adult kakapo on any of the islands on which kakapo are held. The islands have stringent quarantine procedures to prevent accidental introduction of predators. Any further kakapo discovered on Stewart Island will be moved to one of the relatively predator-free kakapo islands.

Nesting attempts of kakapo are closely monitored to prevent predation of eggs and chicks and to prevent starvation when natural food supplies fail. All known female kakapo carry radio-transmitters, and all nests are located within twelve days of laying. Once found, nests are surrounded with rat traps and poison stations, and are monitored 24 hours a day by close-circuit television. Any rats approaching the nests are scared away. At times of high rat risk when the eggs and chicks are unattended, nests are guarded by people standing near the nest, and eggs and chicks are prevented from chilling with electric heat pads. Chick health and condition are closely monitored. Attempts are planned to eliminate Polynesian rats from Little Barrier and Codfish Islands.

Three lines of investigation are being followed to try to increase breeding frequency. Trials are being undertaken to see if hormone therapy can be used to induce old, apparently infertile, birds to breed. Trials are also to be undertaken to see if hormone therapy can be used to induce normally fertile female kakapo to breed more often than they would naturally. Research on environmental triggers to breeding is being undertaken to see if kakapo can be induced to breed more frequently by mimicking natural triggers. A limited increase in breeding frequency occurred on one island when kakapo were provided with supplementary food.

Contact: Graeme Elliott.

Box 6. An overall conservation strategy for the *Vini* lorikeets of the South Pacific islands.

Kerry-Jayne Wilson

Aim: To ensure the long-term survival of all extant species of the genus *Vini* by: i) collating and assessing all information on the threats and status of the lorikeets of this threatened genus and; ii) proposing a co-ordinated approach to the conservation of all island populations.

Justification: There are five lorikeet species in the genus *Vini* which inhabit small islands in the South Pacific from Fiji in the west to the Line Islands in the north-east and Henderson Island in the south-east. Some of these populations are the result of introductions to islands which may be outside, but close to, the natural range (e.g., *V. kuhlii*: Watling 1995, McCormack and Künzle 1996 and *V. ultramarina*: Kuehler *et al.* 1997). Four of these species are considered to be threatened with extinction and as all are found on small islands, nowhere are populations large. The genus as a whole has been subjected to habitat alteration and almost complete replacement in some instances, as well as the attentions of European rats *Rattus rattus*. Whilst the lorikeets seem able to tolerate habitat change, as they are found in a variety of human habitations, such as gardens, villages, and plantations, nest predation by rats seems to have caused local extinction on many islands. Of the rat species present, it appears that *Rattus rattus* is the main problem as Kuhl's lorikeet *V. kuhlii* survives in the presence of *Rattus norvegicus* and *Rattus exulans*, the Henderson Island lorikeet *V. stephensi* is not thought to have suffered since the introduction of *Rattus exulans* (Trevelyan 1995) and *V. peruviana* also survives in the presence of *Rattus exulans* on Aitutaki in the Cook Islands (Wilson 1993 and K-J. Wilson *in litt.* 1997). Consequently, whilst the genus is at risk of extinction from rat introductions to small islands, it is also possible to devise a practical strategy that would safeguard all species. In essence, a little foresight could easily save the whole genus.

Project description: The first stage in this exercise should be the collation of all information, published and unpublished on both the lorikeets and the state of the natural history of the islands on which they live or have lived in the past. Specifically, the distribution of habitats and the extent of its alteration, presence of food plants, and the presence of rats and any competitors on each island should be documented, along with any knowledge of human hunting. For example, there is evidence to suggest that Kuhl's lorikeet became extinct in the Cook Islands because its red feathers were used in cloaks by islanders (McCormack and Künzle 1996). This information collation should include an attempt to chart the progress of rats, especially *Rattus rattus* throughout the southern Pacific and the effect that they have had on the lorikeets and other native wildlife. In addition, information should be sought on the practicality (logistics, cost, and environmental impact) of various rat eradication programmes (e.g. aerial application or the Landcare New Zealand land-based eradication approach) that have already been implemented elsewhere.

Based on this assessment, management recommendations might consider three courses of action. First, islands (perhaps especially those within the lorikeets' natural range) where rats do not occur that have been identified should be considered as high priorities for the prevention of rat colonisation. Second, islands where rats do occur and are threatening lorikeet populations should be considered for rat eradication. Finally, translocation to rat-free islands might be considered: first indications are that this course of action appears to have been successful with ultramarine lorikeets in the Marquesas (Lieberman *et al.* 1997).

Contact: K-J. Wilson.

Box 7. Status assessment of the New Caledonian lorikeet.

Aim: To determine whether the New Caledonian lorikeet *Charmosyna diadema* still exists, and if it does, to devise a strategy for its conservation.

Justification: The only definite records of this species are the two female specimens that were collected in 1859 and from which the species was described, and an observation in 1913 (Forshaw 1989). Other than this the only information is that locals reported it to the west of Mount Panié in 1976 (Stokes 1980).

Project description: Searches for the lorikeet should concentrate around Mt. Panié and any other areas that experienced local bushmen suggest. The cloud forest of Mt. Humboldt and the Massif of Kouakoué might also still contain the species (Bregulla 1993). It should also be determined whether the type locality still holds suitable habitat.

Contact: BIRDS Australia Parrot Association.

Species accounts

Table 2. A list of parrot species of Australia, New Zealand and the south-west Pacific that are considered threatened using IUCN Red List criteria. Also included are threatened taxa for which there is evidence that they may be distinct species, and species removed from the Red List. Species are listed in alphabetical order by their scientific name, together with their distribution and threat status. The criteria under which each species qualifies are given in the appropriate species account. Where two English names are given, the first is that widely used in Australia and the second, in parentheses, is the name used in *Birds to Watch 2* (Collar *et al.* 1994). *Denotes changes from *Birds to Watch 2* (and, therefore, the 1996 IUCN Red List of Threatened Animals), which have been agreed to by BirdLife International who maintain the IUCN list of threatened birds.

English name	Scientific name	Distribution	Threat category
Baudin's cockatoo (White-tailed black-cockatoo)	<i>Calyptorhynchus baudinii</i>	South-west Western Australia	Vulnerable
Carnaby's cockatoo (Slender-billed black-cockatoo)	<i>Calyptorhynchus latirostris</i>	South-west Western Australia	Vulnerable
Red-throated lorikeet	<i>Charmosyna amabilis</i>	Fiji	Vulnerable
New Caledonian lorikeet	<i>Charmosyna diadema</i>	New Caledonia (France)	Endangered
Antipodes parakeet	<i>Cyanoramphus unicolor</i>	Antipodes, New Zealand	Vulnerable
Horned parakeet	<i>Eunymphicus cornutus</i>	New Caledonia (France)	Vulnerable
Swift parrot	<i>Lathamus discolor</i>	Eastern Tasmania and south-east mainland Australia	Vulnerable
Orange-bellied parrot*	<i>Neophema chrysogaster</i>	South-western Tasmania, and coastal Victoria and eastern South Australia	Critically Endangered
New Zealand kaka	<i>Nestor meridionalis</i>	New Zealand	Vulnerable
Night parrot	<i>Pezoporus (=Geopsittacus) occidentalis</i> ¹	Thought to be central Australia	Critically Endangered
Princess parrot (Alexandra's parrot)	<i>Polytelis alexandrae</i>	Western Australia, Northern Territory, and north-western South Australia	Vulnerable
Superb parrot	<i>Polytelis swainsonii</i>	New South Wales and northern Victoria	Vulnerable
Golden-shouldered parrot	<i>Psephotus chrysopterygius</i>	Cape York Peninsula, Queensland	Endangered
Kakapo*	<i>Strigops habroptilus</i>	Codfish, Little Barrier, Mana, Maud, and Stewart Islands, New Zealand	Critically Endangered
Kuhl's lorikeet	<i>Vini kuhlii</i>	French Polynesia and Kiribati	Endangered
Blue lorikeet	<i>Vini peruviana</i>	French Polynesia and Cook Islands (NZ)	Vulnerable
Henderson lorikeet	<i>Vini stepheni</i>	Henderson Island (UK)	Vulnerable
Ultramarine lorikeet	<i>Vini ultramarina</i>	Marquesas Islands, French Polynesia	Endangered
Possible species			
Forbes' parakeet	<i>Cyanoramphus (auriceps) forbesi</i>	Mangere and Little Manger Islands in Chatham Islands New Zealand	Critically Endangered
Orange-fronted parakeet	<i>Cyanoramphus (auriceps) 'malherbi'</i>	Arthur's Pass and the Lake Sumner/Lewis Pass area, South Island, New Zealand	Critically Endangered
Red List removals			
Glossy black-cockatoo*	<i>Calyptorhynchus lathami</i>	Queensland, New South Wales and Victoria, Australia	Lower Risk
Norfolk Island parakeet*	<i>Cyanoramphus (novaezelandiae) cookii</i>	Norfolk Island (to Australia)	Considered a subspecies
Scarlet-chested parakeet*	<i>Neophema splendida</i>	Southern inland Australia	Lower Risk

1. A widely accepted taxonomic revision places the night parrot in a different genus and we follow this revision: the generic name under which it appeared in Collar *et al.* (1994) is given in parentheses.

Baudin's cockatoo *Calyptorhynchus baudinii*

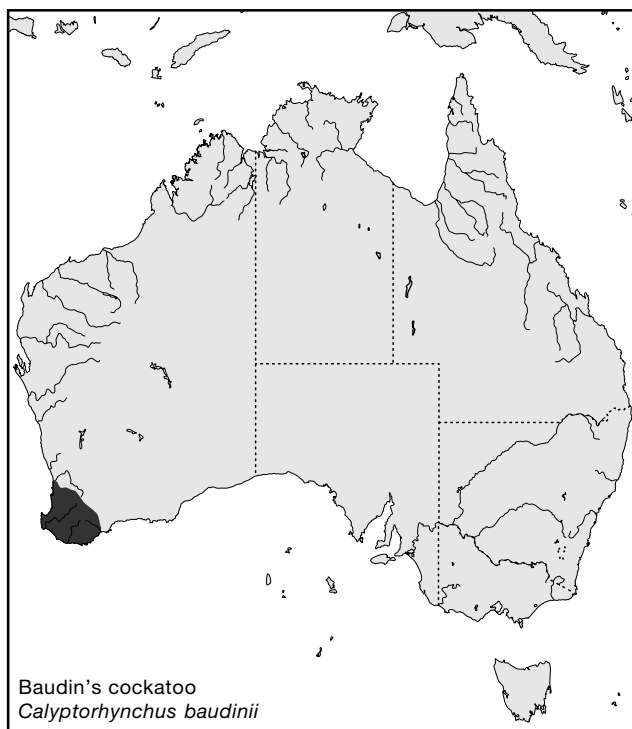
(White-tailed black-cockatoo in Collar *et al.* 1994. Name changed here to conform to Australian usage.)

Contributor: Peter Mawson.

Conservation status: IUCN: Vulnerable (C2a).
CITES: Appendix II.

National protection status: On 30th April 1996 it was formally listed as "rare or likely to become extinct" in Western Australia and was given maximum protection under state legislation.

Distribution and status: Baudin's cockatoo is found within the temperate forests of south-west Western Australia. It requires hollows up to 60m above the ground in mature eucalyptus for breeding.



The population estimate of 5,000–25,000 individuals in 1977 (Garnett 1992) is considered very subjective and it is unlikely that the species has approached the upper limit in recent times with a current estimate of a maximum of 10,000 individuals (P. Mawson *in litt.* 1997). There is no indication whether the population is declining at present (Garnett 1992). Licences to shoot birds where they are causing damage to commercial pome fruit crops have been few in number since 1990 and since 1994/5 licences have only been issued to scare birds, not to kill them.

Threats: Current threats are not known: statements that illegal shooting and logging are having an adverse effect are speculative (Garnett 1992), although it is not clear if the strict prescriptions of coupe timber harvesting, which is practised through much of its range, are sufficient to meet the species' needs. It is also uncertain whether previous forest management has already had a significant adverse effect. Clarifying its status and threats is challenging as the species is difficult to census reliably, but breeding biology is the subject of a small amount of fieldwork.

Action: An understanding of the conservation status and needs of this species would benefit from better data on reproductive ecology, feeding, and nesting requirements within the eucalypt forest. Information on the distribution of birds in relation to topography and vegetation sub-communities would also provide a better understanding of the impact or potential impacts that various land-uses within the forest (e.g., logging, mining, agriculture, dam construction) would have on cockatoo numbers.

Carnaby's cockatoo *Calyptorhynchus latirostris*

(or short-billed black-cockatoo: slender-billed black-cockatoo in Collar *et al.* 1994. Name changed here to conform to Australian usage.)

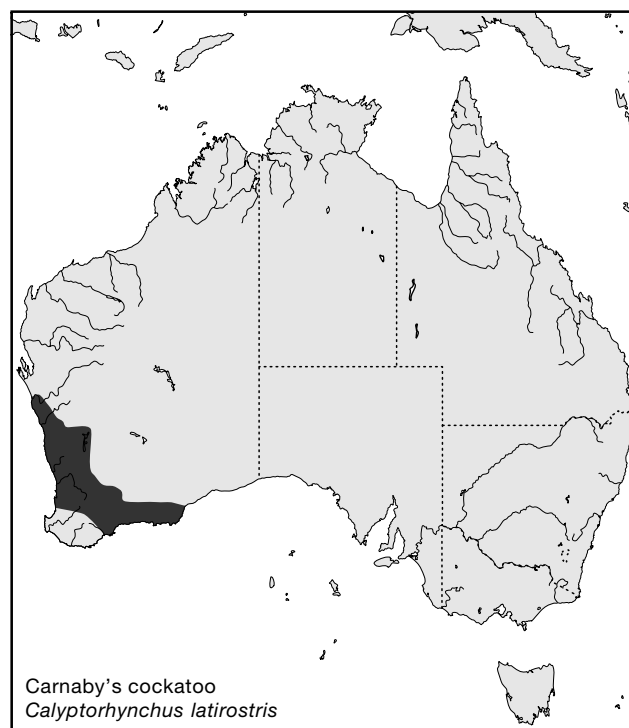
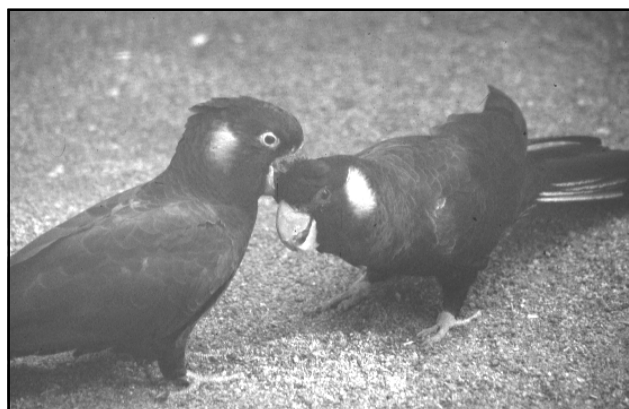
Contributor: Denis Saunders.

Conservation status: IUCN: Vulnerable (C2a).

CITES: Appendix II.

National protection status: On 30th April 1996 it was formally listed as "rare or likely to become extinct" in Western Australia and was given maximum protection under state legislation.

Distribution and status: Carnaby's cockatoo is found in woodland in south-west Western Australia, where it nests



in hollow eucalypts and feeds on seeds in heath, shrublands, and woodlands. In agricultural landscapes its food plants occur in patches. Birds are unable to locate these patches if there is not a link, in the form of native vegetation corridors, to guide them.

The total population was estimated at 9,000–35,000 individuals in 1977 and since then there has been a decline that is likely to continue for some decades. The bird has disappeared from more than a third of its breeding range during the last 30 years (Saunders 1990b).

Threats: The removal of native vegetation for agricultural development has been the biggest cause of the decline. The greatest threat to the cockatoo now is the rising water table resulting from over-clearance of deep-rooted native vegetation and its replacement with shallow-rooted agricultural crops. The increase in salinity has the potential to affect adversely 61,000km², including much of the cockatoo's remaining habitat (Saunders and Ingram 1995). Garnett (1992) and Collar *et al.* (1994) also cited clearance and fragmentation of habitat, insufficient regeneration to supply suitable nesting trees owing to introduced grazers, agriculture which favours the galah *Cacatua roseicapilla*, and nest-robbing for trade as threats. It is now thought that the availability of nest sites is not limiting recruitment (Saunders *et al.* 1982). However, future availability of nest sites will depend upon current habitat management. What is having an affect at present is the distance between nesting and feeding sites which, if too large, results in chicks starving to death or fledging under-weight with attendant reduced reproductive success in the first year (Saunders *et al.* 1982, Saunders 1986). With the introduction of DNA testing, nest robbing may have become a very small problem.

Action: A multi-department programme has been launched to try and reverse the trend in agricultural development, which has had the biggest impact on the species through salination and subsequent loss of habitat (30,000km² have been targeted). This programme aims to promote revegetation, and to try and lower water tables so that further salination can be prevented and the decline in native vegetation halted. If successful, this will benefit the cockatoo as well as a wide range of other native species (Saunders and Ingram 1995). However, the trees being used are farm forestry trees with no other known conservation benefits, and the restoration of native habitat requires a planting campaign using native heath, shrub, and woodland species. Whilst native remnant vegetation can now only be cleared on private land with government approval, much is becoming degraded and is in need of direct management. Without large-scale revegetation and management of the remaining native vegetation, Carnaby's cockatoo will continue to decline.

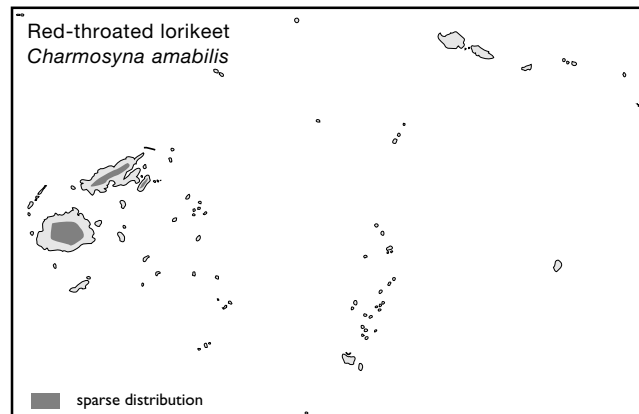
Red-throated lorikeet *Charmosyna amabilis*

Conservation status: IUCN: Vulnerable (C2a; D1).

CITES: Appendix II.

National protection status: Information unavailable.

Distribution and status: This species is endemic to the mature forests (usually above 500m) on the islands of Viti Levu, Vanua Levu, Taveuni and Ovalau, Fiji (Watling 1982, Clunie 1984). The red-throated lorikeet is rare, with no confirmed records this century except from Viti Levu where recent observations are all of small flocks (two to six individuals) (Collar *et al.* 1994).



Threats: Current threats are unknown but predation by European rats *Rattus rattus* may pose a problem.

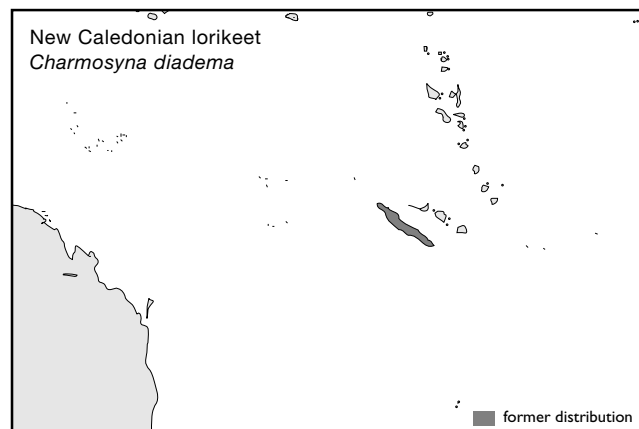
Action: Information is urgently required on the distribution (including habitat use), status, and threats to the species.

New Caledonian lorikeet *Charmosyna diadema*

Conservation status: IUCN: Endangered (D1).

CITES: Appendix II.

National protection status: Information unavailable.



Distribution and status: This species has been described from two specimens, both females, collected in 1859, and an observation in 1913 on New Caledonia (to France) (Forshaw 1989). It was treated as extinct by King (1978–1979) but in 1976 islanders reported that it might still exist, and two birds were reported by an experienced bushman in forest west of Mount Panié (Stokes 1980). It might survive in the cloud forest of Mount Panié, Mount Humboldt, and the Massif of Kouakoué (Bregulla 1993).

Threats: Not known.

Action: Information is urgently required on the distribution (including habitat use), status, and threats to this species. Searches for the lorikeet should concentrate around Mt. Panié and any other areas that experienced local bushmen suggest. The cloud forest of Mt. Humboldt and the Massif of Kouakoué might also still contain the species (Bregulla 1993). It should also be determined whether the type locality still holds suitable habitat. (See Box 7).

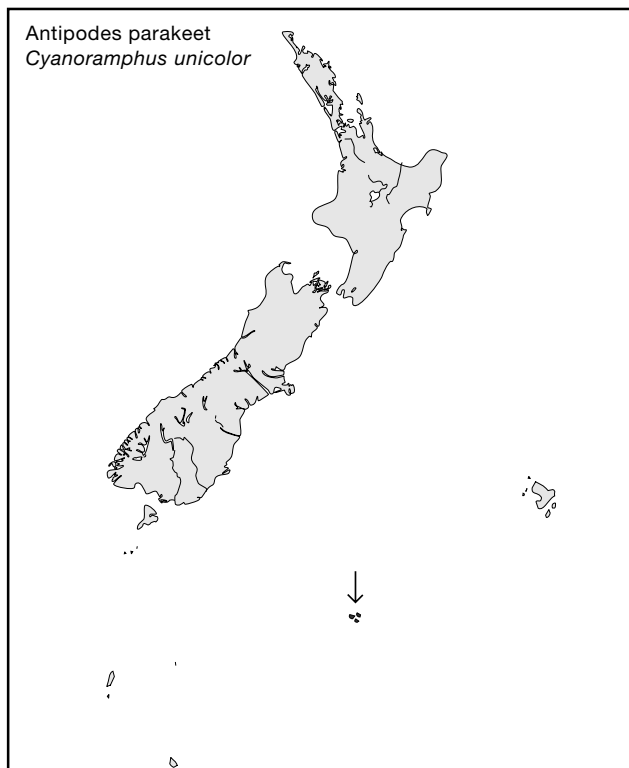
Antipodes parakeet *Cyanoramphus unicolor*

Contributor: Terry Greene.

Conservation status: IUCN: Vulnerable (D2).

CITES: Appendix II.

National protection status: Information unavailable.



Distribution and status: This species is endemic to the uninhabited and protected islands of the Antipodes, New Zealand. In 1978 it was common on the main island (20km²) and Bollons Island (0.5km²) and occurred in smaller numbers on Leeward (0.1km²), Inner Windward (0.08km²) and Archway (0.06km²) islets, with an estimated total of 2,000–3,000 birds (Williams and Given 1981).

Threats: As it nests in burrows among tall dense tussocks or sedges (Taylor 1985), it is threatened by accidental introductions of mammalian predators which once seemed unlikely because of its isolated location, but is now a possibility owing to the increased numbers of visits and fishing in the Southern Ocean (Collar *et al* 1994, T. Greene *in litt.* 1997).

Action: Information is urgently required on distribution (including habitat use), status, and threats to the species, including the risk of predators being introduced.

Horned parakeet *Eunymphicus cornutus*

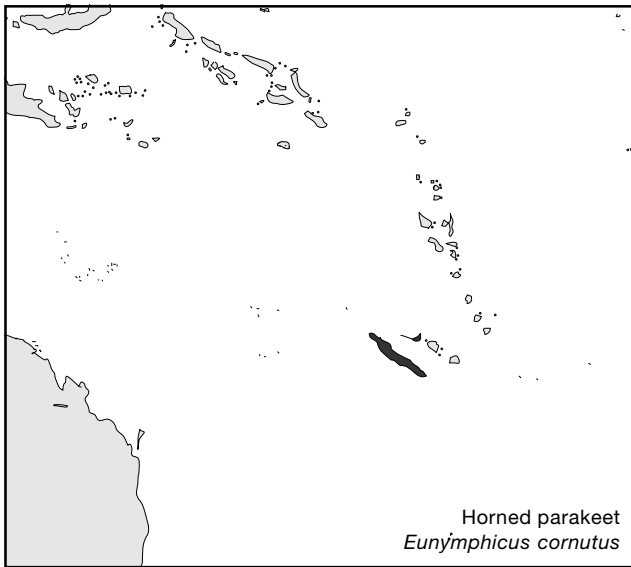
Contributor: Olivier Robinet.

Conservation status: IUCN: Vulnerable (C1).

CITES: Appendix II.

National protection status: Information unavailable.





Distribution and status: The horned parakeet is endemic to the forests of New Caledonia (France), with two races, nominate *cornutus* on the mainland, and *uvaensis* confined on Ouvéa (where approximately 66km² of suitable habitat remains: Robinet *et al.* 1996) in the Loyalty Islands (Forshaw 1989).

The subspecies *cornutus* has declined in number since 1882, when it was reported evident in forested areas, to fairly common in more inaccessible areas above 470m in the 1940s, to relatively frequent in suitable habitat in the 1960s and 1970s (Bregulla 1993), with a population then estimated at 2,000–10,000 individuals (possibly stable) (Collar *et al.* 1994). Numbers of *uvaensis* were estimated at 70–90 birds and declining (Hahn 1993), but a survey in December 1993 counted 73 individuals leading to an estimate of 617 individuals (minimum 274, maximum 996; Robinet *et al.* 1996), in both the north (the stronghold) and the south, where the species was thought to have disappeared. Earlier attempts to release wild-caught stock on nearby Lifou Island (to establish a second population) have failed (Robinet *et al.* 1995), possibly because of the presence of ship and Norwegian rats (O. Robinet *in litt.* 1997; see Robinet and Salas 1996).

Threats: It has suffered from habitat destruction, predation by rats, and capture for the cagebird trade. There were 19 wild caught specimens recorded in international trade between 1991 and 1995, all between 1991 and 1993 (CITES Annual Report database). Robinet *et al.*, (1995) refer to illegal trade to Europe.

Action: A recovery plan has been prepared for *uvaensis* for the period 1997–2002 involving strong local participation in population and habitat monitoring (O. Robinet *in litt.* 1997). A proposal for its inclusion on Appendix I of CITES was rejected in 1997.

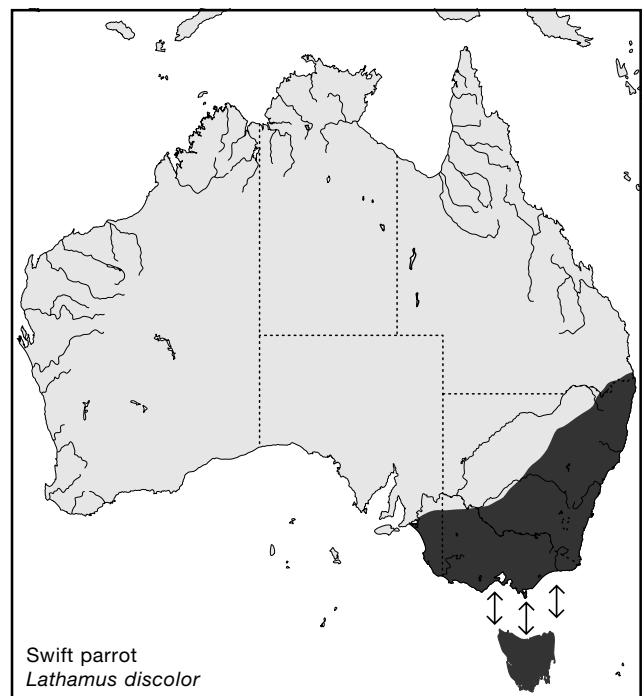
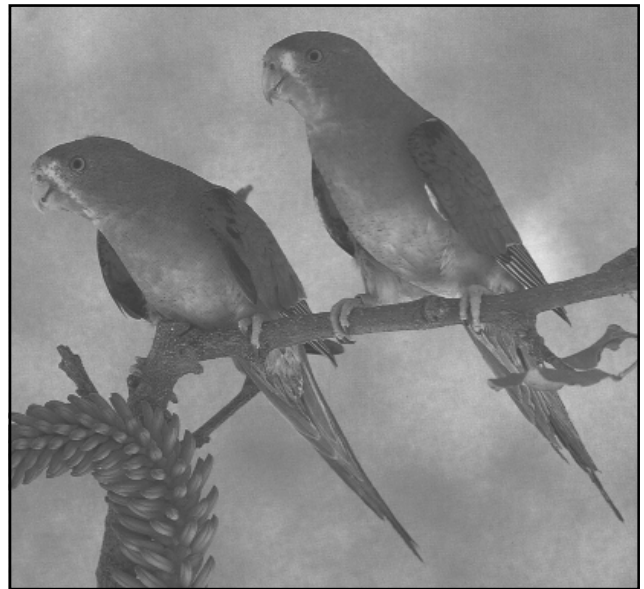
Swift parrot *Lathamus discolor*

Contributor: Peter Menkhorst.

Conservation status: IUCN: Vulnerable (B1 + 2c; C2b).
CITES: Appendix II.

National protection status: Information unavailable.

Distribution and status: The swift parrot breeds in northern and eastern Tasmania (where it inhabits eucalypt forests, especially those with blue gum *Eucalyptus globulus*, breeding in mature and senescent trees) and winters in



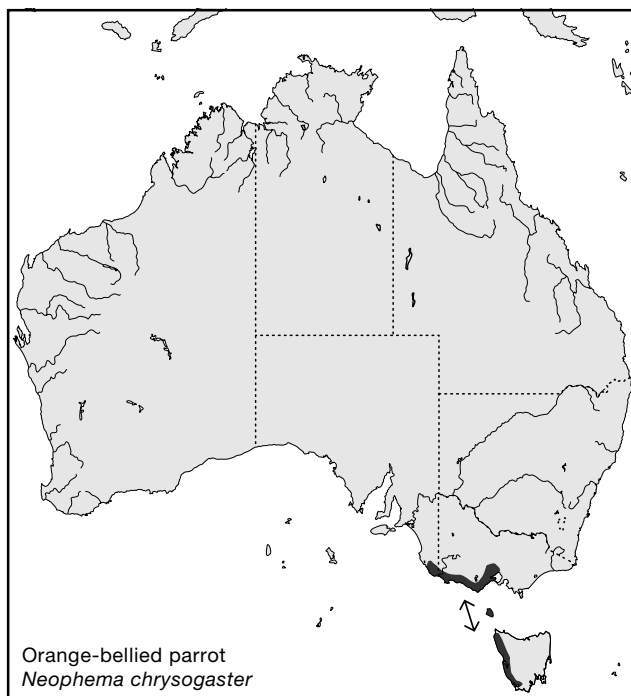
south-east mainland Australia (where it occurs in remnant forest patches within agricultural land and suburbs). A survey in 1988/1989 estimated a population of 1,320 breeding pairs with an end-of-breeding-season population probably in excess of 5,000 individuals (Garnett 1992).

Threats: In its winter range it specialises in insect and nectar exudates which are abundant in rich habitat patches, many of which have long been cleared because they occur in prime sheep and cattle farming areas. Consequently, most of the remaining habitat might be suboptimal (P. Menkhorst *in litt.* 1997). Furthermore, eucalypt forest has been extensively cleared for agriculture and timber throughout its range and some birds continue to be trapped for trade (Garnett 1992), although this is not thought to be a significant problem (P. Menkhorst *in litt.* 1997).

Action: Sympathetic management of remaining habitat should involve a more sensitive forest use strategy in Tasmanian breeding habitat, and a reassessment of timber harvesting practices in Victoria and New South Wales. Forests with highest densities of breeding birds should be protected. A community-based tree-planting programme should be encouraged to increase the coverage of blue gum in Tasmania, and of eucalypts that flower reliably in the wintering areas.

Orange-bellied parrot ***Neophema chrysogaster***

Contributors: Mark Holdsworth and Peter Menkhorst.



Conservation status: IUCN: Critically Endangered (C2b).
CITES: Appendix I.

National protection status: Wholly protected in all states.
Listed as Endangered under Commonwealth *Threatened Species Protection Act 1992*.

The IUCN status of the orange-bellied parrot has been revised to Critically Endangered from Endangered (D1: Collar *et al.* 1994) on the basis of an inferred decline. Intensive population studies of the breeding population since 1991 show a stable population over the period, but, in 1994 and 1995 a decline (about 15%) was observed. Since then the population has recovered. In addition all cohorts are known to experience at least 50% mortality each year (sometimes as high as 70%). Consequently, whatever has caused historic declines and is still restricting population growth has the potential to cause a sustained decline at any time.

Distribution and status: The orange-bellied parrot breeds in tree hollows in the forested margins of the coastal plains and feeds on sedgeland in the World Heritage Area of south-west Tasmania, Australia. It migrates across the islands in the west of the Bass Strait to coastal Victoria and eastern South Australia (P. Menkhorst *in litt.* 1997), and along the southern coast of the Australian mainland in the winter, mostly to the shores of Port Philip Bay in Victoria, where it feeds on saltmarshes and coastal dunes.

In the 19th century there were supposedly flocks of thousands, but in 1981 the population was estimated at 150 individuals with no evidence of a marked decrease in numbers in the wintering range in the period 1978–1990. The species now numbers 100 adults with about 80 young fledging in most years. Continual monitoring of both winter and summer populations does not show any significant change in numbers despite active population and habitat management (P. Menkhorst *in litt.* 1997, see also Male 1995).

Threats: Continuing threats include loss of favoured feeding habitat throughout the winter range and lack of safety in numbers for a small bird attractive to avian predators (Garnett 1992). The suggestion that competition from introduced herbivores is a threat (Collar *et al.* 1994) is entirely conjectural (P. Menkhorst *in litt.* 1997).

Action: The central issue is increasing over-winter survival. Under the *Orange-bellied Parrot Recovery Plan 1998–2002*, a co-ordinated programme that involves all sectors of the community, specific actions will be taken to ensure restoration of the orange-bellied parrot. The programme includes providing new winter feeding areas, reducing predation, finding all wintering populations, continuing the captive breeding and release of healthy birds in both winter and summer, and expanding public awareness initiatives. (See Box 3.)

New Zealand kaka *Nestor meridionalis*

Contributors: Terry Greene and Kerry-Jayne Wilson.

Conservation status: IUCN: Vulnerable (C2a).

CITES: Appendix II.

National protection status: Information unavailable.

Distribution and status: The New Zealand kaka occurs on North Island (race *septentrionalis*) and South and Stewart islands (nominate *meridionalis*) and on some offshore islands, New Zealand (Turbott 1990). Its distribution is



similar in extent to the larger remaining areas of low and mid-altitude native forest.

Numbers are high only on islands such as Stewart Little Barrier, where it remains common despite the presence of feral cats (K-J. Wilson *in litt.* 1997), Codfish, and Kapiti, where the only introduced mammals are rats (O'Donnell and Rasch 1991).

Threats: Its future on the mainland, and in particular on North Island, is threatened by introduced mammalian predators (e.g., stoats and rats), introduced possums that also compete for food, and by the destruction of much of its habitat. Introduced wasps which compete for “honey dew” (an important food source in beech *Nothofagus* forest) are a problem on the South Island, but not elsewhere (T. Greene *in litt.* 1997). Wilson *et al.* (1998) suggest that introduced predators, especially of female kaka, are the major cause of decline on the mainland, and they predict that stoats will cause the species to become extinct on mainland New Zealand without appropriate management. Where predators occur, the kakas' sex ratio is skewed toward males (T. Greene *in litt.* 1997).

Action: Wilson *et al.* (1998) conclude that kaka will only survive in beech and other forests if predators, especially stoats, can be effectively controlled. Such action must be seriously considered.

Night parrot *Pezoporus occidentalis*

A recent widely accepted taxonomic revision (Christidis and Boles 1994) moved this species from the genus *Geopsittacus* under which name it appeared in Collar *et al.* (1994) and on CITES Appendix I.

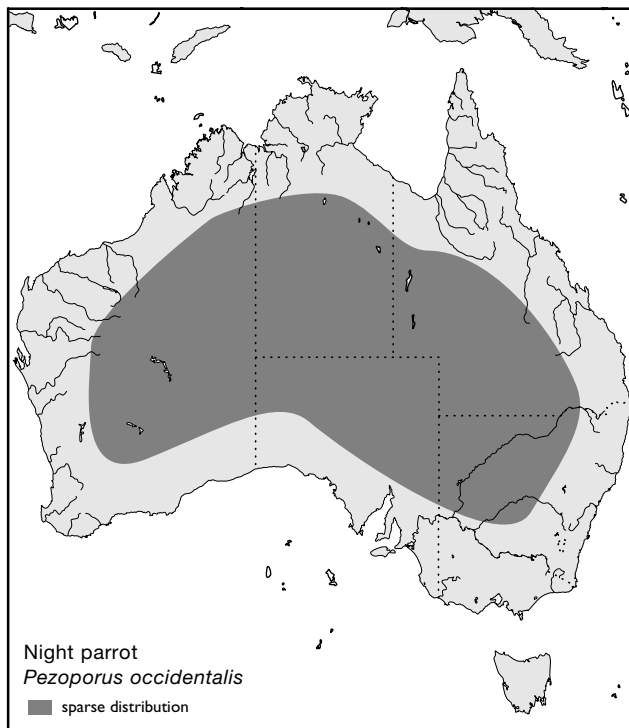
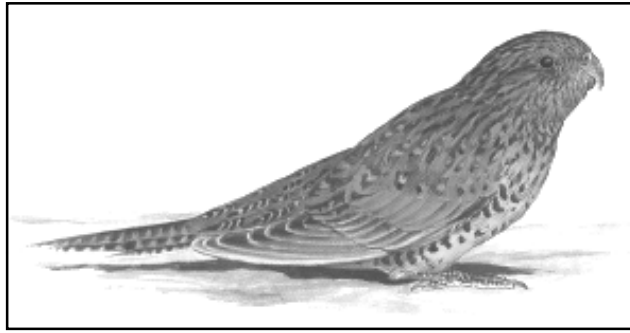
Contributors: John Blyth, Allan Burbidge, and Peter Menkhorst.

Conservation status: IUCN: Critically Endangered (C2a, D1).

CITES: Appendix I.

National protection status: Information unavailable.

Distribution and status: Thought to be nomadic, the night parrot has been recorded almost equally from gravel desert with areas of dense hummock grassland of spinifex (*Triodia* and *Plectrachne* species) and from chenopodiaceous vegetation associated with salt lake systems (J. Blyth and A. Burbidge *in litt.* 1997). It has been suggested that it may use areas of heavily seeding spinifex after local rains and may move seasonally or as conditions require to salt lake systems to feed on the fruits and seeds (and possibly the succulent leaves) of various chenopod species. It has been recorded from all mainland states and



the Northern Territory, but it is now thought to be restricted to arid central Australia from central Western Australia through Northern Territory to south-west Queensland (J. Blyth and A. Burbidge *in litt.* 1997), with unconfirmed reports from Victoria as late as the 1950s (P. Menkhorst *in litt.* 1997).

It was presumably more abundant in the 1870s, when 16 specimens were collected in the Gawler Range and Lake Eyre region in South Australia, compared with a total of six reliable records between 1935 and 1984 in the whole of Australia (Blakers *et al.* 1984). During the last decade there have been 15 individual sight records although none have been authenticated (a corpse was found in 1990: Boles *et al.* 1994). Historical reports and several recent ones in an area of circa 200km² near Cloncurry suggest that it may indeed be nocturnal (Garnett *et al.* 1993).

Threats: Habitat degradation (as a result of altered fire regimes and grazing by domestic stock and feral animals), predation by cats and foxes, and reduction of available

water by introduced camels may all be causes of decline (Garnett 1992).

Action: Little action can be taken until areas where the species occurs are found. An Interim Recovery Plan (see Blyth *et al.* 1998) with an emphasis on locating and recovering one or more populations is being implemented in Western Australia, and reports of sightings by members of the public are being sought in Western Australia and across northern Australia (J. Blyth and A. Burbidge *in litt.* 1997). (See Box 1)

Princess parrot *Polytelis alexandrae*

(Alexandra's parrot in Collar *et al.* 1994. Name changed here to conform to Australian usage.)

Contributor: John Blyth.

Conservation status: IUCN: Vulnerable (B2c+3d; C2a).
CITES: Appendix II.
National protection status: Information unavailable.

Distribution and status: This species appears to prefer the sandy deserts characterised by large areas of hummock grassland associated with desert oak *Allocasuarina decaisneana* and various flowering shrubs such as *Grevillea wickhamii* in Western Australia, Northern Territory, and north-west South Australia, Australia.

Early records of colonial breeding and the low number of recent breeding records involving more than one pair (Blakers *et al.* 1984) have been claimed as evidence of a decline this century (Collar *et al.* 1994). Examination of recent and historical records suggests that it may be irruptive rather than nomadic and that a core population may be resident in the area surrounding Lake Tobin, in the eastern region of Western Australia's Great Sandy Desert (Carter 1993). It was treated as Data Deficient in Australia by Garnett (1992) and is still considered of indeterminate status (J. Blyth and A. Burbidge *in litt.* 1998).

Threats: Changes to its habitat may constitute threatening factors. These may have included altered fire regimes after Aboriginal people left the sandy deserts, and introduced herbivores other than domestic stock. It may never have been anything but a transient species in pastoral country (Carter 1993). Increased water availability on pastoral lands may have favoured more water-dependent parrot taxa to its detriment (but see above). Other threatening processes may have included predation by foxes and cats.

Action: Amateur and professional ornithologists should be encouraged to gather information concerning the distribution and biology of the princess parrot.

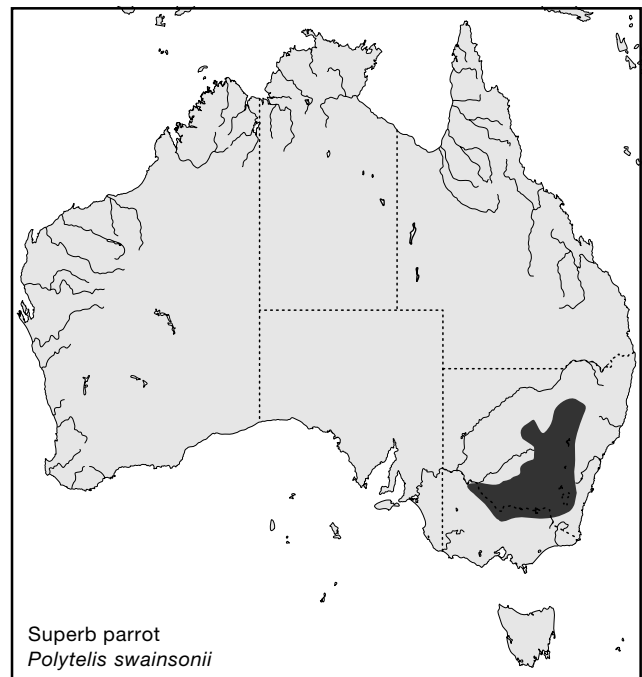
Determining the locations of princess parrot breeding areas, and establishing those habitat factors that are required for successful breeding are two examples of the many research projects that must be undertaken. Further examples include determining whether there is a sedentary population based around Lake Tobin on the Canning Stock Route, and if so, the extent of the area normally occupied, and the number of princess parrots it supports. Additional questions that require answering include: Are there any other areas that support resident populations of the species, and where and under what circumstances are princess parrots observed outside the two areas referred to above? What are the key habitat factors that make an area suitable for princess parrots and are any of these changing in a way that may constitute threats to the princess parrot?

Superb parrot *Polytelis swainsonii*

Contributor: Peter Menkhorst.

Conservation status: IUCN: Vulnerable (C2b).
CITES: Appendix II.
National protection status: Information unavailable.

Distribution and status: The superb parrot occurs in loose colonies in riparian woodlands of the Murray – Murrumbidgee Rivers in New South Wales and northern Victoria and also on the south-west slopes of New South Wales (P. Menkhorst *in litt.* 1997), Australia. It has a breeding population (apparently confined to the southern part of its range) of under 5,000 pairs.



Threats: Threats include a decline in the abundance of hollow trees providing nest sites because of senescence and harvesting for firewood (P. Menkhorst *in litt.* 1997), degradation or clearance of foraging habitat and flight paths to foraging sites, and (probably heavy) trapping (Garnett 1992). There were 96 wild-caught specimens recorded in international trade between 1991 and 1995. Of these, 54 individuals were in 1991 and 34 individuals were in 1993 (CITES Annual Report database).

Action: Three areas of action are needed. First, ensure that timber harvesting prescriptions provide special protection to all known nest colony areas and individual nest trees, and ensure the provision of future nest trees. Second, enforce vegetation clearance controls in box woodlands throughout the Riverina and South-West Slopes Biogeographic Regions. Third, work closely with landholder groups to protect and rehabilitate key foraging sites and protect or create corridors of woodland between breeding and foraging areas.

Golden-shouldered parrot *Psephotus chrysopterygius*

Contributor: Stephen Garnett.

Conservation status: IUCN: Endangered (B1+2a, b, c, e).
CITES: Appendix I.
National protection status: Information unavailable.

Distribution and status: The golden-shouldered parrot was formerly widespread in southern and central Cape York



(Garnett and Crowley 1995). Trapping may formerly have been a problem (Wheeler 1975) but is now thought to be negligible. The fire management of its habitat has been altered to reverse the decline in numbers.

Action: Experimental habitat management would provide information on the species' response so that a management plan could be formulated. Procedures to be tested are those designed to halt the decline in occupied areas and allow colonisation of new areas. Monitoring of selected sites should also be undertaken. (See Box 2)

Kakapo *Strigops habroptilus*

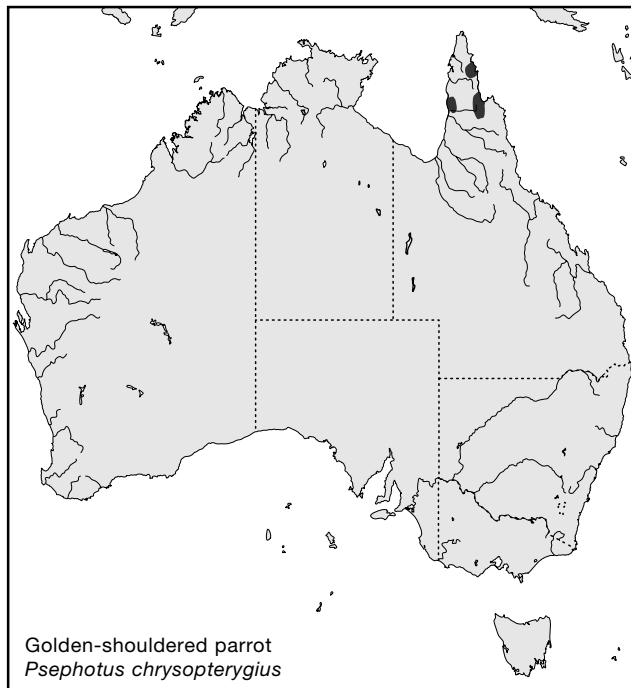
Contributor: Graeme Elliott.

Conservation status: IUCN: Critically Endangered (D1).
CITES: Appendix I.

National protection status: Information unavailable.

The IUCN status of this species has been changed from "Extinct in the Wild" for two reasons. First, the refined definition of "Extinct in the Wild" now excludes species that were the subject of benign introductions and now survive close to their natural range (but not within it), as was the case with the kakapo. Second, the species has now been found within its natural range: a female was found on Stewart Island in mid-June 1997, and further birds are thought to occur on the island (G. Elliott *in litt.* 1997). It is considered Critically Endangered because only nine of the 20 females in a known population of 54 birds are known to have produced fertile eggs. In this increasingly elderly population, the number of mature individuals is almost certainly below 50, if mature equates to potentially reproductively active.

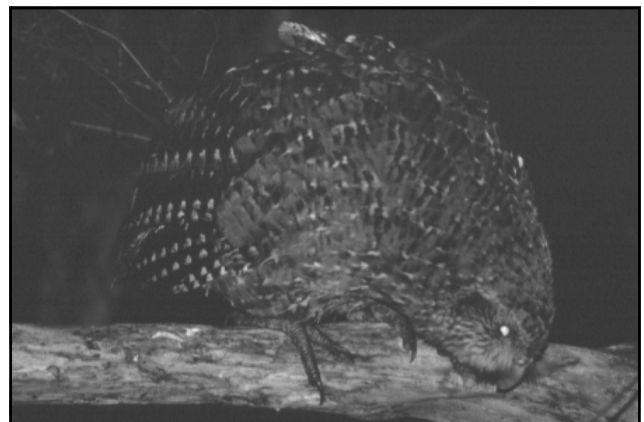
Distribution and status: Formerly, the kakapo occurred at all altitudes throughout forest and scrubland of North, South, and Stewart Islands, New Zealand. Its range had

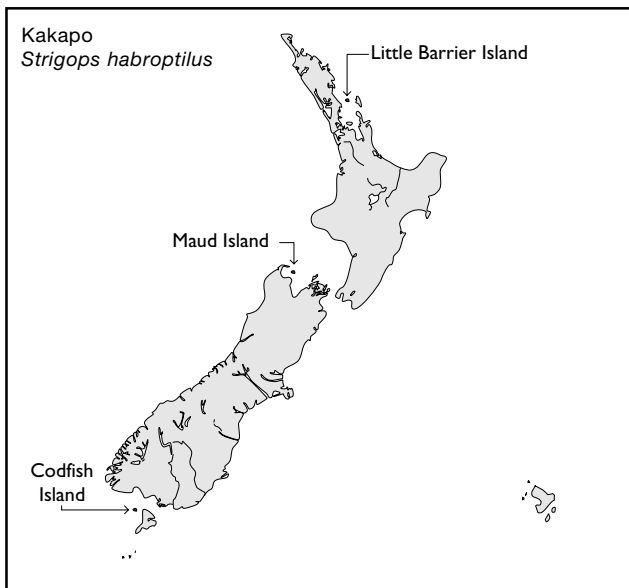


Golden-shouldered parrot
Psephotus chrysopterygius

Peninsula, Queensland, Australia, but now occupies two areas of approximately 300km² and 150km², separated by 200km. It inhabits tropical eucalypt and "paperbark" savanna woodland and nests in termite mounds (Weaver 1982, Garnett and Crowley 1995). The population is less than 2,500 adults and is still declining (Garnett and Crowley 1995).

Threats: The major threat is a widespread change in the burning regime over the last century resulting in the invasion of woody weeds into grassy nesting habitat, and higher predation occurring where the habitat is overgrown





shrunk considerably before European settlement, although it remained abundant in the southern and western parts of South Island until about 1900 (Robertson 1985). Thereafter, the remaining populations in Fiordland and Stewart Island suffered further declines, and it became extinct on South Island by 1989 (Clout and Craig 1995).

Trial transfers of Kakapo to Maud Island were attempted between 1974 and 1981, and since 1982 all known kakapo have been translocated to the predator-free islands of Codfish, Maud, Little Barrier, and Mana (though the translocation to Mana failed and there are no longer any kakapo there). A kakapo was captured on Stewart Island in June 1997 and it is likely that a few birds remain there. Kakapo have a slow and often erratic reproductive rate with four and five year gaps between recent breeding attempts on Stewart and Codfish Islands. Breeding on Stewart and Codfish seems tied to prolific autumn mast fruiting of *Podocarpus*. Supplementary feeding has been partially successful in inducing breeding activity on Little Barrier Island, but has had no effect on Codfish or Maud Islands. Since 1991 six chicks have been successfully fledged, including two that were hand-raised. The total known population at June 1997 was 54 birds, including 20 females of which only 9 individuals are known to have produced fertile eggs (G. Elliott *in litt*, Clout and Craig 1995, Lloyd and Powlesland 1994, and Powlesland and Lloyd 1994).

Threats: This flightless, lekking, nocturnal parrot is especially vulnerable to predation by mammalian carnivores, particularly during breeding.

Action: Three strands are currently underway: attempting to minimise mortality, maximising reproductive output, and investigating ways of increasing breeding frequency. (See Box 5)

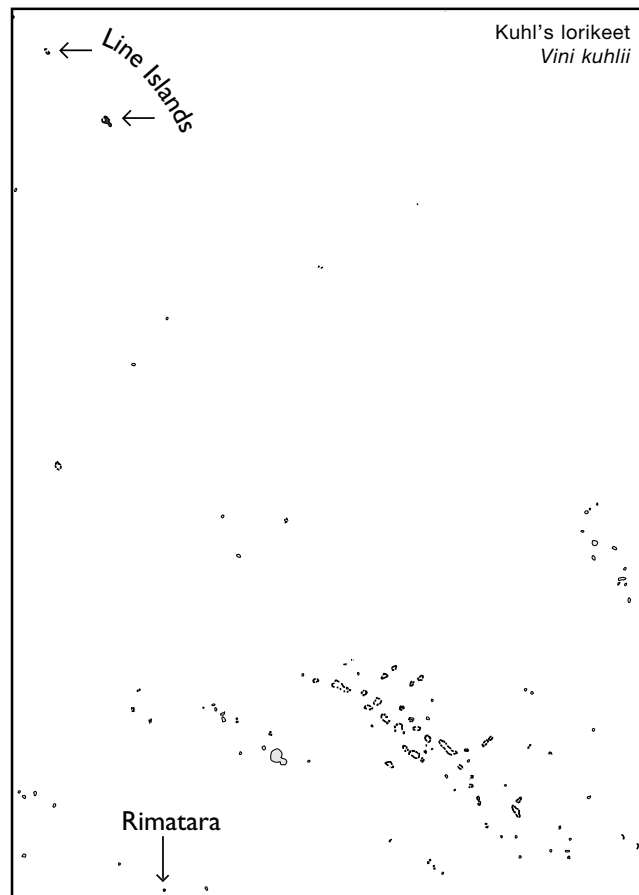
Kuhl's lorikeet *Vini kuhlii*

Conservation status: IUCN: Endangered (B1+2e; C2a; D2).
CITES: Appendix II.

National protection status: Information unavailable.

Distribution and status: The only surviving population of this species within its natural range is that on Rimatara (see Watling 1995, McCormack and Künzle 1996) and possibly Tubuai, although birds on this island may be escaped pets (Forshaw 1989) in the Tubuai (=Austral) Islands, French Polynesia. Populations on the islands of Teraina (=Washington), Tabuaeran (=Fanning), and Kiritimati (=Christmas Island), all in Kiribati, appear to have been introduced. Formerly it may also have occurred in the southern Cook Islands (Forshaw 1989, Holyoak and Thibault 1984).

On Rimatara (population estimated at about 900 birds) the favoured habitat is mixed horticultural woodlands, where preliminary trapping indicated an absence of European rats *Rattus rattus* (McCormack and Künzle 1996). On Teraina there are 1,000 individuals (minimum) and perhaps 50 individuals on a single island in the Tabuaeran atoll. Only two individuals survive on Kiritimati, the result of recent releases (Watling 1995).



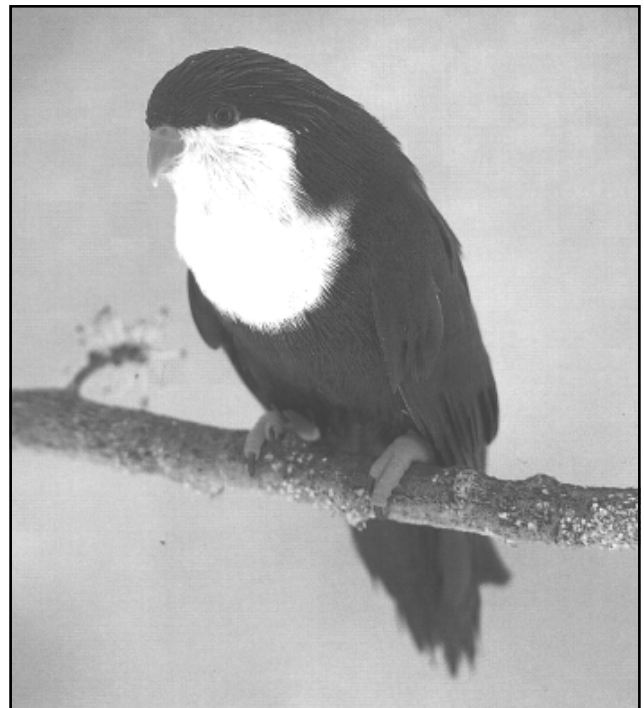
Threats: The species is effectively confined to coconut plantations on Taraina and Tabuaeran and is especially vulnerable to nest predation by rats and, in particular, to *Rattus rattus* present on Tabuaeran (Watling 1995). The population on Rimatara should be monitored, as it is possibly the only natural population. The Teraina population, which is probably the most secure (Watling 1995), should also be monitored.

Action: Information relating to the past and present distribution of the lorikeets, and habitats on relevant islands should be collated. This should then be related to the colonisation of rats, especially *Rattus rattus*, and human hunting. Once the impact of introduced rodents is clear, consideration should be given to preventing rat colonisation, and eradication, if practicable. (See Box 6)

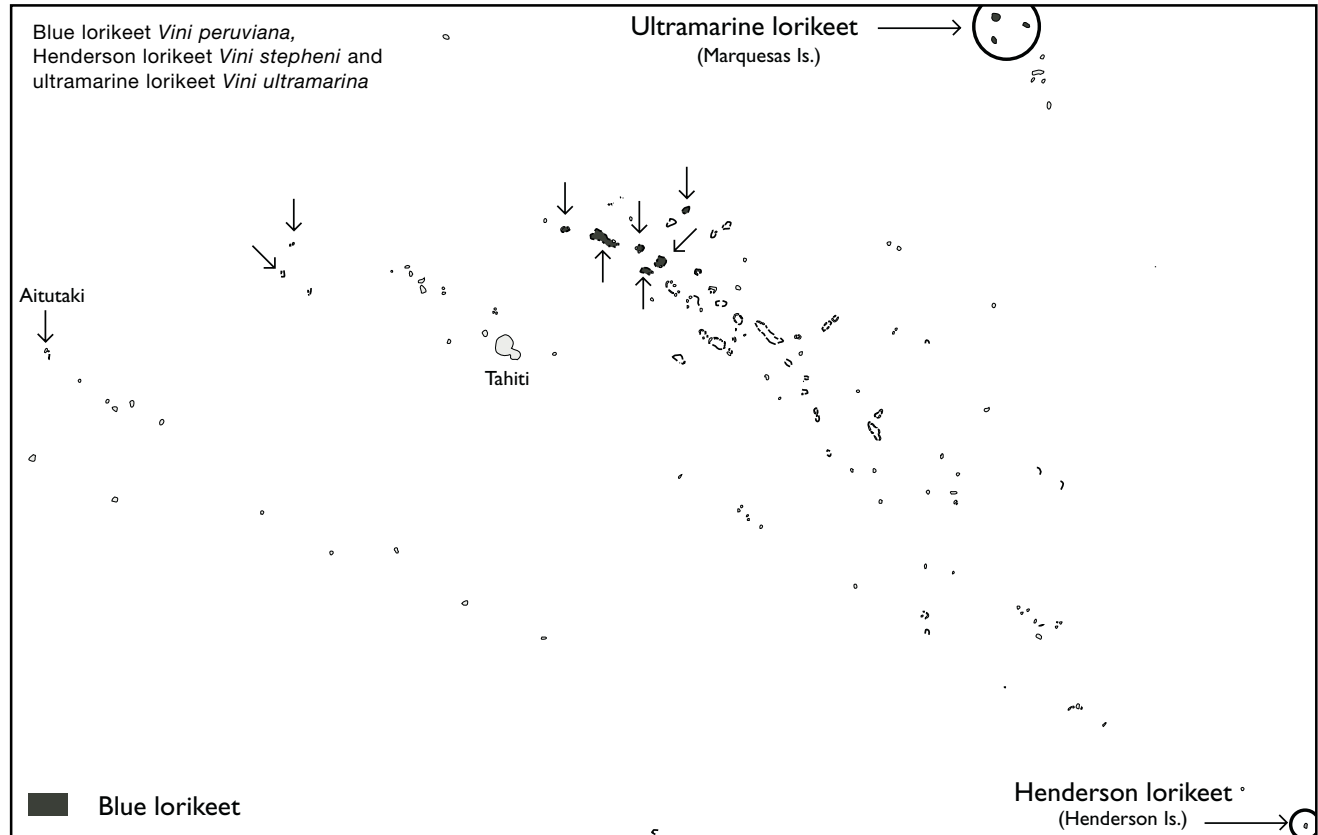
Blue lorikeet *Vini peruviana*

Contributor: Kerry-Jayne Wilson.

Conservation status: IUCN: Vulnerable: (B1+2d; C2a.).
CITES: Appendix II.
National protection status: Information unavailable.



Distribution and status: The distribution of the blue lorikeet is widespread but unevenly distributed in lowland coconut plantations and gardens in south-east Polynesia, including the Society Islands (French Polynesia: formerly all, now



Motu One and Manuae only), the northern atolls of the Tuamotu archipelago (French Polynesia: Rangiroa, Arutua and Tikehau), and Aitutaki, Cook Islands (to New Zealand), where it was probably introduced. In total, the species has been recorded from 23 islands, but it is now extinct on many of these.

There are possibly up to 250 and 300–400 pairs respectively on Motu One and Manuae. Tikehau is thought to hold 30 pairs. Fewer than 500 pairs survive on Aitutaki, with no evidence of a decline in the last decade (Collar *et al.* 1994). This can be compared with a population estimate of 1,200 individuals for Aitutaki based on surveys in 1992 and 1994 by the Cook Island Heritage Project (G. McCormack in Gill 1996). Its status is unknown on two further atolls (Apataki and Kaukura, Tuamotu Archipelago), which have not been visited since 1923. There are several other suitable islands that have not been surveyed (Holyoak and Thibault 1984, Pratt *et al.* 1987, Thibault 1988, Seitre and Seitre 1992). A survey of Tiamanu Motu (in Apataki atoll) in 1989 revealed a minimum population of at least 300 individuals (see Collar *et al.* 1994) and in 1993, 36 birds were observed in two different locations on Rangiroa, with the possibility that several hundred birds live there.

Threats: Many extinctions are thought to be the result of predation by European rats, *Rattus rattus* and cats. Trapping on Aitutaki in May 1993 and March 1994 indicated the presence of *Rattus exulans* but the absence of *Rattus rattus* and *Rattus norvegicus* (Wilson 1993 and K-J. Wilson *in litt.* 1997). Although trade is illegal, birds are still captured and sold by local people (Collar *et al.* 1994). Observations on Aitutaki One indicated that gardens and plantations were the favoured habitats, suggesting that its survival is dependent solely on the absence of European rats *Rattus rattus* (Wilson 1993 and *in litt.* 1997). There were six wild caught specimens recorded in international trade between 1991 and 1995, all in 1991 (CITES Annual Report database).

Action: Information relating to the past and present distribution of the lorikeets, and habitats on relevant islands should be collated and then related to the colonisation of rats, especially *Rattus rattus*, and human hunting. Once the impact of introduced rodents is clear, consideration should be given to preventing rat colonisation and eradication, if practicable. (See Box 6)

Henderson lorikeet *Vini stepheni*

Conservation status: IUCN: Vulnerable (D2).
CITES: Appendix II.
National protection status: Information unavailable.

Distribution and status: The Henderson lorikeet inhabits forests on Henderson Island in the Pitcairn Islands (to UK), an uninhabited raised-reef island (37km²) in the south-central Pacific. It is a generalist feeder and feeds on nectar, pollen, arthropod larvae, and fruits among others (Trevelyan 1995). In 1987 the total population was estimated at between 720 and 1,820 individuals, whilst in 1992 the population was estimated at approximately 1,200 pairs (but assessment was difficult because of their mobility and patchy distribution: Graves 1992).

Threats: Henderson Island's vulnerability to human impact was exposed in 1982–1983 when a millionaire sought to make it his home (Bourne and David 1983, Fosberg *et al.* 1983, Serpell *et al.* 1983). No obvious problems arising from the introduction of *Rattus exulans* were noted in 1992 (Trevelyan 1995).

Action: Safeguarding this species appears to rely on ensuring the integrity of the uninhabited island. Confirmation that *Rattus exulans* does not pose any problems for the species is desirable. A better understanding of the species' distribution in each habitat would be useful. (See Box 6)

Ultramarine lorikeet *Vini ultramarina*

Conservation status: IUCN: Endangered (B1+2b, d; D2).
CITES: Appendix I (transferred from Appendix II in 1997).
National protection status: Information unavailable.



Distribution and status: In 1975, this species occurred in all habitats with trees on Ua Pou, Nuku Hiva, and Ua Huka, in the Marquesas Islands, French Polynesia (Holyoak 1975; Holyoak and Thibault 1984). Sub-fossil remains indicate it formerly had a wider distribution (Steadman 1989). The population on Ua Huka apparently descends from a single pair introduced in the 1940s (Kuehler *et al.* 1997).

On Ua Pou, the population (estimated to be 250–300 pairs in 1975) suffered an unexplained 60% decline in 15 years, so that in 1990 it was rare from sea level to 800m. No birds were found during a week-long search in November–December 1991, although locals claimed small numbers did exist (Collar *et al.* 1994). On Nuku Hiva, an estimated 70 birds were restricted to high valleys and ridges at 700–1,000m in the north-western end of the island in 1972–1975, and by 1990 it was possibly extinct. No birds were recorded during one week in November–December 1991, although a single individual was reported between Taiohae and Taipivi during May 1991. On Ua Huka, the introduced population stood at around 200–250 pairs in the early 1970s, was still strong in 1987, with birds abundant in 1990 up to 500m and numbering some 100–1,500 birds in 1991 (Holyoak and Thibault 1984, Thibault 1988, Seitre and Seitre 1991, Kuehler and Lieberman 1993, Kuehler *et al.* 1997). In 1992 and 1993 seven lorries were translocated each year to Fatu Hiva and 15 lorries were moved in 1994. Fourteen were observed prior to the third release (Kuehler and Lieberman 1993, Kuehler *et al.* 1997) and 51 birds were recorded during eight days in January 1997 including 10 birds in sub-adult plumage, indicating successful breeding (Lieberman *et al.* 1997).

Threats: European rats *Rattus rattus* are the most likely cause of its decline. European rats have been present on Nuku Hiva since the beginning of the century, on Ua Pou (probably) since 1980, and introduced to Amotu a few hundred metres from Ua Huka two years ago. It is not clear if they have become established on the main island also (Seitre and Seitre 1991). Six wild caught specimens were recorded in international trade between 1991 and 1995, all in 1993 (CITES Annual Report database). The species was included in CITES Appendix I in 1997.

Action: Information relating to the past and present distribution of the lorikeets, and habitats on relevant islands should be collated and then related to the colonisation of rats, especially *Rattus rattus*, and human hunting. Once the impact of introduced rodents is clear, consideration should be given to preventing rat colonisation and eradication, if practicable. The success of the translocation to Fatu Hiva should continue to be monitored and a survey is planned for the year 2000 with the support of the San Diego Zoological Society (A. Lieberman and C. Kuehler *in litt.* 1998). (See Box 6)

Accounts for threatened taxa that may be full species

Forbes' parakeet *Cyanoramphus forbesi*

Contributors: Charles Daugherty, Andrew Grant, Terry Greene, and Kerry-Jayne Wilson.

Conservation status: IUCN: To be considered.

CITES: Appendix I (as *C. auriceps forbesi*).

National protection status: Information unavailable.

Reason for taxonomic uncertainty: Although long considered a subspecies of *C. auriceps*, recent protein (allozyme) electrophoresis analysis has led to the suggestion that the Forbes' parakeet should be restored to specific status (Triggs and Daugherty 1996). Currently the data are not conclusive, but as the genetic distance between this taxon on Mangere Island and several *C. novaeseelandiae* populations (from various islands adjacent to North Island, on the Chatham Islands and the Kermadec Islands) is closer than that between this taxon and populations of *C. auriceps* from both North and South Islands, *C. forbesi* is best treated as a distinct species (Triggs and Daugherty 1996). This tentative conclusion is cautiously accepted here, pending further clarification. Uncertainty over the degree of hybridisation with *C. n. chathamensis* must also cloud interpretation of the genetic analysis of the taxonomic status of this form.

Distribution and status: Forbes' parakeet occurs on Mangere and Little Mangere (formerly also Pitt) Islands, Chatham Islands, New Zealand, where it inhabits dense unbroken forest or scrub. Its numbers were drastically reduced earlier this century following deforestation of Mangere and the introduction of cats. No Forbes' parakeets were seen on Mangere in 1923–4 (Taylor 1975). Cats were eradicated in the 1950s and farming was stopped in 1968 when the island was made a Flora and Fauna Reserve (Taylor 1975). The species was restricted to the few hectares of forest that remained. In 1973 fewer than 30 individuals survived (Taylor 1975) on both Mangere and Little Mangere which should be considered as a single population because commuting has been observed (T. Greene *in litt.* 1997).

Since 1968 the open country Chatham Island red-crowned parakeets *C. n. chathamensis* have rapidly recolonised the island and hybridised with *C. forbesi* to such an extent (Taylor 1975) that the purity of the remaining birds is unknown (red-crowned parakeets were recorded on Mangere in 1992: A. Grant *per* T. Greene *in litt.* 1997). What appears to be Forbes' parakeet has been reported from the southern forested area of the main Chatham Island (Greene 1989). Red-crowned parakeets and hybrids

have been culled on Mangere since 1976 in an attempt to maintain the genetic integrity of *forbesi* (Nixon 1994). The 1997 population estimate of the whole population is 100–120 individuals, based on fieldwork on Mangere only (M. Bell *per* T. Greene *in litt.* 1997), although the degree of genetic introgression, if any, remains uncertain. The taxon may qualify as Critically Endangered (B2c,d,e, 3c,d).

Threats: As habitat management is restoring suitable areas for the parakeet, hybridisation remains the biggest single threat facing the species. There were 37 wild caught specimens of *C. auriceps* (no figures specifically for *forbesi*) recorded in international trade between 1991 and 1995, 25 birds in 1992 and 12 birds in 1993 (CITES Annual Report database).

Action: Clarification of the taxonomic status involves two issues: first, determining which taxonomic status is most appropriate for this species and, second, assessing the degree of introgression of red-crowned parakeet genes into the Forbes' parakeet gene pool (Triggs and Daugherty 1996). Unravelling these two issues is likely to be difficult. If it is a species, then it is one of the most threatened parrot species in the world. (See Box 4)

Orange-fronted parakeet *Cyanoramphus malherbi*

Contributors: Charles Daugherty, Terry Greene, John Kearvell and Kerry-Jayne Wilson.

Conservation status: IUCN: To be considered.
CITES: Appendix II.
National protection status: Information unavailable.

Reason for taxonomic uncertainty: This form was treated as a species until it was first proposed as a colour morph of *C. auriceps* in 1974 (Holyoak 1974, see also Taylor *et al.* 1986). But, a recent protein (allozyme) electrophoresis analysis has led to the suggestion that it should be restored to specific status (Triggs and Daugherty 1996, but see Taylor 1998). Currently the data are not conclusive, but as there does appear to be considerable genetic difference between the *Cyanoramphus* forms inhabiting Lake Sumner Park, where “*malherbi*” and *C. (a.) auriceps* co-occur (and allegedly interbreed), *malherbi* is thought to be best treated as a distinct species (Triggs and Daugherty 1996). Only one hybrid pair has been reported and the identification is suspect, casting doubt on supposed interbreeding (J. Kearvell *per* T. Greene *in litt.* 1997). This conclusion is provisionally accepted here, pending further clarification.

Distribution and status: This species was formerly thought to be scattered throughout most of New Zealand (Harrison

1970), although the two records from the North Island are thought dubious and records from Hen Island in the Hauraki Gulf are probably also erroneous (J. Kearvell *per* T. Greene *in litt.* 1997). The South Island is thought to have been the stronghold in the past, but *malherbi* is now confined to Arthur's Pass and the Lake Sumner/Lewis Pass area as a recent island-wide survey failed to locate additional populations (J. Kearvell *per* T. Greene *in litt.* 1997). It inhabits the fringes of *Nothofagus* forest and in one area is found breeding only at 600–900m in forest of *N. fusca* (Taylor 1985), but with a preference for areas bordering stands of *N. solandri*. In the past it has been reported from sea level to sub-alpine scrublands.

There have been only a few sightings since 1966 (Triggs and Daugherty 1996, see also Taylor 1985). Previous assessments of its status have ranged from more common than originally thought (Harrison 1970) to close to extinction (Mills and Williams 1980). The taxon may qualify as Critically Endangered (B2a,b,c,d,e, B3a,b,c,d).

Threats: Small population size and range are cause for concern. Hybridisation with yellow-crowned parakeets *C. auriceps* has been observed at Lake Sumner. Existing captive stocks also show signs of interbreeding with *C. auriceps* and should, therefore, not be considered for any conservation action in the future (Triggs and Daugherty 1996). There were 37 wild caught specimens of *C. auriceps* (no figures specifically for *forbesi*) recorded in international trade between 1991 and 1995, 25 individuals in 1992 and 12 individuals in 1993 (CITES Annual Report database).

Action: Clarification of the taxonomic status is underway at the Victoria University of Wellington, New Zealand (C. Daugherty *in litt.* 1997). (See Box 4)

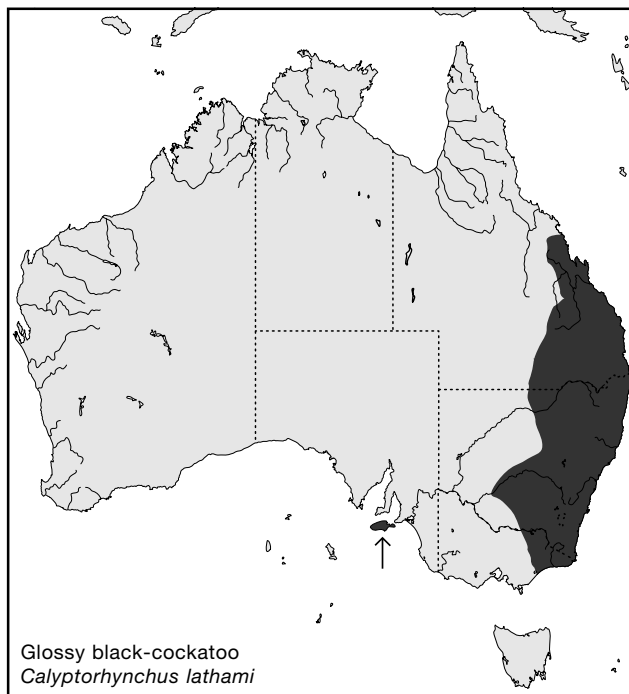
Accounts for species removed from the Red List

Glossy black-cockatoo *Calyptorhynchus lathamii*

Contributors: Stephen Garnett and Peter Menkhurst.

Conservation status: IUCN: Lower Risk (formerly Vulnerable: C2a).
CITES: Appendix II.
National protection status: Information unavailable.

Reason for removal from the list: Although the range of this species in South Australia and possibly Victoria halved in the 19th and early 20th centuries, this contraction does not appear to be continuing and is not expected to begin again (S. Garnett *in litt.* 1997). Clearance of feeding habitat for agriculture or residential development in parts of the east



coast of Australia (see Threats below) are not at a rate that would reduce the population by 20% over the next 10 years or three generations (S. Garnett *in litt.* 1997). The extent of occurrence exceeds 20,000km² and the area of occupancy is greater than 2,000km² (Blakers *et al.* 1984). The population is probably greater than 10,000 individuals in New South Wales alone. A population estimate greater than 10,000 is also obtained by extrapolating the densities recorded by Pepper (1997) in the fragments of habitat on Kangaroo Island (Pepper 1996) to the area of distribution (Blakers *et al.* 1984). The population is not expected to decline by 10% or more over the next ten years: the only

populations counted regularly appear to be stable or increasing (S. Garnett *in litt.* 1997).

Distribution and status: The glossy black cockatoo can be found in eucalypt woodland and forest with casuarinas, predominantly along the coast, in Queensland, New South Wales, and Victoria (nominate *lathami*). It also occurs on Kangaroo Island (subspecies *halmaturinus*), Australia. A third subspecies, *erebus*, has been recognised, localised on outcropping ranges and adjacent lowlands in the Dawson-Mackenzie-Isaac basin in east-central coastal Queensland (Schodde *et al.* 1993).

Calyptorhynchus lathami is thinly and patchily distributed throughout its range of more than 20,000km². An estimate of about 100 individuals for subspecies *halmaturinus* (Collar *et al.* 1994) was based on an incomplete count. Complete counts in 1995 (180 individuals) and 1996 (188 individuals) suggest the population is stable or may even be increasing (S. Garnett *in litt.* 1997).

Threats: This species formerly suffered from habitat loss following European settlement (further loss of habitat may occur as a result of fire or grazing by rabbits), and, although some of the remaining habitat is now conserved in a large number of national parks, the effect of habitat loss on population levels may not yet be fully evident because of the presumed longevity of the species (Garnett 1992). Furthermore, development is taking place along the east coast and much of the range includes production forest in which the density of old trees with suitable nest sites is still declining and much of the remainder is threatened with urban development (P. Menkhurst *in litt.* 1997).

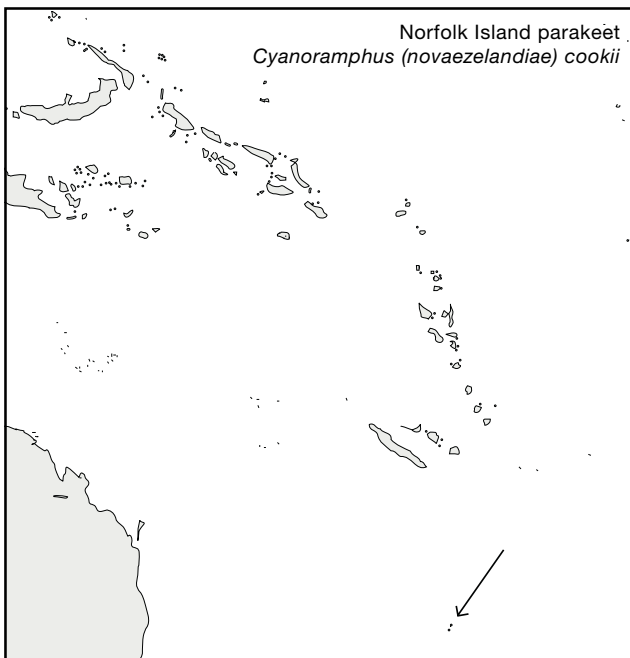
Norfolk Island parakeet *Cyanoramphus (novaezelandiae) cookii*

Contributors: Bruce Male and Paul Stevenson.

Conservation status: IUCN: Critically Endangered (D2).
CITES: Appendix I (as *C. novaezelandiae*).
National protection status: Information unavailable.

An increase in numbers (see below) raises the subspecies above the IUCN Red List threshold for Critically Endangered under the very small populations (less than 50) criterion (D1), although it still qualifies as critical under the very small range criterion (less than 100km²).

Reason for removal from the list: This parrot is generally considered to be a subspecies of the New Zealand kakariki *Cyanoramphus novaezelandiae* (e.g., Christidis and Boles 1994, Triggs and Daugherty 1996), rather than as a distinct species *Cyanoramphus cookii* as treated by Collar *et al.* (1994).



Distribution and status: Endemic to the 35km² Norfolk Island (Australia) where it lives in forest and visits nearby orchards. In 1983, the subspecies numbered approximately 20 individuals (Garnett 1992) and recovery actions were initiated which led to an increase in numbers of more than 60 in the wild and 20 in captivity in 1996. There are now approximately 100 individuals (P. Stevenson *in litt.* 1997).

Threats: This sub-species has suffered from hunting in the past (including hunting for scientific collection) and from habitat destruction, although the main modern threats are from predation by introduced rats *Rattus rattus*, competition for nest-sites from introduced crimson rosellas *Platycercus elegans* (Garnett 1992), and Psittacine Circovirus Disease. This disease was diagnosed in March

1995 and the majority of birds tested since then have demonstrated exposure to it (P. Stevenson *in litt.* 1997). Active management continues in the Norfolk Island National Park and Norfolk Island Botanical Garden and concentrates on rat and cat control, provision of nest hollows, and the establishment of a small captive breeding programme (P. Stevenson *in litt.* 1997).

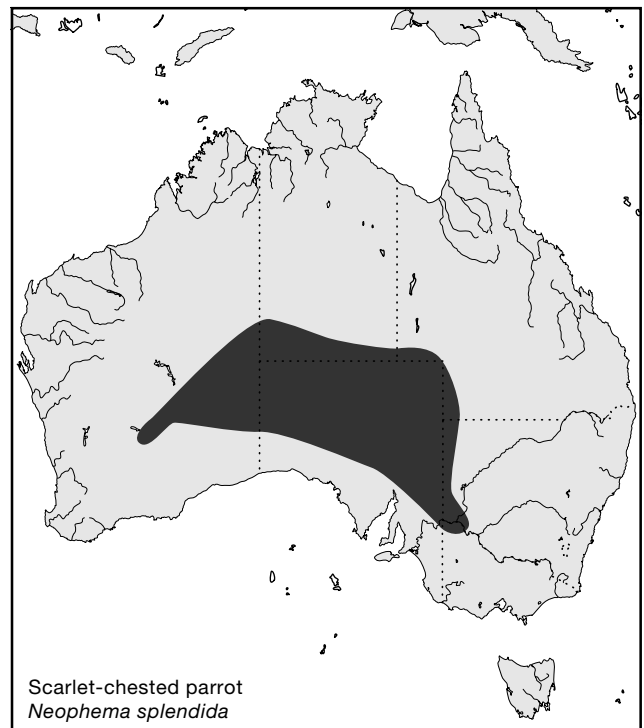
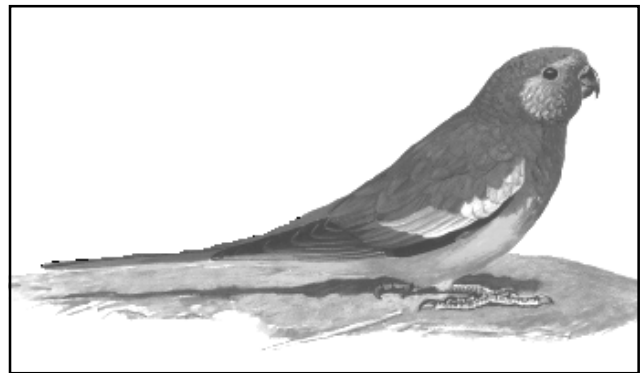
Scarlet-chested parrot *Neophema splendida*

Contributor: Lynn Pedler.

Conservation status: IUCN: Lower Risk (formerly Vulnerable: B2c + 3d).

CITES: Appendix II.

National protection status: Information unavailable.



Reason for removal from the list: The extent of occurrence of this parrot exceeds 20,000km² (Blakers *et al.* 1984) and the area of occupancy exceeds 2,000km² (L. Pedler *in litt.* 1997). The population is probably greater than 10,000 individuals based on area of occupancy and group sizes recorded, but even if the population is smaller, there is no reason to suspect a decline (L. Pedler *in litt.* 1997). The population is not known to be fragmented and the subpopulations are capable of dispersing great distances.

Distribution and status: This species occurs in mallee and acacia shrublands of southern semi-arid inland Australia. Under suitable conditions it apparently breeds rapidly and becomes locally common (L. Pedler *in litt.* 1997), such as the flock of 240+ individuals recorded in the Great Victoria Desert (Andrew and Palliser 1993), apparently dispersing and declining until the next favourable season (Blakers *et al.* 1984; L. Pedler *in litt.* 1997). No population

decline has been recorded or is expected. It has only ever been recorded rarely from New South Wales and there is a recent record from Queensland (Maher 1995).

Threats: It has been suggested that altered fire regimes and increased availability of water in pastoral lands may be having an adverse effect (Garnett 1992; see Collar *et al.* 1994). However, most habitat is outside pastoral areas, and the area over which the species occurs is so large that even vast fires would be unlikely to have a detrimental effect (L. Pedler *in litt.* 1997). In essence, these threats are very unlikely to be operating at a scale that would put the species at risk of extinction. Trapping is now unlikely to be a major problem as the species is kept in large numbers and breeds readily (Garnett 1992). There were 294 wild caught specimens recorded in international trade between 1991 and 1995, decreasing annually from 120 in 1991 to eight in 1995 (CITES Annual Report database).

Asia

CONTINENTAL ASIA

Overview

Philip McGowan

The distribution of Asia's parrots falls into two categories: species-poor continental Asia, and the species-rich islands of the Philippine and Indonesian archipelagos. The latter countries are so diverse, and contain such large numbers of species that are (or have recently been) considered threatened and face such acute conservation problems, that they are treated separately below.

Continental Asia and Sri Lanka is home to few parrot species with only species belonging to the genera *Psittacula* and *Loriculus* occurring between Afghanistan in the west, south China in the north-east, and the Malay Peninsula in the south. These genera have large distributions and link the African parrot fauna to that of the south-east Asian islands. Only three of the 10 (Forshaw 1989) to 13 (Juniper and Parr 1998) species of *Loriculus* occur in continental Asia and Sri Lanka. As the threatened forms of *Loriculus* are endemic to Indonesian islands, they are treated in detail in that section.

There are 13 or 14 surviving species of *Psittacula* parakeet (Forshaw 1989, Juniper and Parr 1998), including the species of the Indian Ocean islands, covered in Chapter 6 of this Action Plan (e.g., echo parakeet *P. eques*). Two other Indian Ocean species became extinct by the turn of the century: the Seychelles parakeet *P. wardi* and Newton's parakeet *P. exsul* which was endemic to Rodriguez Island (Forshaw 1989). In contrast, the ring-necked or rose-ringed parakeet *P. krameri* is arguably the most widespread (naturally and as the result of introductions) parrot in the world.

The only member of this genus considered threatened is the intermediate parakeet *P. intermedia* of northern India where it is only known from skins and bird markets: no confirmed wild records exist. As indicated in the species account below, a recent thorough evaluation of all available evidence suggests that the "species" is in fact a hybrid. It is retained here on the list of threatened parrots until this evaluation is completed and published.

Threats

There are few pressing conservation issues facing the parrots of continental Asia because they are typically

found in large numbers and appear adaptable to changed landscapes. This is typified by the ring-necked parakeet, which breeds well close to human habitation. However, this should not lead to complacency about their future. Trapping is thought to have led to declines of both Finsch's parakeet *P. finschii* and the blossom-headed parakeet *P. roseata* in parts of Thailand (Juniper and Parr 1998) and the increasing intensification of agriculture throughout much of continental Asia may well impact on populations.

Species account

Intermediate parakeet *Psittacula intermedia*

Contributor: Pamela Rasmussen.

Conservation status: IUCN: Vulnerable (D1).

CITES: Appendix II.

National protection status: Information unavailable.

Distribution and status: *P. intermedia* is known from six (Biswas 1959) skins of unknown origin (Ali and Ripley 1987). Also, a small number of live birds, reputed to have come from the plains of Uttar Pradesh, India, appeared in Indian bird markets during the 1980s (Sane *et al.* 1986).

It is very rarely reported in bird markets. No published records of free-flying wild birds are known (Inskipp and Inskipp 1995). Originally described as a distinct species (Rothschild 1895), it has been variously considered a hybrid of *P. himalayana* and *P. cyanocephala* (Husain 1959, Forshaw 1989) or a distinct species (Biswas 1959, Walters 1985), but work in progress corroborates the view that it is of hybrid origin (P.C. Rasmussen *in litt.* 1997). It is retained here until that work in progress is completed.

Threats: If a species, nothing is known of its habitat requirements, status, and any threats, although it is presumably rare. It is still reported that trappers offer the bird for sale, although infrequently (Inskipp and Inskipp 1995).

Action: The nearly completed taxonomic reappraisal of this species should indicate whether it is a distinct species or a hybrid. If it is a distinct species, then survey work to determine its distribution, status, and any threats is clearly urgent.

INDONESIA

Overview

Paul Jepson

(with boxed contributions by Stuart Marsden,
Jon Riley, Tim O'Brien, and Philip McGowan)

Indonesia, an archipelago of 13,500 islands spanning 5,000km² of ocean and connecting the Oriental and Australasian faunal realms, has an exceptionally diverse Psittacine fauna; 76 species occur, of which 30 are endemic to the Republic. Psittacines are prominent components of the avifauna east of Wallace's Line – in the Indonesian bio-regions of Sulawesi, Nusa Tenggara, Maluku, and Irian Jaya. Maluku, with 32 species (of which eight are endemic), and Irian Jaya (the Indonesian territory on the island of New Guinea), with 33 species (including three endemics), are particularly diverse regions.

Threats

At present, most of Indonesia's parrot populations are reasonably healthy, although 15 species have recently been considered threatened, (four Endangered, 11 Vulnerable: Collar *et al.* 1994). One of these, the blue-naped parrot *Tanygnathus lucionensis*, which has a large distribution in the Philippines and which in Indonesia occurs only in the Talaud islands, is now thought to be less at risk and has been removed from the list of threatened birds. Nevertheless, Indonesia has the highest number of threatened Psittacines of any country and around 15% of the world total.

Indonesia is a rapidly developing nation and landscapes are being fundamentally altered. It is preparing to feed an extra 35 million people, making a total population of 235 million, by the year 2015. In Sulawesi, Maluku, and Irian Jaya, Indonesia's three most diverse parrot regions, habitats in the lowland and coastal zone areas are being converted to wet-rice cultivation, plantation and timber crops, and shrimp-ponds. In addition, people are being relocated from elsewhere in Indonesia to populate these areas. Such changes will impact any Psittacine species with specialist lowland habitat requirements. Furthermore, all forest outside nature reserves, at altitudes below 1,000m, and on slopes of a grade less than 40%, will have been selectively logged by the year 2010. This may be critical for some parrot populations because it involves the removal of large trees, which may reduce nest site availability and hence the reproductive potential of parrots.

As natural habitats decline or become degraded, additional pressures associated with increased human population and agricultural intensification may become more significant. Such pressures include excessive use of

pesticides, the popular pastimes of shooting birds with air-rifles, capture of birds for the domestic and international trade, and, in east Indonesia, buying parrots as souvenirs or pets. In Java, Indonesia's most densely populated and developed island, the red-breasted parakeet (=moustached parakeet) *Psittacula alexandri* and blue-crowned hanging-parrot *Loriculus galgalus* are now rare birds. With the increasing human population and development in east Indonesia, other species may soon follow unless preventative actions are started now.

Conservation solutions

Obtaining sufficient information

Until recently, the knowledge base for setting parrot conservation priorities in Indonesia was derived from the largely anecdotal, qualitative, and sometimes prejudiced reports of short-term visitors. Thus, some threat assessments have underestimated the area of available habitat and over-stated the impact of trade in wild caught birds. Recently, systematic surveys have clarified the conservation status of some of Indonesia's parrots that were thought to be most threatened. As a result, the quality of information available for determining the risk of extinction facing parrot species is quite variable, ranging from detailed data, in a few cases, to, more commonly, inferences drawn from patchy knowledge of habitat and distribution.

Limited knowledge of species' status and the pressures that they face are often cited as major obstacles to conservation. In Indonesia where there are many endemic species distributed across many islands covering a huge area, there is a need to improve the capacity to undertake conservation-orientated psittacine studies (see Box 8).

Fieldwork by the Directorate-General of Forest Protection and Nature Conservation (PHPA)/BirdLife International-Indonesia Programme has confirmed that yellow-crested cockatoo *Cacatua sulphurea* populations have collapsed (see Box 9) and has also failed to locate the blue-fronted lorikeet *Charmosyna toxopei*, for which no confirmed reports exist since its discovery in 1927 (see Box 10). However, other status assessments by PHPA/BirdLife in Maluku have revealed that white cockatoo *Cacatua alba*, Tanimbar corella, and the chattering *Lorius garrulus*, blue-streaked *Eos reticulata*, and violet-necked *Eos squamata* lorries, all once believed to be threatened by trade, are still common birds within their limited ranges. A recent York University, UK/Universitas Sam Ratulangi expedition has found that Sangihe hanging-parrot *Loriculus catamene* is widespread in plantations and agricultural gardens, as well as in natural forest (University of York 1995). Lambert (1997) estimated that the red-and-blue lory population on Talaud numbers several thousand

rather than just 500 as reported in the early 1990s. The possibility that the hanging parrot population may be dependent on recruitment from natural forest and that the lory may be declining rapidly requires clarification (see Box 11).

In the case of other species that are thought to be at risk, notably the black-lored parrot *Tanygnathus gramineus* (see Box 10), purple-naped lory *Lorius domicella* (see Box 12), Wallaces' hanging-parrot *Loriculus flosculus*, Moluccan cockatoo (see Box 12), Salvadori's fig-parrot *Psittaculirostris salvadorii*, and Pesquet's parrot *Psittirichas fulgidus*, the information cited to support "threatened" status is inferential and based on limited field data. Thorough status assessments of these species are needed.

Resource allocation and the parrot trade

Because of Indonesia's size there will always be a need to target scarce conservation resources to the richest parrot areas, and the conservation of endemic island species is likely to remain a key issue. For this reason a revision of the taxonomic status of a number of species complexes is highly desirable (see Box 13). Two examples illustrate why.

The rainbow lorikeet *Trichoglossus haematodus* superspecies extends from Lombok east to New Guinea and New Caledonia, and to northern and eastern Australia, including Tasmania, and has 21 recognised taxa (Forshaw 1989). The two taxa occurring in Australia are now classed as separate species, but the 14 taxa occurring in Indonesia are considered to be one species. Whilst the species group is widespread and, in places, abundant, if any taxa is sufficiently distinct (e.g., *T. h. weberi* on Flores) to merit species status then they may require attention.

The Tanimbar corella illustrates the converse problem. It has been considered as a subspecies of the little corella *C. sanguinea* and split purely for convenience (see Forshaw 1989). Because it was classed as an endemic island species, international attention focused on the levels of off-take for the wild bird trade and it was assumed to be endangered. This led to a damaging argument over the need for CITES I listing, between the Indonesian government, trade and animal welfare non-governmental organisations (NGOs), and BirdLife International, which would probably have never happened if *goffini* had been treated as a subspecies with the super-abundant *sanguinea*, the favoured historical approach. Subsequent surveys have shown that *goffini*, like *sanguinea*, is an agricultural pest, although this characteristic is unlikely to guarantee its survival. Other superspecies and species groups where taxonomic reviews are needed to help guide conservation planning are the yellow and sulphur crested cockatoos, eclectus parrot, black-capped lory *Lorius lory*, and Amboina king parrot *Alisterus amboinensis*.

Nine parrot species are protected in Indonesia, including the sulphur-crested cockatoo *Cacatua galerita* and the eclectus parrot *Eclectus roratus*, which are not considered to be globally threatened. The Moluccan cockatoo *Cacatua moluccensis*, Tanimbar corella (=Goffin's cockatoo) *Cacatua goffini*, and red-and-blue lory *Eos histrio* are listed on CITES Appendix I, and international trade (but not domestic trade) is prohibited except under strict circumstances. The remainder of Indonesia's parrots are included on Appendix II of CITES and the export of wild-caught parrots is subject to quotas. Table 3 provides a list of threatened parrot species in Indonesia.

Interventions to control or ban the capture and trade of parrots should be carefully evaluated before they are implemented. For example, recent studies by social anthropologists of forest peoples in Seram and Halmahera showed that parrot catching accounts for 25–30% of their cash income (S. Badcock *in litt.* 1997). Among the Halafara people of the Manusela valley, Seram, young men catch and sell parrots to raise their bride price (S. Badcock *in litt.* 1997). Intervention without careful preparation runs the risk of alienating non-government agencies which are advocating the rights of traditional people and, in extreme cases, unwittingly initiating new and unforeseen problems. A good example of the latter is the case of the Tanimbar corella. When the trade was open, farmers gained compensation for crop damage by selling corellas snared on their maize crop. Now that there is no market, they have started burning tyres to keep the flocks away; increasing the risk of wildfires in Tanimbar's natural vegetation of dry monsoon forests (D. Pursima pers. comm. 1997).

The majority of Indonesia's parrots are forest species and Indonesia's natural forest covers 1,090,000km², of which 303,000km² is classed as protection forest and 167,000km² is contained within nature reserves. Furthermore, several major reserves have been established in key centres of psittacine diversity, notably the 25,000km² Lorentz National Park in Irian Jaya, the 2,290km² Lore Lindu National Park in Sulawesi, and the 1,890km² Manusela National Park in Maluku. Continued work to ensure that all species are adequately represented in protected areas is necessary.

Recognition of cultural diversity

Conservation measures must bear in mind that Indonesia has great cultural diversity and the values and perceptions of many differ from those of western conservationists. For example, many rural people in Indonesia are unaware that birds have restricted distributions and have difficulty with the concept of extinction; as a result they may rationalise population declines in terms of birds moving into the hills

(which they may do if lowland forest is lost) or getting “cleverer” and therefore harder to catch. Furthermore, utilising and trading natural resources is fundamental to Indonesian culture and economy.

Lateral and vertical approaches

Initiatives focusing on threatened species, such as those outlined in this Action Plan, are important. In the longer term, however, there is a need to widen the scope from single-species, crisis-driven interventions to broad-based, sustained efforts to create the conditions for psittacine assemblages to flourish in the human dominated landscape of the future. Such a reassessment of parrot conservation priorities in Indonesia will be a challenging task and its formulation will require a deeper understanding of areas such as psittacine taxonomy and ecology, cultural perceptions towards parrots, habitat status, development planning, forestry and agricultural policy, and institutional capacities. The current portfolio of conservation and development projects in Indonesia is expanding the knowledge base of the latter, general subject areas, but progress in areas specific to parrots will require the initiation of targeted projects.

Status assessments, taxonomic, and social anthropological studies will not in themselves save parrots in Indonesia. The real challenge for the future is translating knowledge into interventions with lasting impact. Promising areas include public awareness, local-level spatial planning, working with the forestry sector, and (for threatened species) inter-agency recovery plans. In each of these areas there are exciting opportunities to build parrot conservation into ongoing activities. For example, the WWF-Indonesia Programme distributes a “radio bulletin” which syndicates environmental news stories to local-language radio stations; WWF, BirdLife, and Conservation International are developing projects to work with local planning agencies on spatial planning; the eco-labelling of tropical hardwood initiative has opened avenues to explore the potential of working with forestry concessionaires on ways to reduce the impact of logging on parrot populations; and BAPA/BirdLife’s yellow-crested cockatoo recovery plan provides an exciting model of how inter-agency support and government resources can be mobilised for the protection of an endangered parrot species. It may be possible to

reduce the impact of logging which removes nest trees by providing artificial nest sites. There are a number of professional and image-conscious logging companies in Indonesia that might be interested in exploring restoration approaches.

Sadly, human capacity or resources do not match opportunities. It may be that fewer than 10 people in Indonesia will look at this Action Plan. In general, the Indonesian conservation community views parrots either as a non-issue or a specialist and thankless conservation activity that runs the risk of embroiling an agency in politics. Opportunities for outside agencies and individuals to make a useful contribution in Indonesia without a strong local partner are limited. Regulations governing foreign agencies and individuals wishing to conduct surveys, research or other conservation activities are complex. A collaborative conservation project (other than short inputs such as training or an awareness poster) with PHPA normally requires a formal agreement approved by the Secretariat to the Cabinet of the Republic of Indonesia which will involve a major investment over two years to conclude.

For parrot conservation to move forward in Indonesia there is a real need for different agencies and interest groups to work together, to pool resources and opportunities, and to recognise that no one agency can succeed meaningfully alone.

Priority projects in Indonesia

- **Provision of training materials and courses in parrot conservation in Indonesia.** (Box 8)
- **Assessment of the ecological requirements and populations dynamics of the yellow-crested cockatoo *Cacatua sulphurea* and other parrots in the Lesser Sundas and Sulawesi.** (Box 9)
- **Search for the blue-fronted lorikeet and black-lored parrot on Buru, Maluku Province, Indonesia.** (Box 10)
- **A strategy for the conservation of the red-and-blue lory *Eos histrio* and the Sangihe hanging-parrot *Loriculus catamene* in the Talaud Islands, Indonesia.** (Box 11)
- **Assessment of the conservation status and needs of the Moluccan cockatoo and purple-naped lory on Seram, Indonesia.** (Box 12)
- **Clarification of parrot taxonomy in Indonesia.** (Box 13)

Box 8. Provision of training materials and courses in parrot conservation in Indonesia.

Paul Jepson and Philip McGowan

Aim: To build local expertise within Indonesia to undertake extensive surveys and intensive research so that the status of parrot populations can be determined reliably and the threats facing them understood.

Justification: Indonesia is home to 76 species of parrot (Andrew 1992), of which 14 species are considered threatened with extinction. This comprises some 15% of the world's threatened parrots and indicates the importance of conservation efforts in this country during the next five years. A major obstacle to conservation in many countries is understanding whether species are at risk and if so what are the limiting factors. This is especially so in Indonesia, a large country consisting of many islands which are home to endemic species and subspecies. Consequently, there are many species that are believed threatened, have small ranges, and are widely separated from each other. This means that the expertise existing within the country is not able to address the conservation-orientated research needs of these species. Therefore, there is a great need to build local capacity for undertaking work that will help our understanding of the plight facing Indonesia's parrots and what might be done to ensure their survival.

Project description: Determining priority areas and personnel for a long-term training initiative should be undertaken in collaboration with the BirdLife-Indonesia Programme, the Directorate-General of Forest Protection and Nature Conservation (PHPA), and the Indonesian Institute of Science (LIPI). Personnel from universities who are attached to Environmental Study Centres (PSL), PHPA field offices (SSKSDA), and national parks should be offered the chance of field training. Training materials could be distributed more widely to national level PHPA and LIPI staff together with universities and non-governmental organisations. Establishing a parrot conservation capacity within a university might prove the most effective way of developing skills within Indonesia.

Personnel thus identified will require resources to allow them to understand parrot status assessments. These resources should include materials such as a parrot identification key (for all species, not just those which are threatened), pictures and tapes, and a manual of field techniques. Provision of a set of standard packs could be supplemented by items specific to some areas and/or species. The provision of stand-alone training packs should be supported by local training courses in which general conservation issues are discussed. Within this context the plight of parrots can be raised and then training given in techniques that can be used in understanding the problems in particular areas. For example, a survey and inventory workshop might draw on staff from LIPI, BirdLife International-Indonesia Programme, and local NGO conservation biologists.

This initiative should be co-ordinated by a training officer whose responsibility it would be to bring together the materials for the standard pack, consider the necessity for additional material for particular areas, and to draw up and begin the training workshops. A period of one year would be sufficient to start the programme and thereafter it could co-ordinated by BirdLife International-Indonesia Programme, PHPA, and LIPI.

Contact: BirdLife International-Indonesia Programme.

Box 9. Assessment of the ecological requirements and populations dynamics of the yellow-crested cockatoo *Cacatua sulphurea* and other parrots in the Lesser Sundas and Sulawesi.

Stuart Marsden

Aims: i) To determine the effects of habitat alteration and direct harvesting on the population size and structure, and the nesting ecology of the yellow-crested cockatoo; (ii) to use available data to identify strategies to ensure the long-term viability of cockatoo and other parrot populations in Wallacea. (iii) to conduct experiments on the use of artificial nest boxes for the yellow-crested cockatoo.

Justification: The yellow-crested cockatoo *Cacatua sulphurea* has suffered large declines throughout much of its natural range (see species account) and other parrots of the subregion, such as eclectus parrot *Eclectus roratus* and great-billed parrot *Tanygnathus megalorynchos*, have also shown dramatic recent declines (Jones *et al.* 1995). The causes of these declines are not properly understood, but populations have no doubt been seriously affected by habitat alteration and, in most cases (e.g., *C. sulphurea* and *E. roratus*), by direct harvesting of the birds themselves. Following recommendations made by the CITES Animals Committee as a result of its review of significant trade in Appendix II listed animal species, Indonesia has instituted an export moratorium pending surveys.

While very little detailed ecological work has been carried out on any of these species, studies of all three species on Sumba have shown that all occurred at higher densities in primary forest than in disturbed forest (Marsden 1995); in all cases densities in non-forested areas were extremely low. Effective strategies are to be developed for the long-term conservation of the yellow-crested cockatoo. Other species of parrot require a much greater understanding of the factors that naturally affect recruitment and mortality. In addition, it is necessary to understand more fully the impacts of habitat alteration on population dynamics (particularly in relation to loss of critical food sources and nesting trees), and the implications of different levels of harvesting. Almost nothing is known of these critical factors in relation to any Indonesian parrot.

The population of the cockatoo is now at such a critically low level throughout its range that there is a need for innovative conservation strategies, such as the provision of nest boxes. If nest sites are limiting population size, provision of acceptable boxes should eliminate this limiting factor.

Project description: Work would be focused on the yellow-crested cockatoo, but data should also be collected on sympatric species such as great-billed and eclectus parrots, and would concentrate on four study areas on Sumba, Sumbawa (Moyo), Komodo, and Sulawesi. Preliminary data on population density, habitat associations, and nesting ecology of Sumba's parrots are already available from previous studies (e.g., Marsden 1995, Marsden and Jones 1997) and should be built upon. Komodo, with high cockatoo density (see species accounts), and the areas on Sumbawa where cockatoos still occur, provide a suitable contrast to Sumba's low density. Comparatively little is known of the population status of cockatoos or other parrots on Sulawesi.

Baseline data would be collected at all sites, including accurate assessments of population densities of all parrot species (reassessed, in some cases), within different habitat types (following Jones *et al.* 1995; Marsden 1999). The densities of active nest sites should be similarly assessed for cockatoos and other selected species, and their abundance determined in relation to patterns of human habitat alteration (though not necessarily on all islands mentioned above). These data will allow an assessment of current population levels for the selected species, as well as an indication of the proportion of non-breeders in each population. In each area, a large sample of active nests should then be monitored to determine their productivity per annum (eggs laid, young fledged). Characteristics of the nest site and variation in productivity should be related to habitat characteristics and other environmental factors and patterns of human nest predation.

Data on population densities and structure in different habitats, nest availability, and productivity could be compared with those data available for related species e.g., galah *C. roseicapilla*: (Rowley 1983); Carnaby's cockatoo *Calyptorhynchus funereus latirostris*: (Saunders 1982, 1986); and three cockatoo species: (Smith and Saunders 1986). Combined with information on bird capture patterns and harvest rates, these data can be used to develop a simple general population model, sensitive to elements both of loss of nesting trees and direct illegal harvest. It is anticipated that this model could be used to predict likely changes in the population size of cockatoos in relation to different levels of habitat loss and harvesting. The model may also be used, with limited field data, for other populations of ecologically similar parrots in Indonesia: in this instance it may help to identify those taxa at risk and help prevent unsustainable harvest from populations by taking account of current habitat loss rates.

Using nest site data collected during the initial course of fieldwork, artificial nest boxes should be designed and tested in appropriate localities in the field.

Contact: S. Marsden, BirdLife International-Indonesia Programme.

The project is designed to fit into the framework of the *Yellow-crested cockatoo Cacatua sulphurea Recovery Plan* that is being developed by PHPA/BirdLife International.

Box 10. Search for the blue-fronted lorikeet and black-lored parrot on Buru, Maluku Province, Indonesia.

Philip McGowan and Stuart Marsden

Aim: To find one or more populations of the blue-fronted lorikeet and black-lored parrot and propose recommendations for the long-term survival of these species.

Justification: The blue-fronted lorikeet *Charmosyna toxopei* and the black-lored parrot *Tanygnathus gramineus* are endemic to Buru, an island of less than 2,500km² to the east of Sulawesi in central Maluku Province, Indonesia. The only certain records of the former species are seven specimens collected by Toxopeus using bird lime and described by Siebers (1930). The specimens were caught to the west of Lake Rana, in the centre of the island and remain the only definitive records despite intensive searches by the BirdLife International-Indonesia Programme in 1995 (Gunung Kelapat Mada proposed protected area, Lake Rana, and Teluk Bay) and 1996 (central north-east Buru and in the mangroves of Kayeli Bay). The only trace of this species followed claims by two hunters who reported catching it for food to the north-west of Lake Rana. Reports by Smiet (1985) that the species was common in Teluk Bara in 1980 are thought questionable (e.g., Forshaw 1989) and were not confirmed in either 1989 or 1995, although it may have been encountered above Teluk Bara in 1989 (Marsden *et al.* 1997). There is only one recent record of the black-lored parrot (Smiet 1985) and it was not found during the 1989 survey, but calls which may be this species were heard in western Buru in 1995 (BirdLife-IP *in litt.* 1997).

Project description: There is an urgent need to clarify the status of both species. The lack of records for these species might suggest that they occur at very low densities, are nomadic or have very specific habitat requirements. In the case of the black-lored parrot, the fact that it is nocturnal is probably part of the reason for the lack of confirmed records. Consequently, any survey should call on as much precise information as possible relating to locality, altitude, state of the habitat, time of year, and time of day when planning searches. For example, the search for the lorikeet might concentrate north-west of Lake Rana and in Teluk Bara, from where the only recent reports come from. Searches should be made at the same time of year as the hunters claim to have caught birds and any additional information should be sought that might reveal aspects of behaviour or ecology that make the birds difficult to detect. Results from as detailed a status assessment as is possible may then be used to propose the next stage in conservation planning for this species and its habitat. For the black-lored parrot, searches might concentrate in the Kelapat Mada Mountains at dusk.

Contact: BirdLife International-Indonesia Programme, Stuart Marsden.

Box 11. A strategy for the conservation of the red-and-blue lory *Eos histrio* and the Sangihe hanging-parrot *Loriculus catamene* in the Talaud Islands, Indonesia.

Jon Riley

Aim: To ensure the survival of the red-and-blue lory and the Sangihe hanging-parrot in the Talaud Islands by: increasing protection and reducing trapping levels of the red-and-blue lory on Karakelong and raising public awareness of its plight; assessing the status of both species on Sangihe.

Justification: The Endangered red-and-blue lory was formerly found in great abundance in the Talaud Islands and large flocks could regularly be seen moving between islands (Meyer and Wigglesworth 1898). It is now thought extinct from parts of its former range. Its stronghold is Karakelong the largest of the Talaud Islands (Riley 1995, Lambert 1997), and the only island in the Talaud group where trapping takes place. Trapping levels are very high, with at least several hundred birds trapped in a year (Lambert 1997). Approximately 1,200 birds are estimated to have been shipped from the island in 1996 (Wardhill and Riley 1997). This level of trapping is likely to have played an important role in the decline of the species and is probably the most immediate threat to its future. The species was included in CITES Appendix I in 1995.

Other potential factors are habitat loss, the use of the insecticide Azodrin and the potential for escaped captive birds to transmit diseases to wild birds. Habitat loss is thought to be responsible for the species' disappearance from Salibau and Kabaruan. Several areas are scheduled for logging on Karakelong. The insecticide Azodrin is applied to coconut trees leaving the coconuts unfit for human consumption for three months after application. Lories drink nectar from flowers in contaminated trees and it is not known whether the insecticide has any effect.

The Sangihe hanging-parrot is widespread at low densities on Sangihe, to which it is endemic, and has been recorded in small groups from a number of localities in different habitats. Almost all of Sangihe's original vegetation has been replaced by mixed crop plantations and secondary scrub although small remnant patches of forest survive on Mt. Sahengbalira in southern Sangihe and on Mt. Awu in the north. It is unlikely that Sangihe will prove important for the red-and-blue lory, as fewer than 50 birds are thought to survive there (Riley 1995, Lambert 1997).

Project description: A conservation strategy for the red-and-blue lory should address the three threats outlined above through:

- i) Increasing protection: protection is required at two levels. Firstly the red-and-blue lory should be placed on the Indonesian list of protected species. The legislation relating to this criteria should be strictly enforced; detailed recommendations are given in Lambert (1997). Secondly the status of protected areas on Karakelong should be clarified and possibly revised. Although the population on the island is centred on a hunting reserve, logging concessions have apparently been issued for part of this site. Whilst this situation is being clarified, it may be considered appropriate to revise the status of this reserve to a designation more compatible with the conservation requirements of this species.
- ii) Raising public awareness: legislation designed to reduce trapping and improve habitat protection will require partnership with district chiefs, village heads, and local communities. Workshops and educational material might concentrate on the need to conserve threatened parrots and forest resources, and increasing awareness of existing protected areas. For the lory specifically, its probable role as a controller of agricultural pests and in pollinating crop plants should be emphasised.
- iii) Improving knowledge: wherever possible, additional information should be sought, both for monitoring purposes and to provide an understanding of the species' ecological requirements, and the impacts of potential threats. Field surveys should be repeated and compared with Lambert (1997) after an appropriate time period. The numbers of birds recorded in trade should also be monitored. Two potential threats should be investigated: the possible impact of the insecticide Azodrin and whether escaped birds are transmitting diseases to wild birds.

A status assessment of both species on Sangihe is required, especially the hanging-parrot. This should involve determining the distribution of the species across the island and quantifying habitat use, to be followed by ecological assessments designed to understand factors currently affecting population size and identifying threats. For the hanging-parrot, this should include clarification of whether the species depends on forest patches because although it appears to be faring well in Sangihe's plantations (it feeds from coconut inflorescences), it is not known whether all of its requirements are met by this artificial habitat. Key factors are an assessment of its breeding success, roosting requirements, and determining whether any agricultural practices (e.g., the use insecticide Azodrin) are having a negative impact. These data will provide for recommendations concerning the appropriateness of habitat protection (including promoting the establishment of a protected area near Mt. Sahengbalira) and agricultural practices.

Contact: Jon Riley, BirdLife International-Indonesia Programme.

Action Sampiri, a year long conservation project in the Talaud and Sangihe Islands, begun in 1998.

Box 12. Assessment of the conservation status and needs of the Moluccan cockatoo and purple-naped lory on Seram, Indonesia.

Philip McGowan, Tim O'Brien and Paul Jepson

Aim: To assess the status of the Moluccan cockatoo and purple-naped lory on Seram and propose a strategy for their conservation.

Justification: The Moluccan cockatoo *Cacatua moluccensis* is endemic to Seram and the smaller islands of Saparua, Hariku, and Ambon in Maluku Province. The purple-naped lory *Lorius domicella* occurs only on Seram and Ambon. Most of Seram's forests, which are still extensive, are now under timber concessions and the island's Regional Development priority status means that forests over good soil may be converted to wet rice cultivation and other crops. At present far too little is known of either species to be sure that they can withstand such changes. What little information does exist on habitat use is largely anecdotal in nature, although it is known that they are unable to exist in wet rice cultivation.

Both species are forest inhabitants. The cockatoo is not thought to occur above 700m and does not tolerate selectively logged forest (Marsden 1998). It may tolerate traditional forest/garden mosaics. Crucially, however, there are no data on breeding success in either natural or human-modified habitats and so it is not known if they will survive in these altered habitats in the long-term. The lory is considered uncommon in hill forest between approximately 400 and 900m. Both species are traded and at least one species plays a significant part in the culture and economy of the inhabitants of Manusela National Park. For both species, there is a clear lack of information upon which to base recommendations that will ensure their survival in concert with regional development.

Project description: The first step is the assessment of the status of both species on Seram. Ideally this should attempt to determine relative abundance by habitat. In addition, information on the size and distribution of habitat blocks, and on trapping and timber extraction would be applicable to Regional Development Projects. These data would permit consideration of the needs of these species in appropriate management strategies, such as advocacy of reserve boundaries, land-use zoning, and possible new provincial forestry and agriculture policies. Furthermore, it will provide an adequate baseline for monitoring and a determination of the degree to which trade affects the status of the species. In response to the threat from international trade, *Cacatua moluccensis* was included in CITES Appendix I in 1990.

During the status assessment, it should be determined whether it is feasible to assess the breeding success of both species in different habitats. This is necessary before the species' presence in man-modified habitats can be interpreted as an indicator that it will survive in these habitats in the long-term.

Contacts: Wildlife Conservation Society-Indonesia Programme (lead agency on a planned survey), BirdLife International-Indonesia Programme, Stuart Marsden.

Box 13. Clarification of parrot taxonomy in Indonesia.

Paul Jepson and Philip McGowan

Aim: To clarify areas of uncertainty in the taxonomy of Indonesia's parrots in order to ensure distinct threatened taxa are not overlooked.

Justification: Knowledge of Indonesia's parrot fauna is very poor indeed compared with some other areas of the world. Many taxa have been recorded only a few times and much of their taxonomy is based on few specimens from an unevenly distributed sample of sites. Whilst the standard taxonomy seems adequate for many species and their subspecies, it is apparent that in some cases the existing nomenclature fails to reflect the variation in the "species" across its range. It is typically the degree of variation in plumage that has led to questions of taxonomic validity.

Understanding the taxonomy of these complexes is important because scarce resources for conservation are more likely to be targeted towards species than subspecies. Therefore, it is crucial to understand whether taxa described as species accurately reflect genetic variation. There are several cases worthy of investigation among Indonesia's parrots, but the priorities are perhaps the rainbow lory *Trichoglossus haematodus* and the yellow or lesser sulphur-crested cockatoo *Cacatua sulphurea*. The former is distributed from Bali eastwards through Indonesia to New Caledonia and the Loyalty Islands, and southwards to northern and eastern Australia. It has been assigned to 21 subspecies (Forshaw 1989), but the distinctness of the forms that inhabit the Indonesian islands from Bali to Biak in particular require clarification. The key issue within the subspecies of the lesser sulphur-crested cockatoo is whether *C. s. citrinocristata* from Sumba is sufficiently distinct to be considered a species.

Other issues that require resolution include relationships within the pygmy parrots *Micropsitta*, fig parrots *Cyclopsitta* (= *Opopsitta*), Desmarest's fig-parrot *Psittaculirostris desmaresti*, blue-rumped parrot *Psittinus cyanurus*, painted parrot *Psittacella picta*, red-cheeked and singing parrot *Geoffroyus geoffroyus* and *G. heteroclitus*, golden-mantled racquet-tail, *Prioniturus platurus*, Amboina king parrot *Alisterus amboinensis*, and the eclectus parrot *Eclectus roratus*.

Project description: Comparisons of the base pair sequences in the rapidly evolving parts of the mitochondrial deoxyribonucleic acid (DNA) provide an objective way of comparing degrees of genetic difference between populations within the same species, by reference to another recognised species that is closely related (i.e., the control or outgroup). Suitable outgroups for the rainbow lory forms might be *T. h. moluccanus* from Tasmania and the ornate lory *T. ornatus* from Sulawesi. With the lesser sulphur-crested cockatoo, the monotypic salmon-crested *Cacatua moluccensis* or white cockatoo *C. alba* seem appropriate. Ideally, blood or other fresh tissue samples from many individuals in each group are required to provide a sufficient sample from their populations for these DNA tests. To achieve this in these cases, it will probably also be necessary to amplify minute and degraded DNA samples from moulted feather shafts collected in the wild, and from captive birds (if they are known to be pure and not hybridised).

Contact: Museum Zoologi Bogor, LIPI.

Species accounts

Table 3. A list of Indonesian parrot species that are considered threatened using IUCN Red List criteria.

Also included is one species removed from the Red List. Species are listed in alphabetical order by their scientific name, together with their distribution and threat status. The criteria under which each species qualifies are given in the appropriate species account. Where two English names are given, the first is that widely used in Australia and the second, in parentheses, is the name used in *Birds to Watch 2* (Collar *et al.* 1994). *Denotes changes from *Birds to Watch 2* (and, therefore, the 1996 IUCN Red List of Threatened Animals), which have been agreed to by BirdLife International who maintain the IUCN list of threatened birds.

English name	Scientific name	Distribution	Threat category
White cockatoo	<i>Cacatua alba</i>	North Moluccas	Vulnerable
Moluccan cockatoo (Salmon-crested cockatoo)	<i>Cacatua moluccensis</i>	Seram and satellite islands, Moluccas	Vulnerable
Yellow-crested cockatoo	<i>Cacatua sulphurea</i>	Lesser Sundas, Sulawesi and Masalembu Islands	Endangered
Blue-fronted lorikeet	<i>Chamosyna toxopei</i>	Buru	Vulnerable
Black-winged lory	<i>Eos cyanogenia</i>	Islands in Geelvink Bay, Irian Jaya	Vulnerable
Red-and-blue lory	<i>Eos histrio</i>	Miangas, Talaud and Sangihe Islands	Endangered
Sangihe hanging-parrot	<i>Loriculus catamene</i>	Sangihe Island	Endangered
Wallace's hanging-parrot	<i>Loriculus flosculus</i>	Flores	Vulnerable
Purple-naped lory	<i>Lorius domicella</i>	Seram and Ambon, Moluccas	Vulnerable
Chattering lory	<i>Lorius garrulus</i>	North Moluccas	Vulnerable
Salvadori's fig-parrot	<i>Psittaculirostris salvadorii</i>	Northern Irian Jaya	Vulnerable
Iris lorikeet	<i>Psitteuteles iris</i>	Timor and Wetar	Vulnerable
Pesquet's parrot	<i>Psittrichas fulgidus</i>	New Guinea	Vulnerable
Black-lored parrot	<i>Tanygnathus gramineus</i>	Buru	Vulnerable
Red List removal			
Blue-naped parrot*	<i>Tanygnathus lucionensis</i>	Philippines, Talaud islands in Indonesia, and islands off Sabah, Malaysia	Lower Risk

White cockatoo *Cacatua alba*

Contributor: BirdLife International-Indonesia Programme.

Conservation status: IUCN: Vulnerable (A2c,d).

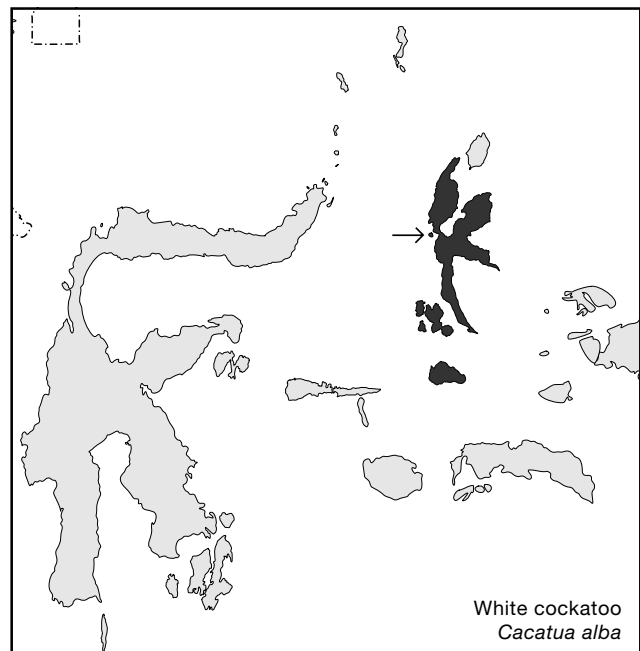
CITES: Appendix II.

National protection status: Information unavailable.

Distribution and status: This species is endemic to Halmahera, Bacan, Kasiruta, and Mandiole in the north Moluccas, Indonesia (specimens from Bisa and Obi seem most likely to derive from captive birds, or a feral population on Bisa, now extinct; Lambert 1994a), where it is found in primary and logged forest visiting tall trees within recently cleared areas in the lowlands to 600m. It is apparently absent from lowland forest areas, with few records from forest over nutrient deficient soil near Foli (Lambert 1994a), and no records from Gunung Gamkonorna or in forest over super-alkaline soils inland from Buli (BirdLife-IP *in litt.* 1997).

Survey work carried out in 1991 and 1992 resulted in a population estimate of 49,765–212,430 birds (Lambert 1993a). It has been suggested that the proposed Lalobata protected area on Halmahera may contain as many as

28,500–42,900 individuals (MacKinnon *et al.* 1995), although they did not survey lowland forest on rich volcanic soil which reportedly contains the highest densities (BirdLife-IP *in litt.* 1997).





Threats: It is believed that the levels of legal and illegal trade in this species in the early 1990s (a minimum of 5,120–7,500 individuals are estimated to have been captured in 1991) were not sustainable, particularly when combined with current levels of habitat loss and degradation (Lambert 1993a). There were 17,362 wild caught specimens recorded in international trade between 1991 and 1995; 6,855 in 1991, 5,766 in 1992, 3,563 in 1993, 995 in 1994 and 183 in 1995 (CITES Annual Report database). Following an export moratorium recommended by the CITES Animals Committee as a result of their review of significant trade in Appendix II listed species, PHPA revised its quota to the level recommended by Lambert (1993a: see Collar *et al.* 1994). The export quota for 1997 was set at 720 individuals (CITES Notification to the Parties No. 980, June 1997) and reduced to 380 individuals for 1998 (CITES Notification to the Parties No. 1998/07).

Action: The reduction of the CITES quota should help reduce the number of wild white cockatoos in international trade, but ways of reducing all exploitation (i.e., domestic trade as well) should be found. A clear priority is improved law enforcement, with all responsibility for quotas being centralised at the Department of Forestry in Ambon (Lambert 1993c). Additional approaches might include provision of incentives for not overexploiting cockatoo populations. This might be achieved through the introduction of cockatoo concessions in which particular areas would be allocated for cockatoo collection each year. Such an approach should allow better monitoring and would clearly involve considerable public awareness input if it were to succeed (Lambert 1993c).

Moluccan cockatoo ***Cacatua moluccensis***

(Salmon-crested cockatoo in Collar *et al.* 1994. Name changed here to conform to Indonesian usage.)

Contributors: BirdLife International-Indonesia Programme and Frank Lambert.

Conservation status: IUCN: Vulnerable (A1c,d; A2c,d; B1+2c,e).

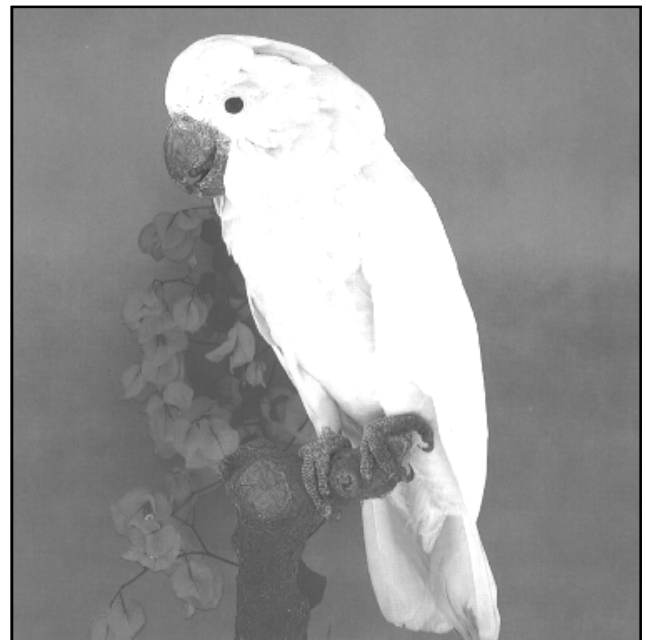
CITES: Appendix I.

National protection status: Information unavailable.

Distribution and status: This species was endemic to Seram and its satellite islands (Saparua, Haruku, and Ambon), in the Moluccas, Indonesia (White and Bruce 1986), but apparent extinctions on Saparua and Haruku and the persistence of only a small population in north-east Ambon (see Poulsen and Jepson 1996) leaves it almost restricted to Seram (BirdLife-IP *in litt.* 1997). It is found in lowland forest to 1,000m.

Surveys in central and north-east Seram, including the Manusela National Park, in 1989, found that it occurs at highest densities in primary (9.1 ± 6.3 per km²) and disturbed primary forest (9.8 ± 7.7 per km²), rather than in secondary forest (6.4 ± 6.2 per km²) and much lower in recently logged forest (1.9 ± 1.8 per km²) (Marsden 1992), suggesting that large-scale logging could considerably reduce its total population (Collar *et al.* 1994).

Threats: It is not clear whether the above figures reflect its specialised habitat requirements or the pattern and volume of bird capture: evidence that trade levels in this species were not sustainable and that its population was declining



led to a complete ban on trade being imposed by CITES in 1989 (Marsden 1992; see Inskipp *et al.* 1988, Bowler and Taylor 1989) and inclusion in Appendix I in 1992. The species also received protected status in Indonesia (Collar *et al.* 1994). Illegal trade could, however, still be a threat (Collar *et al.* 1994) and still occurs (F. Lambert *in litt.* 1997). There were 235 wild caught specimens recorded in international trade between 1991 and 1995, with an annual maximum of 131 individuals in 1992 (CITES Annual Report database). These refer mainly to movement of pre-CITES held birds and pets.

Action: The status of the species on Seram should be clarified and relative abundance in each habitat type determined. In addition, information on the size of and distribution of habitat blocks, and on trapping and timber extraction should be collected. Once such data have been collected, future action should be considered. These data will also provide an adequate baseline for monitoring and a determination of the degree to which trade affects the status of the species. A BirdLife/Wildlife Conservation Society project is addressing these needs. (See Box 12.)

Yellow-crested cockatoo *Cacatua sulphurea*

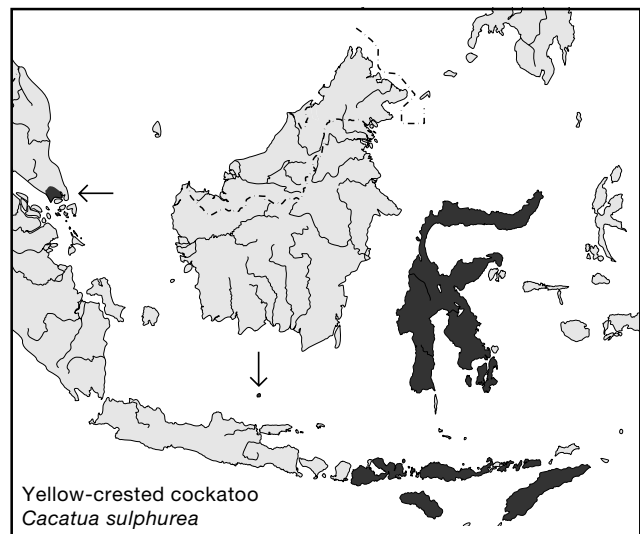
Contributor: BirdLife International-Indonesia Programme.

Conservation status: IUCN: Endangered (A1c,d; A2c,d).
CITES: Appendix II.

National protection status: Information unavailable.

Distribution and status: The yellow-crested cockatoo is endemic to Indonesia (and introduced to Singapore and Hong Kong), where it occurs virtually throughout the Lesser Sundas, on Sulawesi and its satellite islands, and off Nusa Penida (off Bali) and the Masalembu islands (in the Java Sea). It is found in forested habitat in the lowlands to 500m on Sulawesi and to 800m, sometimes 1,200m, in the Lesser Sundas (White and Bruce 1986, MacKinnon and Phillips 1993, Collar *et al.* 1994).

It was formerly locally common throughout much of its range, but numbers have declined. It is extinct on Lombok (BirdLife-IP *in litt.* 1997) and thought to be potentially beyond recovery on Sulawesi (Andrew and Holmes 1990, Collar *et al.* 1994). There is evidence of substantial population declines in South Sulawesi (Cahyadin *et al.* 1994a) and North Sulawesi (BirdLife-IP *in litt.* 1997). It survives, but is rare, on Flores (Dutson 1995). In the Masalembu Islands in the Java Sea only 8–10 individuals of the endemic subspecies *abbotti* were located in 1993 and 1994 (Cahyadin *et al.* 1994b) and only three breeding pairs now remain (BirdLife-IP *in litt.* 1997). On



Nusa Penida (where it may be irruptive) it was last recorded in 1986 (see Collar *et al.* 1994). In the Lesser Sundas it was thought very threatened on Sumba (Collar *et al.* 1994), although this island might constitute one of its remaining strongholds, along with Komodo and Sumbawa (BirdLife-IP *in litt.* 1997). However, the paucity of records from the latter in July–September 1993 led to concerns about its survival on the island (Butchart *et al.* 1996). It was still common in the Komodo National Park in 1993 (Butchart *et al.* 1996; see also Collar *et al.* 1994), and on Sumba the endemic subspecies *citrinocristata* was estimated to number 2,376 birds in 1992 (Jones *et al.* 1995). Intensive studies on Sumba indicate that the species select very large *Datiscaceae* trees for nesting and that there is a significant positive correlation between nest hole availability and cockatoo abundance (Marsden and Jones 1997).

Threats: The reason for the continuing decline is believed to be a combination of habitat destruction and the unsustainable levels of trapping for the bird trade (see Collar *et al.* 1994). Cockatoo nests seem to be safe from trappers if they are sufficiently high and the lack of such trees may have played an important role in the species' decline (Marsden and Jones 1997). PHPA and BirdLife-IP have an active conservation programme for the species (BirdLife-IP *in litt.* 1997). There were 13,901 wild caught specimens recorded in international trade between 1991 and 1995: 5,880 in 1991, 4,668 in 1992, 2,409 in 1993, 461 in 1994, and 483 in 1995 (CITES Annual Report database). In March 1993, as part of the CITES Significant Trade Process, the CITES Standing Committee recommended countries to suspend imports from Indonesia, pending field surveys to assess the status of the species (CITES Notification to the Parties No. 737).

Action: Information relating to the effects of habitat alteration and direct harvesting on the population size, structure and nesting ecology are required. Baseline data are required from selected sites. These data should include accurate assessments of population and active nest densities in each habitat type and in relation to habitat alteration. This should allow an estimate of current population level, proportion of non-breeding birds, and (if some nests are monitored) productivity. Assessment of nest site characteristics should aid the design of an experiment to determine the use of artificial nest boxes. The data collected from the study should be used to determine strategies for the long-term viability of cockatoo. Some of these initiatives are incorporated in the PHPA/BirdLife International-Indonesia Programme *Yellow-crested cockatoo* *Cacatua sulphurea* *Recovery Plan*. (See Box 9)

Blue-fronted lorikeet ***Charmosyna toxopei***

Contributor: BirdLife International-Indonesia Programme.

Conservation status: IUCN: Vulnerable (B1 + 2c; C1; C2b; D1).

CITES: Appendix II.

National protection status: Information unavailable.

Distribution and status: The blue-fronted lorikeet is endemic to Buru, Indonesia, where it is known from seven specimens collected by Toxopeus on the west side of Lake Rana at altitudes between 850 and 1,000m in the 1920s (Siebers 1930, White and Bruce 1986).

The seven specimens are thought to be the only definite records of this species as intensive searches by BirdLife-IP in 1995 (Gunung Kelapat Mada proposed protected area, Lake Rana and Teluk Bara) and 1996 (central north-east

Buru and the mangroves of Kayeli Bay) failed to record the species. The locals who brought the birds to Toxopeus did not know other areas that the species inhabited. The inhabitants of ten villages in western Buru were not generally familiar with the species in 1996 (BirdLife-IP *in litt.* 1997), although two hunters had caught it for food in the mountains of the sacred Garan area north-west of Lake Rana, an area which includes similar habitat to that on the west of the lake (BirdLife-IP *in litt.* 1997). Smiet's (1985) records are thought uncertain: he described it as quite common in plantations, secondary, and primary forest around Teluk Bara in 1980 but intensive searches in this area in 1989 and 1995 failed to find it (BirdLife-IP *in litt.* 1997), although two flocks of five and six birds that were seen were thought to be this species (Marsden *et al.* 1997). Smiet's observations have also been attributed to the more widespread red-flanked lorikeet *C. placensis* by Forshaw (1989), but there is no firm evidence that the latter occurs on Buru (Jepson 1993, see van Bemmelen 1948). The paucity of historical records suggests that *C. toxopei* is rare, nomadic or is restricted to a specific habitat. Marsden *et al.* (1997) considered that the species should be treated as data deficient.

Threats: If it proves to be confined to lowland forest, it could be seriously threatened by deforestation (Jepson 1993). Despite the lack of recent reliable field records of this species seven wild caught specimens were recorded in international trade between 1991 and 1995, all in 1991 (CITES Annual Report database).

Action: Information is urgently required on the distribution (including habitat use), status, and threats to this species. (See Box 10)

Black-winged lory ***Eos cyanogenia***

Contributor: BirdLife International-Indonesia Programme.

Conservation status: IUCN: Vulnerable (A1c,d; B1+2c; C1). CITES: Appendix II.

National protection status: Information unavailable.

Distribution and status: The black-winged lory is known from Biak-Supiori, Numfor, Manim, and Meos Num islands in Geelvink Bay, Irian Jaya, Indonesia (Beehler *et al.* 1986). On Biak it is considered generally uncommon (but sometimes in flocks of 40–60 individuals), feeding in inland forest (up to 460m) and thought to roost in coconut plantations and nearby coastal forest (Collar *et al.* 1994). It was thought to be quite common in January 1997 (BirdLife-IP *in litt.* 1997); on adjacent Supiori it was common in 1982 along the coast and inland to



Red-and-blue lory *Eos histrio*

Contributors: BirdLife International-Indonesia Programme, Frank Lambert and Jon Riley.

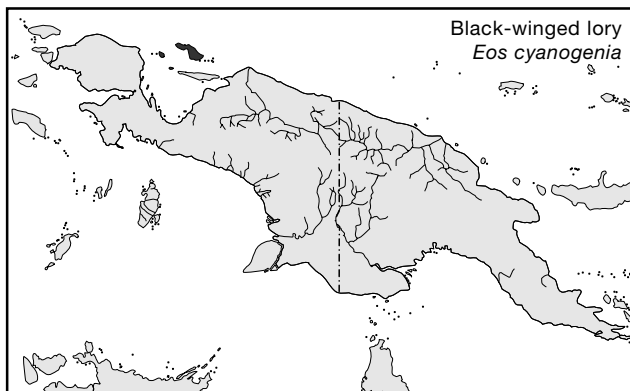
Conservation status: IUCN: Endangered (A1c,d; A2c,d; B1+2c,d,e; C1).

CITES: Appendix I (transferred from Appendix II in 1995).

National protection status: Information unavailable.

Distribution and status: This species is known from Miangas (although this is doubted: F.R Lambert *in litt.* 1997) and Talaud and Sangihe Islands, between Sulawesi, Indonesia and Mindanao, Philippines (White and Bruce 1986). It has also been reported from the Nenusa Islands (Anon 1993).

In 1978, its status on Sangihe was reported to be similar to that in the last century (White and Bruce 1986). Since then several ornithologists have visited the islands (Lambert 1997). The indigenous nominate subspecies was not recorded until 1995 when a maximum of six birds were seen in northern Sangihe (Riley 1995, University of York 1996). A proportion of these birds were escapees as ring markings were observed and were of the subspecies *E.h. talautensis*, rather than the native subspecies, which probably numbers fewer than 50 birds (Lambert 1997) and that are centred on Sangihe's only remaining forest on Mt. Sahengbalira. Riley (*in litt.* 1997) reports that there may only be one voice record from this area since 1995. The species may now be extinct on the three other islands in this group from which it was previously known, Siau,

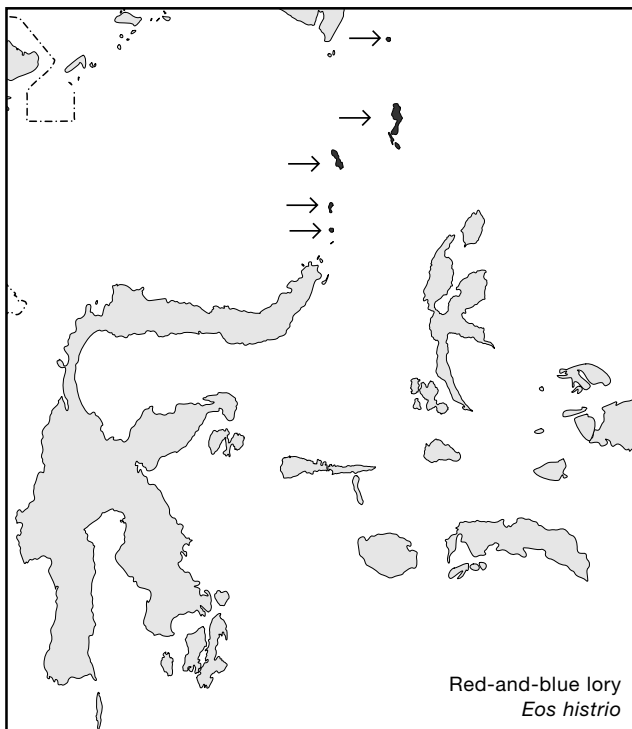


approximately 200m, but less common at higher altitudes (Bishop 1992). Like many lorries it is thought to be highly nomadic, making it difficult to assess true numbers.

Threats: The species is threatened by the destruction of large areas of primary lowland forest on Biak (Collar *et al* 1994, see also Arndt 1992). It has been trapped for nearly 20 years (BirdLife-IP *in litt.* 1997). The effect this has had on the population is unknown. There were 223 wild caught specimens recorded in international trade between 1991 and 1995, with an annual maximum of 215 individuals in 1991 (CITES Annual Report database). Following a review under the CITES Significant Trade Process, Indonesia was recommended by the CITES Animals Committee in 1993 to suspend exports pending the development of a population monitoring programme. This moratorium is still in place.

Action: Information is urgently required on distribution (including habitat use), status, and threats.





Ruang, and Tagulandang (Riley *in litt.* 1997). Karakelong, in the Talaud Islands is the stronghold: the population was estimated at less than 2,000 birds in the early 1990s (Collar *et al.* 1994). In 1995 up to 250 birds were seen in a day (Riley 1995) and in 1996 the population was estimated at 9,400–24,160 individuals. A single bird was recorded from Salebabu (Talaud Islands) in 1995 (Riley 1995) and six birds which may be of this species were noted in November 1996 (Lambert 1997). No birds were found on Kabaruang (Talaud Islands) in November 1996 (Lambert 1997) but locals reported birds visiting the island for part of the year. The species is thought unlikely to occur in the Nenusa Islands or Miangas (Lambert 1997), the former being the supposed range of the questionable third subspecies *challengeri* (Riley *in litt.* 1997).

Threats: Several hundred birds, perhaps as many as 700, were being illegally traded in 1992 and early 1993 (Nash 1993). There are two estimates, both made in 1996, for numbers trapped on Karakelong: Lambert (1997) estimated that several hundred birds (possibly over 1,000) were trapped each year and Riley (*in litt.* 1997), using figures provided by trappers, estimated that some 1,335 individuals were trapped in 1996. Logging may become a serious threat in the future (operations were started on Karakelong in 1996; Riley *in litt.* 1997). It has been speculated that insecticide may affect the parrots directly in coconut plantations, and that disease might be introduced to wild birds through releases of captive birds (Lambert 1997). There were 648 wild caught specimens in international trade between 1991 and 1995, with an annual maximum of 475 individuals in 1992 (CITES

Annual Report database) and none in 1995 when the species was listed in Appendix I.

Action: A conservation strategy for the red-and-blue lory should address the threats outlined above through legislation and raising public awareness, and by providing appropriate ecological knowledge. The species should be included on the Indonesian list of protected species and the status of protected areas on Karakelong should be clarified. A registration scheme for captive birds is also desirable. Workshops and educational material designed to raise public awareness might concentrate on the negative impacts of over-exploitation such as the lory's probable role as a controller of agricultural pests and in pollinating crop plants. Additional ecological information provides the knowledge upon which to refine conservation strategies and monitor populations. (See Box 11)

Sangihe hanging-parrot *Loriculus catamene*

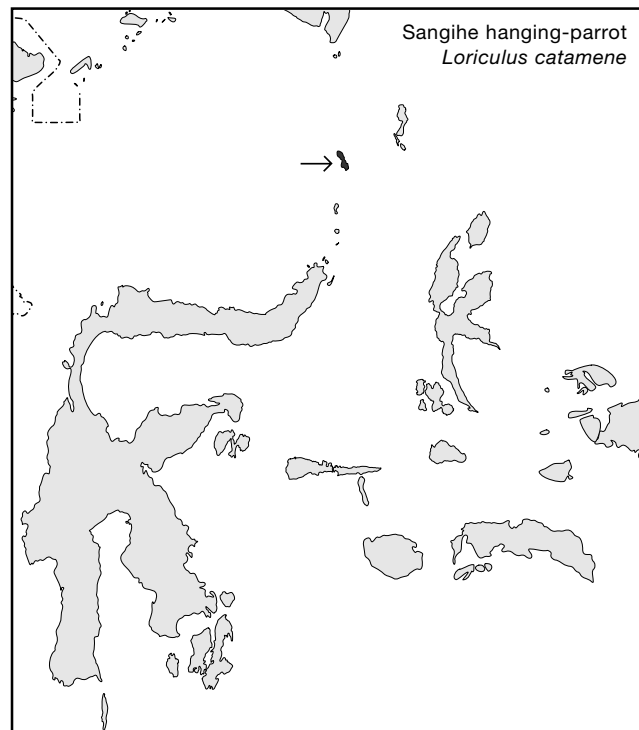
Contributors: Frank Lambert and Jon Riley.

Conservation status: IUCN: Endangered (B1+2c; C1; C2b; D1; D2).

CITES: Appendix II.

National protection status: Information unavailable.

Distribution and status: This species is endemic to Sangihe Island, north of Sulawesi, Indonesia (White and Bruce



1986). In the mid-1980s, it was found to be not uncommon outside forest and was regularly observed in coconut groves (Collar *et al* 1994). At least two pairs were observed on steep, tree-cropped, volcanic slopes in 1986, but further investigation is required to determine whether it can survive in purely secondary habitats (Bishop 1992). Recently it has been considered widespread at low densities with groups of one to six birds being most commonly encountered, although 19 birds have been recorded in a flock (Riley *in litt.* 1997). It was commonly seen and heard in 1996 in the Mt. Awu and Mt. Sahengbalira areas (F. Lambert *in litt.* 1997).

Threats: Sangihe's original vegetation has been almost completely replaced by coconut and nutmeg plantations, and the secondary vegetation of abandoned gardens (Whitten *et al.* 1987a,b). Although Riley (*in litt.* 1997) and Lambert (1997) have recorded birds regularly in plantations and cultivated areas adjacent to forest areas, it is not clear whether birds can survive in the absence of forest. Other possible threats include the accidental transmission of disease from captive birds and the use of insecticides on trees from which birds take nectar (Riley *in litt.* 1997).

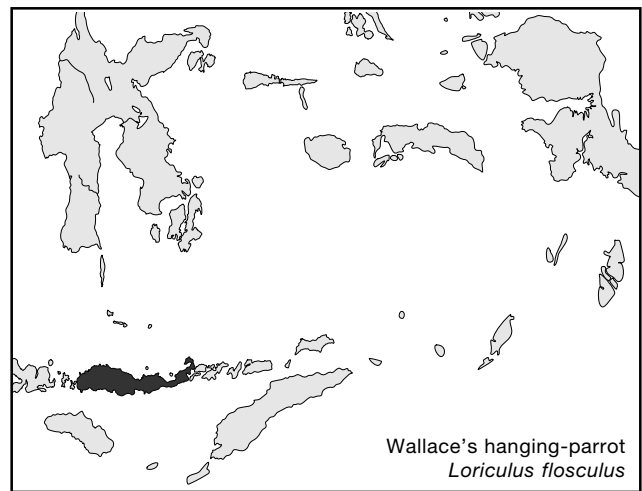
Action: Information is urgently required on distribution (including habitat use), status, and threats to the species. This should include clarification of whether the species depends on forest patches because although it appears to be faring well in Sangihe's plantations (it feeds from coconut inflorescences), it is not known whether all of its requirements are met by this artificial habitat. Key tasks include assessing its breeding success and roosting requirements, and determining whether any agricultural practices are having a negative impact. For example, use of the insecticide Azodrin is a cause for concern for red-and-blue lorries on Karakelong; it should be determined whether any chemicals applied to coconut trees on Sangihe may be affecting *L. catamene*. These data will provide for recommendations concerning the appropriateness of habitat protection and agricultural practices. (See Box 11)

Wallace's hanging-parrot *Loriculus flosculus*

Contributors: BirdLife International-Indonesia Programme and Frank Lambert.

Conservation status: IUCN: Vulnerable (B1+2c; C1; C2a).
CITES: Appendix II.
National protection status: Information unavailable.

Distribution and status: Wallace's hanging-parrot is endemic to Flores in the Lesser Sundas, Indonesia (White and Bruce 1986), where it was historically known from just



one documented locality (Schmutz 1977, Forshaw 1989). Surveys in 1993 found it to be locally common in primary semi-evergreen rainforest between 450 and 1,000m (most sightings in fruiting fig trees occurred between 850 and 1,000m) in the Tanjung Kerita Mese proposed protected area, near Paku, west Flores (Butchart *et al.* 1996). It was also seen at 1,000m on Gunung Egon in east Flores in 1987, and along a roadside in west Flores in 1995 (F. Lambert *in litt.* 1997; see Butchart *et al.* 1996).

Threats: Little evergreen forest below 1,000m is included within the gazetted protected areas on Flores (Collar *et al* 1994), so this species is vulnerable to habitat destruction (Butchart *et al.* 1996). There were 55 wild caught specimens recorded in international trade between 1991 and 1995, all in 1991 (CITES Annual Report database). Following a review under the CITES Significant Trade Process, in 1992, Indonesia was recommended by the CITES Animals Committee to suspend exports pending the development of a population monitoring programme, and this moratorium is still in place.

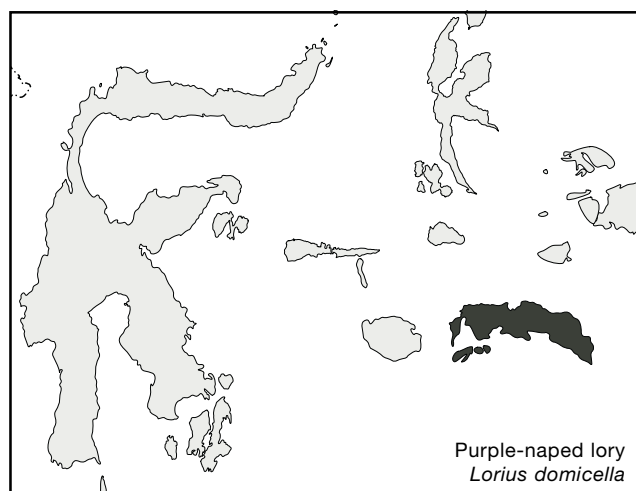
Action: BirdLife-IP and WWF are undertaking biodiversity surveys with the aim of strengthening the protected area network on the island (BirdLife-IP *in litt.* 1997).

Purple-naped lory *Lorius domicella*

Contributor: BirdLife International-Indonesia Programme.

Conservation status: IUCN: Vulnerable (B1+2e; C1).
CITES: Appendix II.
National protection status: Information unavailable.

Distribution and status: The purple-naped lory is endemic to Seram and Ambon in the Moluccas, Indonesia (White and Bruce 1986).



Purple-naped lory
Lorius domicella

In Manusela National Park (central Seram) it is rare to uncommon in hill forest within a narrow altitude range from 400 to 900m (BirdLife-IP *in litt.* 1997). It was found to be more common on ridges above 900m in the Way Bala area of eastern Seram in 1996. Here 10–14 individuals were recorded along 1–2km of ridge (Isherwood *et al.* 1996). The species is either very rare or extinct on Ambon (BirdLife-IP *in litt.* 1997).

Threats: It is a popular cagebird in Maluku where it is considered the most intelligent parrot. Although it has been suggested that any external trade in this species would pose a serious threat to its survival (Bowler and Taylor 1989, Bishop 1992), as population size and volume of trade have not been quantified it is not clear what the impact of trade is (BirdLife-IP *in litt.* 1997). There were three wild caught specimens reported in international trade between 1991 and 1995, two in 1991 and one in 1994 (CITES Annual Report database).

Action: The status of the species on Seram should be clarified and relative abundance in each habitat type determined. In addition, information on the size and distribution of habitat blocks, and on trapping and timber extraction should be collected. Once such data have been collected, future action should be considered. Furthermore, it will provide an adequate baseline for monitoring and a determination of the degree to which trade affects the status of the species. (See Box 12)

Chattering lory *Lorius garrulus*

Contributor: BirdLife International-Indonesia Programme.

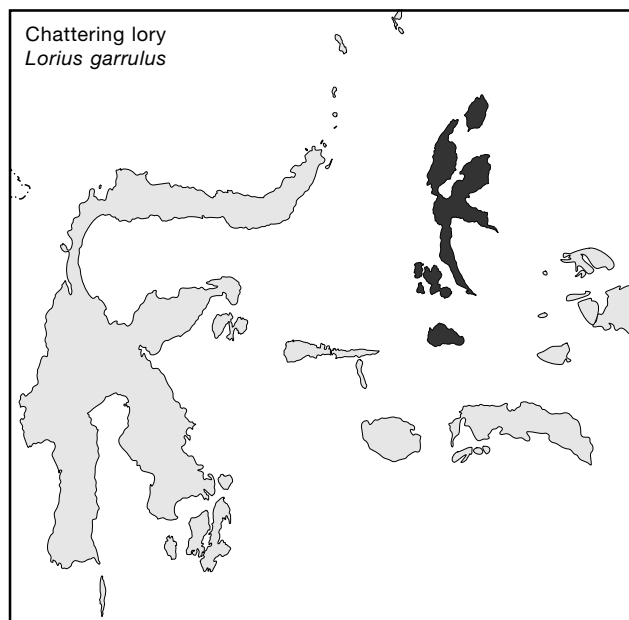
Conservation status: IUCN: Vulnerable (A2c,d).

CITES: Appendix II.

National protection status: Information unavailable.

Distribution and status: This species is endemic to the north Moluccas, Indonesia where it is known from Halmahera, Widi, Morotai, Rau, Bacan, Obi and possibly Ternate (White and Bruce 1986). It is found in forest, including logged forest, but not normally in agricultural land, from the lowlands to 1,300m. It is rarely encountered in forest on extremely alkaline soils (BirdLife-IP *in litt.* 1997).

The highest population densities are found in lowland forest on rich volcanic soils (BirdLife-IP *in litt.* 1997). Survey work carried out in 1991 and 1992 resulted in a population estimate of 46,360–295,540 birds (Lambert 1993a). It has been suggested that the proposed Lalobata protected area on Halmahera may contain as many as 56,600–105,900 individuals (MacKinnon *et al.* 1995) and BirdLife International-Indonesia Programme (*in litt.* 1997).



Chattering lory
Lorius garrulus

reports similar figures. Four to six birds were seen on each of six days in the Danau Mantis catchment in west Obi (Linsley 1995).

Threats: This is a very popular cagebird throughout Indonesia and is one of the target species for bird trappers (it was not recorded in easily accessible areas: MacKinnon *et al.* 1995, BirdLife-IP *in litt.* 1997) and it is believed that the levels of legal and illegal trade in this species at that time (a minimum of 9,600–9,927 are estimated to have been captured in 1991) were not sustainable, particularly when combined with current levels of habitat loss and degradation (Lambert 1993a, BirdLife-IP *in litt.* 1997). However, PHPA has revised its (legal) quota to the level recommended by Lambert (1993a) (Collar *et al.* 1994). There were 19,060 wild caught specimens recorded in international trade between 1991 and 1995, with an annual maximum of 7,725 individuals in 1992 followed by 6,305 individuals in 1991 and 4,331 individuals in 1993 (CITES Annual Report database). Following the CITES Significant Trade Review, the Animals Committee made recommendations to Indonesia to suspend exports pending establishment of a population monitoring programme. In 1997 and 1998, Indonesia established export quotas of 450 birds each year for this species (CITES Notification to the Parties No. 994 and No. 1998/07).

Action: Approaches to reduce the exploitation of wild chattering lorries should be found. A clear priority is improved law enforcement, with all responsibility for quotas being centralised at the Department of Forestry in Ambon (Lambert 1993c). Additional approaches might include provision of incentives for not overexploiting parrot populations. This might be achieved through the introduction of parrot concessions in which particular areas would be allocated for parrot collection each year. Such an approach should allow better monitoring and would clearly involve considerable public awareness input if it were to succeed (Lambert 1993c).

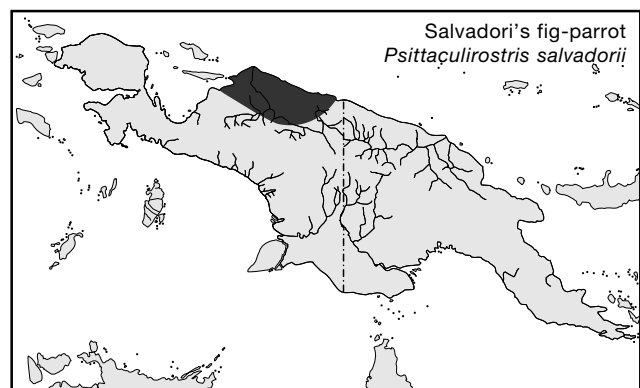
Salvadori's fig-parrot *Psittaculirostris salvadorii*

Conservation status: IUCN: Vulnerable (A2c,d).

CITES: Appendix II.

National protection status: Information unavailable.

Distribution and status: This species occurs in northern Irian Jaya, Indonesia, from the Cyclops Mountains to the eastern shore of Geelvink Bay, where it inhabits evergreen forest from the lowlands to 400m (Rand and Gilliard 1967, Beehler *et al.* 1986). It is locally common (Diamond 1985, Collar *et al.* 1994), for example in the flat lowlands west of Jayapura (Collar *et al.* 1994).



Threats: Large numbers have been trapped for the cage bird trade (Collar *et al.* 1994). It is also likely to decline locally owing to extensive logging and land clearance for the increasing human population (the result of transmigration policy) (Collar *et al.* 1994), although much of its range is remote and inaccessible (Collar *et al.* 1994). There were 1,288 wild caught specimens in international trade between 1991 and 1995, only 23 of which were traded in the last two years (1994 and 1995: CITES Annual Report database). Following the CITES Significant Trade Review in 1993, the CITES Animals Committee recommended that Indonesia inform the CITES Secretariat of the biological basis for allowing exports. In 1998 Indonesia established an annual export quota of 190 birds for this species (CITES Notification to the Parties No. 1998/07).

Action: Information is urgently required on distribution (including habitat use), status, and threats to the species.

Iris lorikeet ***Psitteuteles iris***

Contributors: Frank Lambert and Richard Noske.

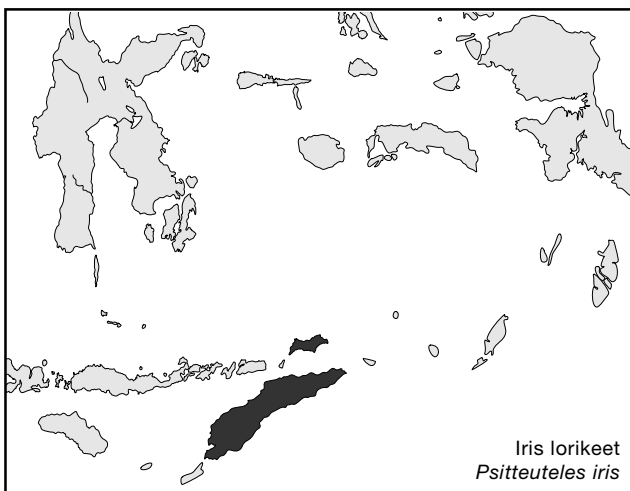
Conservation status: IUCN: Vulnerable (C1; C2a).

CITES: Appendix II.

National protection status: Information unavailable.

Distribution and status: This species is endemic to Timor and Wetar, Indonesia, in monsoon and evergreen forest from the lowlands to 1,500m (White and Bruce 1986), but more recently it has been recorded as high as 1,800m (R. Noske *in litt.* 1997).

Collar *et al.* (1994) considered it scarce as it was seen at only two localities during a nine-week survey of west Timor's remnant lowland forest in 1993 (Noske and Saleh 1993), but the species may occur at higher altitudes (R. Noske *in litt.* 1997). Many were seen with olive-headed lorikeets *Trichoglossus euteles* in June 1993 at 840m near Kefamenanu in remnant evergreen and secondary forest.



During December 1995 many small flocks were noted in lower montane *Eucalyptus urophylla* forest at 1,300m near Lelobatan (R. Noske *in litt.* 1997). Several observers have recorded it on Gunung Mutis (at 1,800m or higher) in recent years. F. Verbelen (*per* R. Noske *in litt.* 1997) found them with olive-headed lorikeets at Bipolo (30m altitude) and Camplong (200m) in September–October 1995, but they were not recorded at these sites in September 1996 when hundreds of olive-headed lorikeets were found feeding on nectar of *Syzigium* flowers (R. Noske *in litt.* 1997). These observations suggest that these birds are very mobile, as is typical for nectarivores. During a two-week visit in November 1997, only two were seen at Bipolo whilst huge numbers of olive-headed lorikeets were recorded in lower montane forest around Gunung Mutis (R. Noske 1998). Although trapped, it is not considered uncommon in west Timor (Noske 1995). It was not recorded on a short visit to Wetar in 1990 (F. Lambert *in litt.* 1997), but extensive forest remains there (see RePProT 1990). It is, however, quite unobtrusive and so may have escaped detection in the few areas visited (F. Lambert *in litt.* 1997). Also, familiarity with the calls is required to distinguish them from those of the olive-headed lorikeet (R. Noske *in litt.* 1997) as confusion is possible if birds are flying overhead. However, separation is easy if birds are feeding (R. Noske *in litt.* 1998).

Threats: Loss and fragmentation of the forests at lower altitudes are two of the threats to this species. It is also trapped; 510 wild caught specimens were recorded in international trade between 1991 and 1995, 470 of which were in caught 1991 and 1992 (CITES Annual Report database). Following the CITES Significant Trade review, in 1993, the Animals Committee made recommendations to Indonesia to suspend exports pending establishment of a population monitoring programme.

Action: A systematic assessment of the species' status is now required to build upon the information obtained. This should seek to determine what the species' distribution is, and thus whether it is localised on the island, or whether its apparent scarcity is a result of natural movement patterns. The impact of habitat alteration at lower altitudes should be determined.

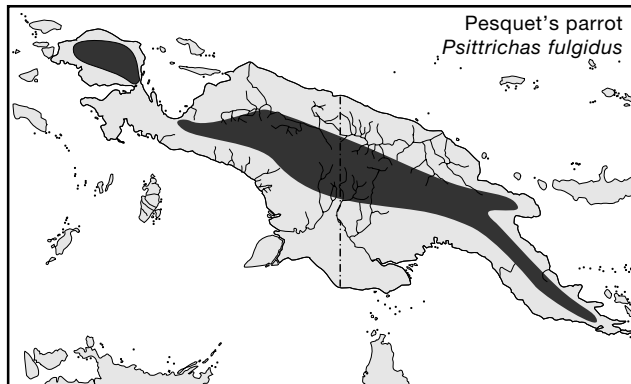
Pesquet's parrot ***Psittrichas fulgidus***

Conservation status: IUCN: Vulnerable (A1c; A2c,d).

CITES: Appendix II.

National protection status: Information unavailable.

Distribution and status: Pesquet's parrot inhabits primary and secondary forest, mostly at 600–1,200m in New Guinea



(Irian Jaya, Indonesia, and Papua New Guinea), needing to forage widely for fruits. It is patchily distributed and absent from many areas. It was occasionally seen flying over the Fly River and also along the Magazine Road north of the town in Kiunga area, Western Province (Gregory 1997).

Threats: Its absence from many areas is due to hunting for feathers and food. This is especially true in Papua New Guinea (Coates 1985, Beehler *et al.* 1986, Collar *et al.* 1994), where skins are in high demand, being used as a “bride” price in the highlands (Schmid 1993) and being even more valuable than those of birds-of-paradise (Collar *et al.* 1994). The species is threatened to a lesser degree by trapping for the bird trade (Collar *et al.* 1994). There was

one wild caught specimen recorded in international trade between 1991 and 1995, in 1991 (CITES Annual Report database).

Action: Information is urgently required on distribution (including habitat use), status, and threats to the species.

Black-lored parrot *Tanygnathus gramineus*

Contributor: BirdLife International-Indonesia Programme.

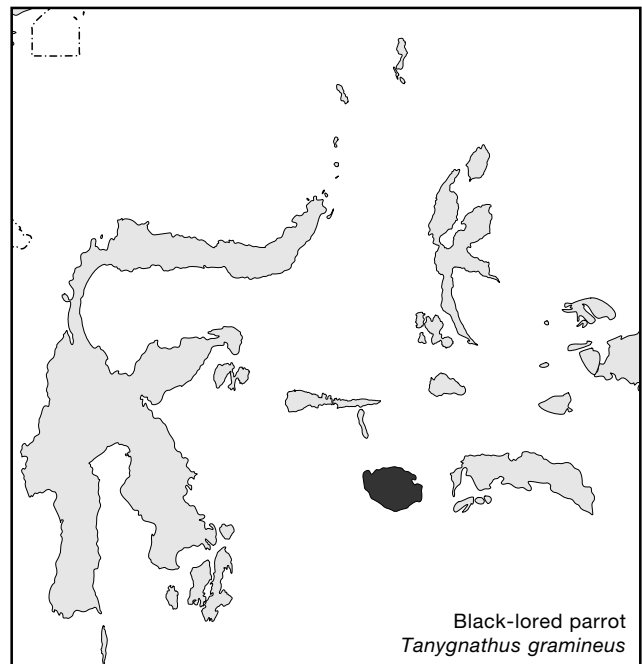
Conservation status: IUCN: Vulnerable (D2).

CITES: Appendix II.

National protection status: Information unavailable.

Distribution and status: This species is endemic to Buru in the Moluccas, Indonesia, where it is known from forest above about 600m but has rarely (four times) been collected, being at least partly nocturnal (Forshaw 1989).

It is not uncommonly heard in montane forest at night, although there is only one recent record, of two birds perched in treetops in daytime in 1980 (Smiet 1985, White and Bruce 1986). It was not found during a one-month survey in 1989, perhaps because suitable habitat was not visited at night (Jepson 1993), so its current status remains unknown. Large parrots perched in the canopy of tall *Agathis* trees or flying downhill above the forest just after dusk were commonly heard at 1,100–1,500m in the Kelapat Mada Mountains, western Buru, during 1995; voice and altitude suggesting that they belong to this species (BirdLife-IP *in litt.* 1997).



Threats: Montane forests on Buru are likely to be relatively secure (Collar *et al* 1994).

Action: Information is urgently required on distribution (including habitat use), status, and threats to the species. (See Box 10)

Species removed from the Red List

Blue-naped parrot *Tanygnathus lucionensis*

The species account for the blue-naped parrot, Indonesia, is the same as that for the Philippines. Please refer to page 88.

THE PHILIPPINES

Overview

James Lowen (with boxed contributions by Des Allen, Tom Brooks, Guy Dutson, and Frank Lambert)

The psittacine fauna of the Philippines is characterised by endemism and endangerment. Of the 13 species that have occurred in a wild state, all but three (all *Tanygnathus* parrots) are endemic to the country, four are globally threatened and four near-threatened. Almost all threatened species were abundant and widespread at the turn of the century, but subsequently have undergone a catastrophic reduction in population and range. Although no species have become extinct, there is a very strong possibility that perhaps two (specifically the Philippine cockatoo *Cacatua haematuropygia* [see Box 14] and perhaps the blue-winged racquet-tail *Prioniturus verticalis*) will soon do so, unless measures to conserve them are rapidly implemented. Table 4 provides a list of threatened parrot species in the Philippines.

The preparation of conservation strategies, or even recovery plans, for Philippines endemic parrots, is problematic given the poor knowledge of their distribution, status, and ecological requirements. Further surveys are indicated in this plan (see also Collar *et al.* 1998). Yet, there remains the real possibility that one or more of these target species, figureheads for Filipino conservation, may no longer be a part of the Philippines' biological heritage by the time such surveys take place.

Threats

Parrots in the Philippines are threatened solely by human activity, both direct (extraction of wild birds for trade and food) and indirect (habitat destruction). The relative severity

varies between species and islands, but the one exacerbates the other, forming a potent combination.

The ensuing drop in numbers and range has been dramatic. The blue-winged racquet-tail was found to be "exceedingly common" on Sulu Island in 1883 (see Collar *et al.* 1998), but the species could not even be located on Tawi Tawi and the Tandubas Island group in 1995 (see Collar *et al.* 1998). On Palawan, anecdotal evidence suggests that the Philippine cockatoo has declined by up to 90% since 1980 (Lambert 1994b).

Almost all Philippine endemic psittacids are (at least partially) dependent on forests, the dominant (and natural) vegetation in the archipelago until recent decades. More than 80% of the natural vegetation has been removed (Forest Management Bureau 1988), and just 8% primary forest remains (Danielsen *et al.* 1994) see Box 15. The situation is particularly severe on the smaller islands, such as Cebu, Negros, and Mindoro (Evans *et al.* 1993). Commercial logging, whether under licence or illegal, and subsistence shift-and-burn agriculture (locally known as "kaingin"), play equally severe roles.

Logging

The destruction of lowland forest, the first vegetation to be decimated by human colonisation, has caused the green racquet-tail *Prioniturus luconensis* to become locally extinct in parts of Luzon (Poulsen 1995). The removal of low elevation forests in the Sulu Islands leaves just a few hundred Philippine cockatoos there (Lambert 1994b, Collar *et al.* 1998). On Palawan, logging activities target the same tree size and species in which the hole-nesting cockatoo and the blue-naped parrot *Tanygnathus lucionensis* breed (Lambert 1994b), and the incessant clearance of mangroves on Palawan and other islands for fishpond construction presents a further threat to the former (Quinnell and Balmford 1988, Collar *et al.* 1998). Montane forest is not exempt from logging activities, with forest generally only left on inaccessible mountain tops and steep slopes. On Mt. Kitanglad, Mindanao, the Mindanao racquet-tail *Prioniturus waterstradti* and the Mindanao lorikeet *Trichoglossus johnstoniae* suffer from large tracts of forest being cleared by immigrants to plant crops such as potato and cabbage that do not thrive in lowlands (Collar *et al.* 1998: see Box 16).

Trapping and hunting

Trapping pressure is substantial, afflicting all psittacids to various degrees. Trade, both internal and international, has a crucial deleterious effect on species with already low and ever-declining populations. The green racquet-tail no longer occurs close to population centres in Luzon's Sierra

Madre mountains (Poulsen 1995). Particularly susceptible are the Philippine cockatoo and the blue-naped parrot: the latter forms 55% of all birds traded in Palawan, and a basketful of nestlings was being sold for Philippine Pesos (PhP) 200 each in Cubao Farmers Market in December 1995 (Collar *et al.* 1998).

On Palawan, cockatoo chicks are taken from virtually every known and accessible nest, with Palawan tribesmen purposely leaving *Koompasia excelsia* nest-trees in otherwise cleared land in order to harvest nestlings (and, increasingly, adults) on an annual basis (Boussekey 1993, Lambert 1994b). The cockatoo can be sold for up to 10 times the price of other hole-nesting birds such as the blue-naped parrot and the hill myna *Gracula religiosa*. In 1991, the Manila street price reached US\$640 (Lambert 1994b).

Parrots are also exploited directly for other ends, being hunted for food (e.g., Philippine cockatoo: Lambert 1994b), persecuted for their depredation of maize and rice fields just prior to ripening (e.g., again, the cockatoo: see Collar *et al.* 1998), and used for target practice by sportsmen and the military (e.g., the unfortunately tame blue-winged racquet-tail: Lambert 1993b).

Mining and disease

Other potential threats include the explorations of mining companies, as may already be affecting the Mindanao lorikeet and the Mindanao racquet-tail on Mt. Matutum, Mindanao (Collar *et al.* 1998); and viscerotropic velogenic Newcastle disease which could spread into wild populations of the Philippine cockatoo and the blue-headed racquet-tail *Prioniturus platenae* by the release of infected captive birds (Lambert 1994b).

Conservation solutions

Action to conserve the Philippines' threatened parrot fauna has taken several forms; all, however, need to be strengthened if the extinction of one or more species is not to result.

Protected areas

Since December 1993, 200 sites covering nine percent of the country's land area have been incorporated into the National Integrated Protected Areas System (NIPAS). The ten sites selected for priority action include the Northern Sierra Madre, Luzon (important for the Luzon racquet-tail *Prioniturus montanus* and the green racquet-tail), Mt. Kitanglad, and Mt. Apo (significant sites on Mindanao for the Mindanao lorikeet and the Mindanao racquet-tail). The subsequent National Integrated

Protected Areas Programme aims to afford *de facto* protection to Mt. Pulog National Park, Luzon (where the green racquet-tail occurs).

All but one threatened psittacid species occur in one or more protected area; immediate intervention is required in the Sulus to conserve remaining forests, and thus the blue-winged racquet-tail (see Box 17). Several protected areas should be extended or otherwise modified, to conserve, for example, montane forest in Palanan Wilderness Area, Luzon, for the Luzon racquet-tail and the Babuyan valley, adjacent to St Paul's National Park, Palawan, for the Philippine cockatoo.

Trade

Measures to combat trade have been of uncertain success. The Philippine cockatoo has been included on Appendix I of CITES since 1992. Palawan has been decreed a "game reserve" in which it is illegal to capture wild animals. However, the continuing illegal trade is likely to decline only with the introduction of locally-based, economically viable alternatives that lessen threats to birds and their habitats. These could include financial rewards to those who report and protect nest holes of the blue-naped parrot and the cockatoo. More drastic measures, such as Department of Natural Resources (DENR)-manned controls at major transport terminals, may be required to enforce CITES legislation for the cockatoo (Lambert 1994b, Collar *et al.* 1998).

Education

Awareness campaigns are an urgent requirement of any parrot conservation strategy. Such initiatives for the cockatoo have met with considerable success on Palawan and Mindanao (Tabaranza 1992, Low 1996). An expansion of these projects, managed by an internationally funded Philippine cockatoo Campaign Officer, and incorporating components of the successful *Amazona* parrot projects in the Caribbean (see Butler 1992), has been recommended (Lambert 1994b, Collar *et al.* 1998).

Captive breeding

Experiments with captive breeding are in their infancy, and the cockatoo forms the main subject (Boussekey 1995, Low 1996). There have been few successful breeding attempts and, although an internationally co-ordinated programme could complement *in-situ* conservation initiatives, there is no guarantee that captive-bred birds would survive once released into the wild (Lambert 1994b, Collar *et al.* 1998).

Priority projects in the Philippines

- Conservation of the Philippine cockatoo throughout the Philippines. (Box 14)
- Assessing extinction risk of Philippine parrot populations following deforestation. (Box 15)
- Provision of a management plan for the parrots of Mt. Kitanglad Range National Park and environs in Mindanao, Philippines. (Box 16)
- Assessment of the conservation needs of the parrot fauna in the Sulu Archipelago, Philippines. (Box 17)

Box 14. Conservation of the Philippine cockatoo throughout the Philippines.

Based on Lambert (1994b)

Aim: To implement actions that are urgently required to save the Philippine cockatoo *Cacatua haematuropygia* from extinction.

Justification: The Philippine cockatoo is a Critically Endangered species that is endemic to the Philippines. It is one of the most threatened parrots in the world and has already disappeared from many islands throughout its former range (Lambert 1994b). The species account in this Action Plan indicates the scarcity of recent records. Palawan Province is probably the stronghold for this species with an important population on Tawi Tawi.

Whilst further information is necessary to build a long-term conservation plan for the cockatoo, there is the risk that the species may disappear whilst such biological information is being collected. This is because the populations are so small and fragmented and are continuing to be depleted by trapping. Although habitat destruction in the past has contributed substantially to the species' decline, the current level of exploitation for the pet trade is also now threatening the species' survival in the immediate future.

Project description: Action on behalf of this species falls into three areas. First, is the clear need to raise awareness of the species' plight and the fact it is endemic to the Philippines. A poster campaign highlighting endemic species has been initiated through Fauna and Flora International and includes the cockatoo. This should be expanded and followed up using the expertise available in organisations such as the Haribon Foundation in Manila.

The second area where action is urgently needed is the protection of known breeding sites. These sites hold the key to the species' future as they are often in commercially valuable emergent dipterocarps (resinous hardwoods typically found in Southeast Asia) (Lambert 1994b), and they are also the sites where birds can be caught for the pet trade. In some cases, nesting trees are left uncut so that chicks can be regularly harvested. Although parents are now also being taken (Lambert 1994b), the direct result of this chick harvesting can be seen in the increasing proportion of aged individuals in cockatoo populations. Protecting these sites, either through law enforcement or by some sort of subsidy is crucial to the survival of the species. The latter would also contribute to the protection of other hole-nesting species that are caught for trade, such as other parrots, including the blue-naped parrot *Tanygnathus lucionensis*, the endemic Palawan hornbill *Anthracoceros marchei*, and the hill myna *Gracula religiosa*. A proposed extension to St Paul's Subterranean River National Park on Palawan should be implemented urgently, as trade does not currently threaten this population of some 200 birds.

The third area of action involves addressing legislation designed to protect the cockatoo. This includes the listing on Appendix I of CITES in 1992 and, in light of this, the drafting of new laws that will ban the export of the species unless individuals are on the DENR inventory of birds held before the CITES listing. The cockatoo is also protected by the designation of Palawan as a "Game Reserve", under Presidential Proclamation 219, in which it is illegal to catch any wild animals. This legislation should be implemented through establishment of DENR check-points at all major ports of entry to the key islands.

Contacts: Tom Brooks, Guy Dutson, Frank Lambert.

Box 15. Assessing extinction risk of Philippine parrot populations following deforestation.

Aim: To assess the tolerance of Philippine endemic parrots to deforestation, and to assess the rate at which parrot populations are becoming extinct.

Justification: Only 24% of the Philippines' rainforest remains, and clearance continues (Brooks *et al.* 1997). Since deforestation inevitably opens forests up to allow access to trappers and hunters (e.g., Diamond 1984) all of the endemic Philippine parrots are probably subject to some human pressure. Many Philippine parrots are also thought to make seasonal movements (Dickinson *et al.* 1991) which may indicate that more than a single block of suitable habitat is required to meet all of their needs.

Project description: Forest cover data available from the World Conservation Monitoring Centre in Cambridge, UK (on CD-ROM: Iremonger 1997) and the National Mapping Resource Information Agency, Manila, Philippines, should be obtained. With this information, brief visits by skilled ornithologists should be paid to as many of the surviving forest tracts as possible, with the aim of locating parrot populations. Intensive sites should be identified where repeat visits can be concentrated to investigate within and between year movements. Surveys should concentrate on observation of parrots from vantage points (e.g., hill-tops) supplemented by aural surveys and location of key feeding and roosting trees. All surveys should also include interviews with residents to provide local reports and an indication of the extent of the parrot-trade on a local scale.

This project should be designed to complement other initiatives, such as the proposed Sulu Archipelago project (see Box 17), and should build upon the results of recent forest surveys on Luzon, Mindoro, Panay, Negros, Cebu, Siquijor, Bohol, Tawi Tawi, and parts of Mindanao and Palawan. This will allow the most efficient use of resources so that areas not recently surveyed may be covered, including forests on Samar and Leyte, Jolo, Basilan, and much of Mindanao and Palawan. This combination of extensive surveys and intensive work at selected sites will provide an indication of the rate at which parrot populations are lost as deforestation progresses throughout the Philippines.

Contact: T. Brooks.

Box 16. Provision of a management plan for the parrots of Mt. Kitanglad Range National Park and environs in Mindanao, Philippines.

Philip McGowan

Aim: To survey the parrots of the Mt. Kitanglad area, assess their status and whether their conservation needs are being met. A management plan for the protected area and surrounds should follow.

Justification: Two Lower Risk parrot species, the Mindanao lorikeet *Trichoglossus johnstoniae* and the Mindanao racquet-tail *Prioniturus waterstradti* are known from the recently gazetted Mt. Kitanglad Range National Park. Current information on these species is patchy and leads to varying assessments of threat, the most pessimistic of which is that the species are at risk. Coming into existence in 1990, the park covers over 10km² (IUCN 1994) in the north-east of the island. Most of Mindanao's montane endemics have been recorded from this mountain range and, as such, it is probably one of the most important areas for endemic birds on Mindanao (Lambert 1993a).

Both parrot species inhabit forest above 1,000m (Dickinson *et al.* 1991) and are suffering from forest destruction in the lower altitudes of their range (Collar *et al.* 1994). On the southern slope of Mt. Kitanglad, especially in the Lantapan and Basak areas, and in the neighbouring Pangantukan Mountains, "gardening technology" is considered a very serious threat (Collar *et al.* 1998). Brought by migrant Igarots from Luzon, this results in large tracts of montane forest being cleared and replaced with crops that do not grow well in the lowlands. What is needed now is an assessment of how well this protected area is serving the conservation of these threatened parrots, and other montane endemics, and recommendations for its future management. In addition, other sites where these species are known to occur should be surveyed so that additional sites for their conservation can be targeted.

Project description: Any management plan will rely on the findings of both extensive surveys and intensive research. For surveys, suitable blocks of forest should be identified from existing vegetation maps. While some sites can be identified from Kennedy *et al.* (1997), the World Conservation Monitoring Centre (WCMC) should also be contacted. Each site thus identified would then be visited and searched for the two parrots (as well as other montane endemics). The state of the forest should be evaluated and pressures on the parrots determined.

Detailed ecological work will probably be centred on Mt. Kitanglad and will attempt to determine habitat use for various activities, abundance of nesting sites and breeding success. Based on the results obtained and the numbers of birds on other habitat patches (from the survey), predictions can be made about the survival of various populations. The most urgent needs can be addressed through a management plan.

Contacts: Tom Brooks and Frank Lambert.

Box 17. Assessment of the conservation needs of the parrot fauna in the Sulu Archipelago, Philippines.

Des Allen, Tom Brooks, and Guy Dutson

Aim: To provide the biological information necessary for the survival of the Philippine cockatoo, blue-winged racquet-tail, and blue-naped parrot in the Sulu Archipelago through the identification of key sites and the assessment of their management needs.

Justification: Habitat destruction and trapping for the cagebird trade are problems facing parrots throughout the Philippines. As forest loss continues and lowland forest birds become confined to increasingly isolated and ever smaller areas of suitable habitat, the impact of trapping almost certainly increases on dwindling populations. The Philippine cockatoo *Cacatua haematuropygia* is one of the most threatened parrots in the world (Collar *et al.* 1994). The blue-winged racquet-tail *Prioniturus verticalis* is endemic to the Sulu Archipelago (Dickinson *et al.* 1991), where it is threatened by habitat destruction. The need for an assessment of the status of these parrots should act as a catalyst for a systematic avifauna survey of Tawi Tawi and adjacent islands and which should identify which areas could be protected. The Sulu Archipelago has no protected areas. See Allen (1998).

Project description: A comprehensive effort to conserve these species in the Sulu Archipelago requires both extensive surveys and intensive study, and attempts to minimise the effects of direct human exploitation (trapping, shooting, and habitat loss). Such a project should also focus on the distinctive subspecies of the Philippine hanging-parrot *Loriculus philippensis bonepartei*.

i). Further surveys. The key problem with understanding the distribution and abundance of these parrots and other bird species throughout the Sulu Archipelago is the difficulty in travelling safely around Tawi Tawi and to other islands (Dutson *et al.* 1996). What little area of Tawi Tawi that has been visited (the southern part of Tawi Tawi and Bongao) is known to hold these species, but possibly in small numbers. However, the prevalence of cockatoos in captivity on the island, and the difficulty of identifying the racquet-tail from calls alone in many areas, together with the extent of mangrove forest on the island suggest that these species might be widespread in areas not yet visited. Consequently, surveys should target areas known to hold suitable habitat, which possibly include mangroves adjacent to lowland forest.

Of the other islands, Tumindao, Manuk Manka, and Jolo may offer the best prospects for additional sites for the species; unlike on Bongao, forest is thought to still remain here. However, contrasting reports suggest that Tumindao and Manuk Manka have few trees left. Forest cover maps, if available (e.g., from the WCMC), should be consulted so that logistically difficult surveys stand the best chance of locating these parrots. The easiest way of finding cockatoos is by checking maize fields in the harvest season, which they can devastate. Information on feeding, roosting, and nesting sites, as well as the level of exploitation for the cagebird trade, should be sought at each locality.

ii). Intensive studies. All nine racquet-tails are very poorly known and a study of the ecology (especially habitat use, feeding requirements, breeding biology, and movements) of the blue-winged racquet-tail would serve as the basis for a conservation plan for the species. Once a key site or sites have been found, intensive population surveys should be instigated urgently. These would attempt to determine numbers of parrots in each forest type present, bearing in mind that different forest blocks might be used for different activities. Subsequently, intensive study on roost and nest tree use, and of food requirements could be used in conjunction with the results of the survey to make a preliminary appraisal about the availability of these key resources throughout the islands and be used as the basis for proposing protected areas.

iii). Roost and nest sites should be protected from trappers, and it should be ensured that the impending development of the island does not destroy remaining forest. In the long-term, survival of these species and their habitat will be dependent upon raising public awareness and promotion of development that does not lead to habitat loss; for example, stimulation of the agar-agar industry. Consequently, there is a need for a strategy that incorporates conservation of habitats into development so that the global importance of this area can be reconciled with the real problems facing the human population. Improving protection and public awareness for the Philippine cockatoo is so clearly needed, and such a high priority, that a separate project is devoted to this issue (see Box 14).

Contacts: Des Allen, Tom Brooks, Guy Dutson, Frank Lambert.

Species accounts

Table 4. A list of Philippine parrot species that are considered threatened using IUCN Red List criteria.

Also included are four species removed from the Red List. Species are listed in alphabetical order by their scientific name, together with the islands on which they occur, and their threat status. The criteria under which each species qualifies are given in the appropriate species account. *Denotes changes from *Birds to Watch 2* (and, therefore, the 1996 IUCN Red List of Threatened Animals), which arise from BirdLife International and the Haribon Foundation's work on *Threatened birds of the Philippines* (Collar *et al.* 1998). BirdLife International maintains the IUCN list of threatened birds.

English name	Scientific name	Distribution	Threat category
Philippine cockatoo	<i>Cacatua haematuropygia</i>	Now possibly as few as 10 islands in the Philippines	Critically Endangered
Green racquet-tail*	<i>Prioniturus luconensis</i>	Luzon and Marinduque, Philippines	Vulnerable
Blue-headed racquet-tail	<i>Prioniturus platenae</i>	Palawan Province, Philippines	Vulnerable
Blue-winged racquet-tail	<i>Prioniturus verticalis</i>	Sulu archipelago, Philippines	Endangered
Red List removals			
Luzon racquet-tail*	<i>Prioniturus montanus</i>	Luzon, Philippines	Lower Risk, nt
Mindanao racquet-tail*	<i>Prioniturus waterstradti</i>	Mindanao, Philippines	Lower Risk, nt
Blue-naped parrot*	<i>Tanygnathus lucionensis</i>	Philippines, Talaud islands in Indonesia, and islands off Sabah, Malaysia	Lower Risk, nt
Mindanao lorikeet*	<i>Trichoglossus johnstoniae</i>	Mindanao, Philippines	Lower Risk, nt

Philippine cockatoo *Cacatua haematuropygia*

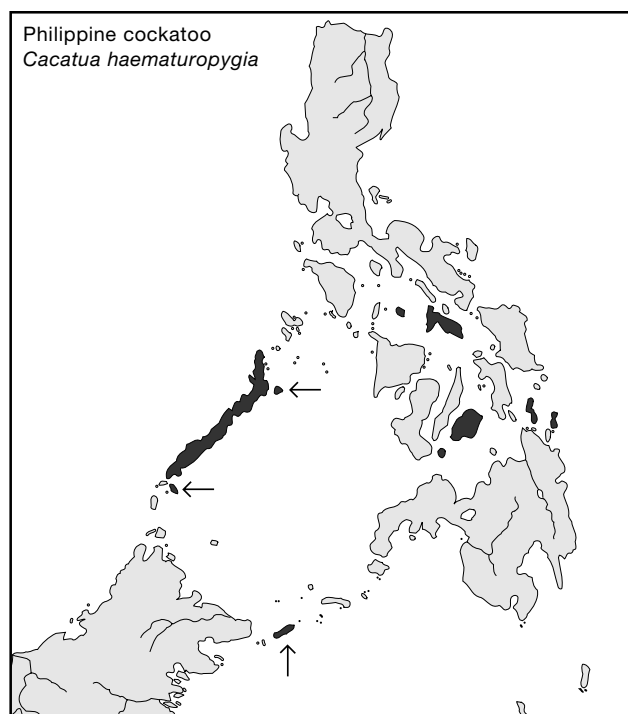
Contributors: Des Allen, Tom Brooks, Guy Dutson and Frank Lambert.

Conservation status: IUCN: Critically Endangered (A1c,d; C1; C2a).

CITES: Appendix I.

National protection status: Information unavailable.

Distribution and status: The Philippine cockatoo formerly occurred on all major and many minor islands (comprising



a total number of 45 areas) of the Philippines, but recent visits to roughly half of these have shown that very reduced and often possibly unviable numbers remain on as few as ten islands, chief among them being Palawan and its satellites, and Tawi Tawi (see below).

A six-week survey in August–September 1991 yielded a population estimate for Palawan of 800–3,000 birds, of which Pandanas, Bugsuk and Bancalan probably support 100–300 individuals and Dumarán 150–250 individuals, with Tawi Tawi possibly holding several hundred more

(Lambert 1993b, 1994b). A single pair survived on Siquijor in 1991 (Evans *et al.* 1993), a few remained at Mount Isarog, Luzon, in 1988 (Goodman and Gonzales 1990), and a few pairs reputedly hang on in Mindoro, chiefly at Malpalon (Dutson *et al.* 1992). Birds were observed on Masbate in 1993 (Curio 1994), and the species has been recorded a few times in singles or small numbers in Rajah Sikatuna National Park, Bohol since 1989 (Brooks *et al.* 1995b). Two pairs (G. Dutson *in litt.* 1997) were seen on Tawi Tawi in 1994 and it was considered widespread on Tawi Tawi in 1995/1996, although more often seen in captivity than in the wild (two singles in Batu-Batu and a single and a pair in Buan: D. Allen *in litt.* 1997). Three birds were noted on Simunul in 1996 (D. Allen *in litt.* 1997: see also Dutson *et al.* 1996), while a number of smaller islands, and those such as Samar and Leyte that have not been visited in recent years, may yet prove (or have been reported) to hold birds. So, the total population may lie between 1,000 and 4,000 birds (Lambert 1992, Tabaranza 1992). It is considered extinct on Cebu (Brooks *et al.* 1995a) and Negros (Brooks *et al.* 1992).

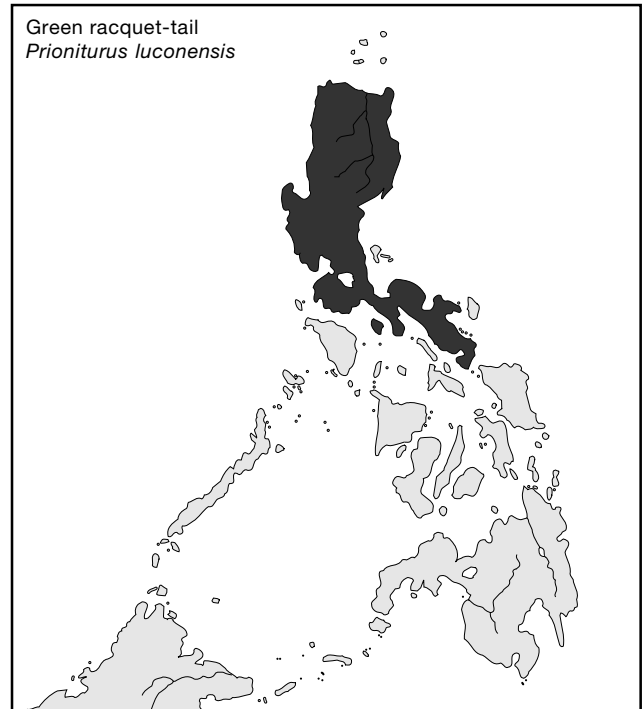
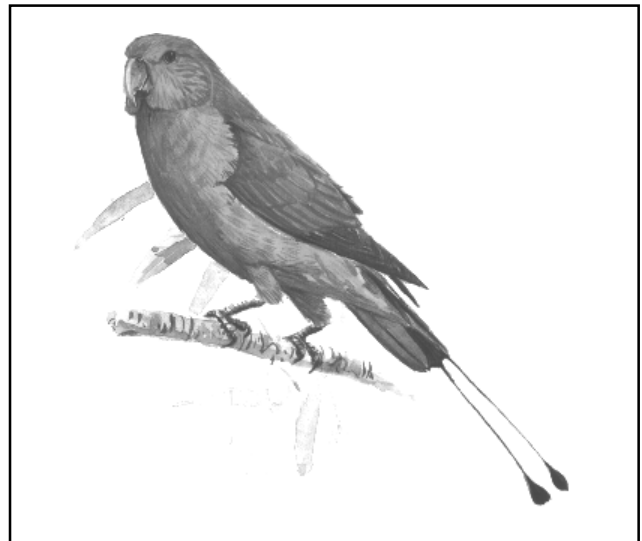
Threats: Intensive trapping (“the young of every known accessible nest are taken for the pet trade”: Dickinson *et al.* 1991, Lambert 1992) combined with destruction of its lowland forest habitat (amongst which mangrove may be critically important) suggests that this species may soon become extinct. Agriculture on Tawi Tawi has changed to agar-agar cultivation from maize (D. Allen *in litt.* 1997) and the possible beneficial impact of this should be investigated; the shift in emphasis away from forested areas to coastal ones may reduce habitat loss. Following the CITES Significant Trade Review in 1992, the Animals Committee made recommendations to the Philippines to suspend exports pending population surveys. Subsequently, the species was included in CITES Appendix I in 1992 and the Philippines prohibited the export of all terrestrial wildlife in 1997 (CITES Notification to the Parties No 980, 1997).

Action: Reducing the numbers of birds taken for the pet trade is the single most important action required. Achieving this is likely to require a combination of law enforcement and raising awareness. The cockatoo is already protected by the designation of Palawan as a “Game Reserve”, in which it is illegal to catch any wild animals. This legislation should be implemented, through establishment of DENR checkpoints at all major ports of entry to the key islands. It was listed in Appendix I of CITES in 1992 and new laws will ban the export of the species unless individuals are on the DENR inventory of birds held before the CITES listing. The proposed extension of St Paul’s Subterranean River National Park should be implemented as a matter of urgency as it contains the only population not immediately threatened by trapping (see Box 14, and also Box 17).

A poster campaign highlighting endemic species has been initiated through Fauna and Flora International and includes the cockatoo. Promoting sustainability amongst those collectors who take every nestling for the trade is imperative. Further work designed to protect nest sites is crucial to the survival of the species and is likely to require creative solutions, such as provision of a subsidy to local collectors.

Green racquet-tail *Prioniturus luconensis*

Contributor: Frank Lambert.



Conservation status: IUCN: Vulnerable (A1c,d; A2c,d; C2a). Formerly Endangered (A1b,c; A2b,c; C1; C2a: see Collar *et al.* 1994).
CITES: Appendix II.
National protection status: Information unavailable.

Full justification of revision to IUCN threat category is given in Collar *et al.* (1998).

Distribution and status: This species inhabits forest edge and cultivated areas of the lowlands and foothills of Luzon and Marinduque in the Philippines (Dickinson *et al.* 1991).

Although there is no news of its status on Marinduque (though it must be in very low numbers), evidence from Luzon since 1988 suggests that (other than in Subic Bay Naval Forest Reserve: Collar *et al.* 1994) it is now very rare throughout, with all records in the Sierra Madre originating from 300–700m, and none near habitation (Collar *et al.* 1994, Danielson *et al.* 1994, Poulsen 1995). Recorded from Subic Bay Forest Reserve and Quezon National Park, where it is now very rare (F. Lambert *in litt.* 1997). It has been found recently in Aurora Province in small numbers (F. Lambert *in litt.* 1997).

Threats: Habitat loss and trapping for the cagebird trade threaten this species (Collar *et al.* 1994). The export of wild taken specimens of all flora and fauna from the Philippines is prohibited (CITES Notification to the Parties No 980, 1997).

Action: Information is urgently required on distribution (including habitat use), status, and threats to the species. A study of the species' year-round ecological requirements may elucidate limiting factors and, if undertaken at the Subic Bay Naval Forest Reserve, could guide management of what appears to be the only known large population (see Collar *et al.* 1998).

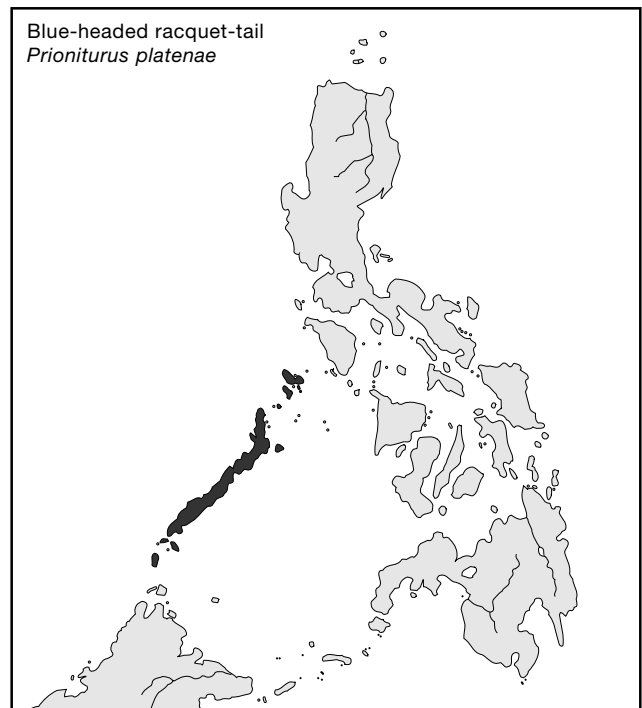
Blue-headed racquet-tail ***Prioniturus platenae***

Contributor: Frank Lambert.

Conservation status: IUCN: Vulnerable (C1; C2a).
CITES: Appendix II.
National protection status: Information unavailable.

Distribution and status: This species inhabits lowland forest and adjacent cultivation in the Calamian Islands, Palawan, and Balabac in the Philippines (Dickinson *et al.* 1991).

The blue-headed racquet-tail is uncommon and declining (Collar *et al.* 1994). It has been recorded from Iwahig Penal Colony in 1990 (Collar *et al.* 1998) and is



uncommon but regularly recorded in St Paul Subterranean National Park (Collar *et al.* 1994). It was regularly observed in forests, including secondary forests in Palawan during 1991 (F. Lambert *in litt.* 1997).

Threats: Rapid and extensive clearance of its habitat are among the threats to this species (Collar *et al.* 1994). The export of wild taken specimens of all flora and fauna from the Philippines is prohibited (CITES Notification to the Parties No 980, 1997).

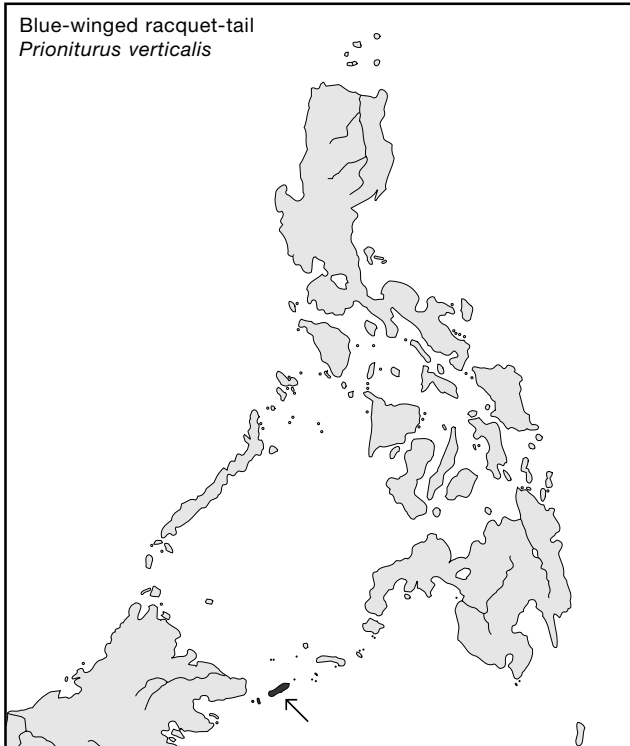
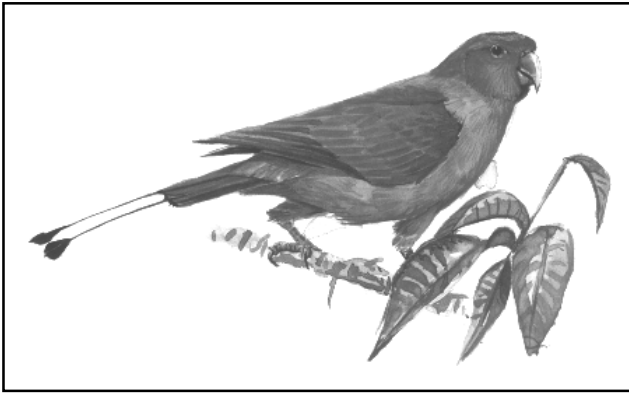
Action: Roosts and nest sites should be protected from trappers and a public awareness campaign should highlight the scarcity of this Palawan Province endemic. A survey of all remaining forest areas on the islands to determine the distribution of the species and assessment of its ecological needs are also required (see Box 15).

Blue-winged racquet-tail ***Prioniturus verticalis***

Contributors: Des Allen, Tom Brooks, and Guy Dutson.

Conservation status: IUCN: Endangered (A2c,d, B1+2a–e, C1, C2a, D1). Formerly Endangered (A1b,c; C1; C2a: see Collar *et al.* 1994).
CITES: Appendix II.
National protection status: Information unavailable.

Full justification of additional IUCN threat criteria is given in Collar *et al.* (1998).



Distribution and status: This species is endemic to the islands of Tawi Tawi, Bongao, Manuk Manka, Tumindao, Sanga Sanga, and Sibutu in the Philippines (Dickinson *et al.* 1991). It may occur on Simunul (D. Allen *in litt.* 1998).

The blue-winged racquet-tail was reportedly abundant in mangroves on Tawi Tawi a century ago (Dickinson *et al.* 1991), where only a small part of its potential range has been visited recently (D. Allen *in litt.* 1997). In this area, the species was found only near undisturbed forest and in small numbers in September 1991 (Lambert 1993b). Only six racquet-tails were seen in August 1994 (Collar *et al.* 1994), and although none were recorded in July 1995 some were seen in May 1996 and December 1996/January 1997 (D. Allen *in litt.* 1998). The species' last patch of known habitat is about to disappear (Collar *et al.* 1994). However, the species is very difficult to see and calls can be difficult to separate in the field from other parrots (D. Allen *in litt.*

1997). There are extensive tracts of mangrove in the south and east of the island (D. Allen *in litt.* 1997) which may hold the species. No reports from Bongao, Tumindao, or Manuk Manka since the turn of the century exist (Collar *et al.* 1998). It is thought unlikely to survive on Bongao as almost all of the mangroves have been lost, but forest may still survive on Tumindao and Manuk Manka (D. Allen *in litt.* 1997).

Threats: Threats to this species include habitat clearance and previous use as target practice by men with high powered rifles (Lambert 1993b), although the latter is no longer thought to be a problem (T. Brooks *in litt.* 1997). None were seen in captivity in 1994 (G. Dutson *in litt.* 1997). The export of wild taken specimens of all flora and fauna from the Philippines is prohibited (CITES Notification to the Parties No 980, 1997).

Action: The extent and quality of forest on all islands in the Sulu Archipelago should be determined and considered urgently for protection. As part of this assessment process, forest patches should be surveyed for this and other endemics, starting with mangrove forest on Tawi Tawi and spreading to islands away from Tawi Tawi. Collar *et al.* (1998) state that whilst the other six Endemic Bird Areas in the Philippines now have protected areas, the Sulu Archipelago still has none and an integrated conservation strategy for these islands should consider the needs of several threatened endemic species (such as the Sulu Hornbill). (See Boxes 15 and 17)

Accounts for species removed from the Red List

Luzon racquet-tail *Prioniturus montanus*

Conservation status: IUCN: Lower Risk, nt (formerly Vulnerable: A2b,c; C1; C2a).

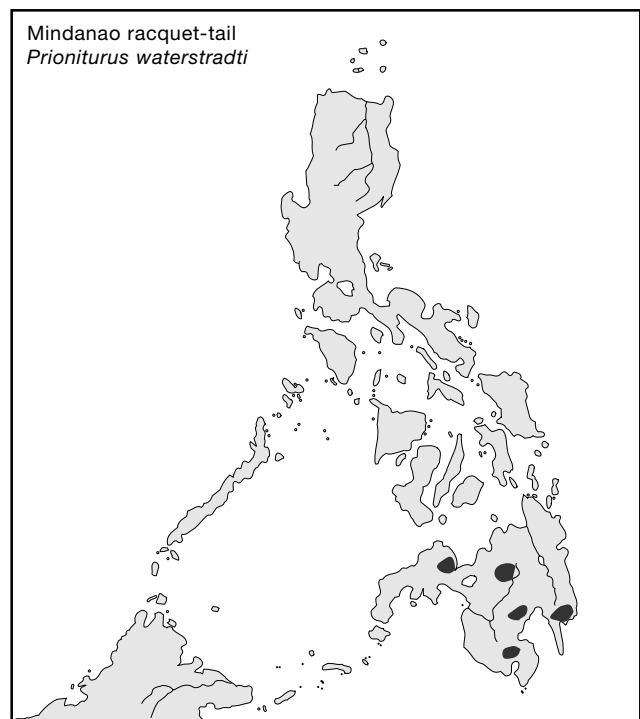
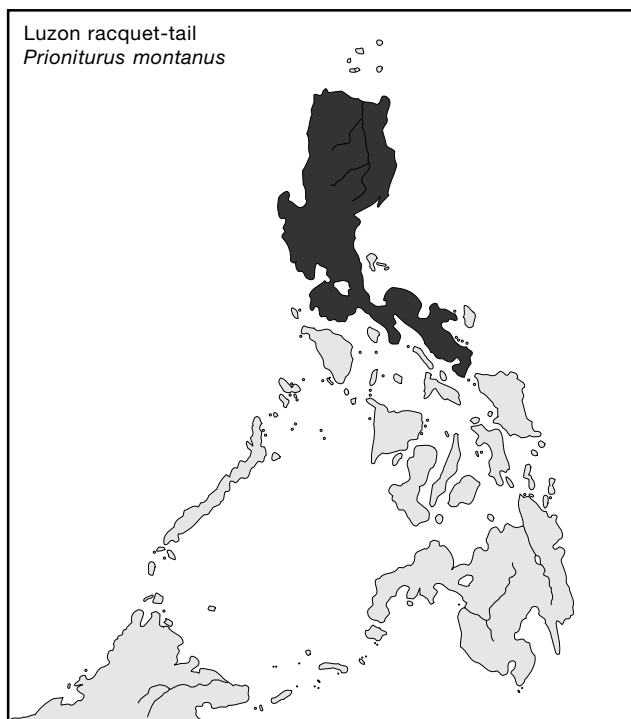
CITES: Appendix II.

National protection status: Information unavailable.

Reason(s) for removal from the list: The species is now believed to inhabit areas which are relatively inaccessible, suggesting that its numbers are stable (Collar *et al.* 1998).

Distribution and status: The Luzon racquet-tail is endemic to Luzon in the Philippines. It is possibly still common in parts of the Cordillera Central and Sierra Madre in primary forest above 700m (Collar *et al.* 1994).

Threats: The combination of habitat destruction, hunting, and trapping for the cagebird trade are threats and require continued monitoring (Danielson *et al.* 1994, Poulsen



1995). The export of wild taken specimens of all flora and fauna from the Philippines is prohibited (CITES Notification to the Parties No 980, 1997).

Mindanao racquet-tail ***Prioniturus waterstradti***

Contributors: Nigel Collar and Frank Lambert.

Conservation status: IUCN: Lower Risk, nt (formerly Vulnerable: C2a).



CITES: Appendix II.

National protection status: Information unavailable.

Reason for removal from the list: The assessment that this species is local and uncommon (Collar *et al.* 1994) has been revised because of information contained in old and new sources (see Collar *et al.* 1998). In addition, the species habitat (montane forest) is relatively safe at present.

Distribution and status: The Mindanao racquet-tail is known from nine mountain localities on Mindanao in the Philippines (see Collar *et al.* 1998). It is generally restricted to forest above 1,000m, but has been recorded at 820m and is thought to make daily vertical migrations (Collar *et al.* 1994, 1998).

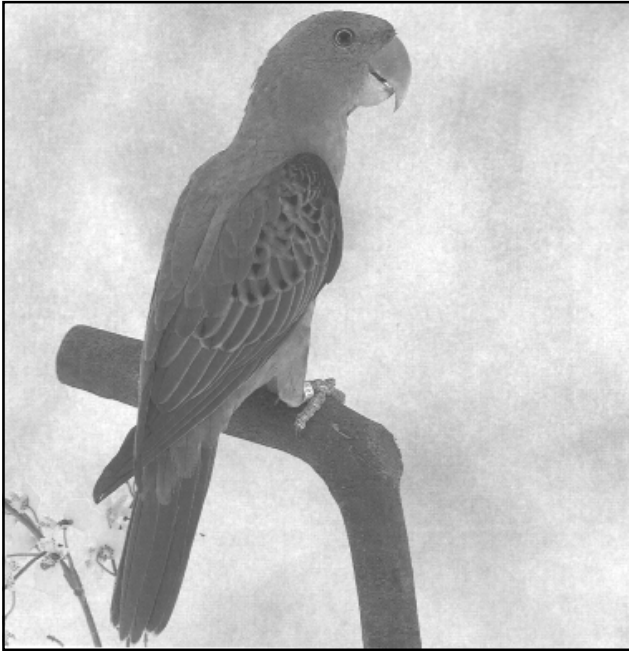
This species is thought to have been abundant in the first half of the century (N. Collar *in litt.* 1997) and is still found in good numbers in Mount Kitanglad National Park. However it is now certainly local and uncommon, apparently occurring at lower density than some of its congeners (Dickinson *et al.* 1991, Collar *et al.* 1994). There are recent records from several areas, including Mt. Apo (F. Lambert *in litt.* 1997).

Threats: This species is presumed to be threatened by habitat destruction (Collar *et al.* 1994) although this is now questioned (Collar *et al.* 1998) and should be investigated (see Boxes 15 and 16). The export of wild taken specimens of all flora and fauna from the Philippines is prohibited (CITES Notification to the Parties No 980, 1997).

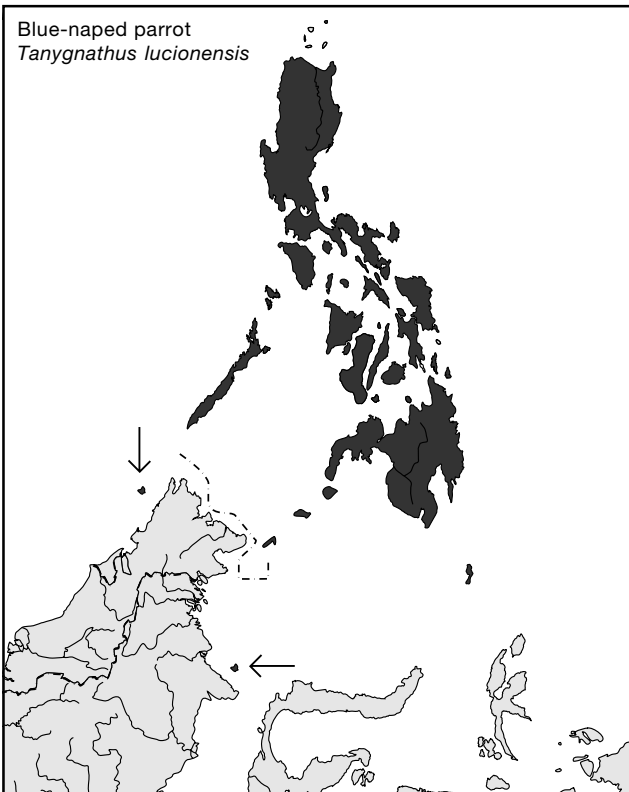
Blue-naped parrot
Tanygnathus lucionensis

The species account for the blue-naped parrot in the Philippines, is the same as that for Indonesia.

Contributors: Des Allen, Nigel Collar, Frank Lambert, and Jon Riley.



Blue-naped parrot
Tanygnathus lucionensis



Conservation status: IUCN: Lower Risk, nt (formerly Endangered: A1b,c; A2b,c; C1; C2a).

CITES: Appendix II.

National protection status: Information unavailable.

Reason for removal from the list: Determining this species' status is extremely problematic as it is thought to survive in small pockets of habitat on the smaller islands in its range (Collar *et al.* 1998). This makes assessment of numbers and inference or prediction of population trends difficult. However, its persistence in small numbers, together with the conclusion that it is still fairly numerous in some areas of Palawan and on Tawi Tawi (Lambert 1993, D. Allen *per* N. Collar *in litt.* 1997), and is found in large numbers in a large tract of forest on Talaud (Riley 1997), suggest that it may be best considered Lower Risk, nt (Collar *et al.* 1998).

Distribution and status: The blue-naped parrot formerly occurred in lowland forest up to 1,000m throughout the Philippines (in the subspecies *lucionensis* on Luzon and Mindoro, *hybridus* on Polillo, and *salvadorii* in the rest of its range, including 45 Philippine islands), the Talaud Islands, Indonesia, and islands off the north and east of Sabah, East Malaysia (Dickinson *et al.* 1991).

The species was considered common on the larger islands in the Sulu Archipelago in 1971 (du Pont and Rabor 1973) and on Salebabu, Talaud, in 1978 (White and Bruce 1986). It was seen occasionally on Talaud in 1996 where suitable habitat exists on Karakelong, suggesting that the island may support an important population (J. Riley *per* N. Collar *in litt.* 1997). The species was noted on Ticao in 1993 (Curio 1994) and in 1996 a pair was recorded on both Simunul and Sibutu. It was not uncommon around Tawawakan Agricultural Research Station, Tawi Tawi (considered widespread on Tawi Tawi: Dutson *et al.* 1996) and may occur on the small offshore island of Buan (D. Allen *in litt.* 1997). It was considered common wherever remnant forest patches exist (mostly in the mountains) around Mt. Awu and Mt. Sahengbalira on Sangihe in 1996 (F. Lambert *in litt.* 1997). Riley (*in litt.* 1997), however, recorded only a single bird, which may have been an escapee, in five months on Sangihe. Searches have failed to find it on Negros and Siquijor (Evans *et al.* 1993). It was thought rare on Mindoro (Dutson *et al.* 1992), although subsequently was considered quite common in Siburan Sub-prison of the Sablayan Prison and Penal Colony (Brooks *et al.* 1995c). It is thought to be rare on Luzon and elsewhere (Collar *et al.* 1994), in every case as a result of habitat loss and heavy trapping. It was seen regularly in small numbers on Palawan in 1991 in small numbers (especially in the southern half), in areas that still held small patches of forest (F. Lambert *in litt.* 1997). It is found in Bataan, Quezon, Minalungaw, and St Paul Subterranean River National Parks (N. Collar *in litt.* 1997).

Threats: Threats to this species include habitat loss and targeting for the pet trade (Lambert 1993b). Occasional sightings in cultivated areas on Talaud (Riley *in litt.* 1997) and in heavily disturbed areas on Tawi Tawi suggest that its tolerance to habitat alteration requires investigation. This would also help with interpreting the species' status given its presence in small habitat patches on many small islands. There were 22 wild caught specimens recorded in international trade between 1991 and 1995, with an annual maximum of 13 individuals in 1991 (CITES Annual Report database). In 1998, the annual export quota from Indonesia was for 190 birds (CITES Notification 1998/07). The export of wild taken specimens of all flora and fauna from the Philippines is prohibited (CITES Notification to the Parties No 980, 1997).

Mindanao lorikeet ***Trichoglossus johnstoniae***

Contributors: Nigel Collar and Frank Lambert.

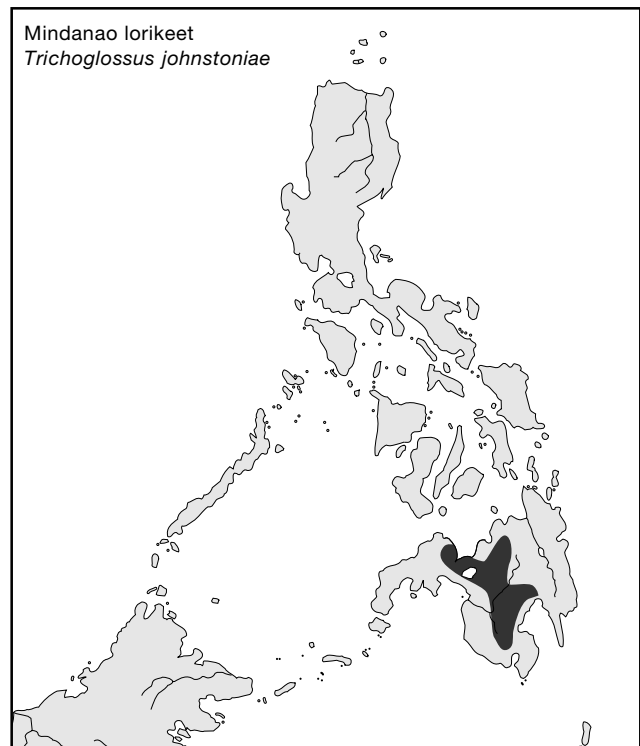
Conservation status: IUCN: Lower Risk, nt (formerly Vulnerable: C1; C2a).

CITES: Appendix II.

National protection status: Information unavailable.

Reason for removal from the list: The species is now thought to be numerous in montane forest above approximately 1,000m a habitat which is relatively secure at present (Collar *et al.* 1998).

Distribution and status: The Mindanao lorikeet inhabits montane forest and forest edge habitat including logged and degraded areas, above 800m on Mindanao in the Philippines. It occurs here as two subspecies, *johnstoniae* on five mountains, *pistra* on one (Dickinson *et al.* 1991).



Thought now to be reasonably secure, although its status away from Mt. Kitanglad is not well known (F. Lambert *in litt.* 1997).

Threats: Forest destruction was previously considered a problem (Collar *et al.* 1994), but is now thought unlikely to be a significant threat (Collar *et al.* 1998). Clarification of this would be useful (see Boxes 15 and 16). There were eight wild caught specimens recorded in international trade between 1991 and 1995, all in 1994 (CITES Annual Report database). The export of wild taken specimens of all flora and fauna from the Philippines is prohibited (CITES Notification to the Parties No 980, 1997).

Africa

Overview

Mike Perrin, Philip McGowan, Colleen Downs,
Craig Symes, and Louise Warburton

Africa is a large continent containing relatively few parrot species. There are 21 species that are native to Africa and the islands of Madagascar, Mauritius, and the Seychelles. They inhabit a variety of habitats, ranging from closed forests to arid zones. Most of these species have allopatric distributions (i.e., do not overlap) (Fry *et al.* 1988) and in most parts of sub-Saharan Africa only one species occurs. All species are monogamous and typically both sexes are similar in appearance (sexually monomorphic), although both sexes in arid zone species are dissimilar in appearance (dimorphic), as is the forest-dwelling grey-headed lovebird *Agapornis cana* of Madagascar and the Cape parrot *Poicephalus robustus*.

Continental Africa is home to 18 species belonging to four genera. The African grey parrot *Psittacus erithacus* from West Africa is the only member of the genus *Psittacus* and is a common cage bird in many countries throughout the world. The genus *Poicephalus* contains nine predominantly large-bodied species. There is some uncertainty concerning the taxonomy of the Cape parrot *P. robustus* and recent data suggest that there may be three species rather than the currently accepted one (Wirminghaus unpublished data).

The range sizes of the *Poicephalus* parrots differ greatly. The large Cape parrot *P. robustus* is found in northern Namibia, northern Botswana, north-east South Africa and northern Ethiopia. In contrast the small yellow-fronted parrot *P. flavifrons* is endemic to Ethiopia. Species in the genus are distributed among most major habitat types, ranging from arid scrub (e.g. Rüppell's parrot *P. rueppelli* of northern Namibia and southern Angola) to lowland forests (e.g., Jardine's or red-fronted parrot *P. gulielmi* found in west Africa and locally in central and east Africa).

The third genus found in Africa is *Agapornis*, the small-bodied lovebirds typically found in large flocks. As with the larger *Poicephalus* parrots, geographical range sizes vary across the genus. The widely distributed red-headed lovebird *A. pullaria*, can be found from eastern Sierra Leone to Uganda and Ethiopia whilst the very localised black-cheeked lovebird *A. nigrigenis* is almost entirely confined to an area of less than 5,000km² in Zambia (Dodman 1995). They also occur in most habitats, from arid areas of southern Angola, Namibia, and western South Africa, where the rosy-faced (or peach-faced) *A. roseicollis* lovebird occurs, to forests, which the black-collared lovebird *A. swinderianus* prefers.

Some lovebirds, including Fischer's lovebird, have established feral populations in cities and others have become established on the Seychelles, where there are no naturally occurring parrots.

The only native representative of the *Psittacula* is the echo or Mauritius parakeet *P. eques* from Mauritius, one of the most threatened birds in the world (Collar *et al.* 1994). Another species in this genus, the rose-ringed parakeet *P. krameri*, has become established across a large tract of central Africa from Senegambia eastwards to Uganda and Ethiopia, since it was first introduced in the early 1900s.

Madagascar is home to one lovebird species, the grey-headed, and two vasa parrots *Coracopsis*. Both vasa also occur on the Comoros Islands, and the lesser vasa *C. nigra* is also found in the Seychelles. All three are to be found in groups, the vasa parrots being found in small groups, and the lovebird in flocks of up to 30 birds. The lesser vasa, *C. nigra*, is more likely to be found in forest habitat than the greater vasa and can be found at higher altitudes (Langrand 1990). Although considered common (Langrand 1990), the rapid pace of forest loss on Madagascar suggests their status should be carefully monitored.

The biological characteristics of the two main genera, *Poicephalus* and *Agapornis*, are strikingly different and may influence their responses to human interference. The *Poicephalus* parrots are large and tend to remain in pairs whereas the smaller lovebirds tend to be found in groups. The lovebirds have a much greater reproductive potential as they tend to have larger clutches (three to six in the wild, up to eight in captivity, as opposed to one to four in *Poicephalus*) and their incubation period is a few days shorter than in the larger parrots (Fry *et al.* 1988). As they can also lay two clutches in a season, there is the potential for increasing numbers much more rapidly than is possible with the *Poicephalus* species.

Threats

The diverse habits of the African parrot fauna is reflected in the variation in pressures facing the species. Some species appear to be at low risk of extinction at present, such as Meyer's parrot *Poicephalus meyeri*, despite occasional illegal trapping. Others are seriously at risk, such as the echo parakeet which is considered to be Critically Endangered. Across the group as a whole the two main threats are thought to be trapping for the bird trade and habitat loss. Table 5 provides a list of the threatened parrot species in Africa.

The bird trade

Trapping for the bird trade has long been a problem for some species, including Fischer's, masked or yellow-collared *Agapornis personatus*, black-cheeked *Agapornis nigrigenis*, and rosy-faced *Agapornis roseicollis* lovebirds, the Senegal parrot *Poicephalus senegalus*, and the African grey parrot *Psittacus erithacus*. Other species are now appearing in the bird trade and such trade may pose a significant threat for species such as Rüppell's, red- or orange-bellied *P. rufiventris* and Jardine's parrots. Trade is predominantly from Senegal, Cameroon, and the Democratic Republic of the Congo (*Poicephalus* and *Psittacus*) in West Africa, and Tanzania (*Poicephalus*) in East Africa.

A key problem here is the lack of appropriate legislation, and the lack of enforcement of such legislation where it exists. Addressing this issue and those related to it will be necessary before Africa's threatened parrots can be considered safe from extinction.

Habitat loss

Habitat loss faces many species, but it is difficult to predict how the impact of often subtle changes in land-use may affect parrots. For the large-bodied parrots that tend to be dependent upon climax forest the effects may be clear (e.g., Cape parrot), but for species inhabiting open country, changes can be far from obvious (e.g., black-cheeked lovebird). Whilst the effects of outright habitat loss, such as deforestation, might be straightforward to determine, the consequences of a decrease in the suitability of habitats through increasing desertification and the intensification of agricultural practices are far less easy to assess, but may be no less dramatic.

Conservation solutions

Increasing the current knowledge base

In confronting the pressures facing Africa's parrots, the major constraint is one of lack of knowledge. The need for additional information on birds in the wild is one of the overriding issues in African parrot conservation. The establishment of an informal network of people concerned for the future of parrots in the wild would be helpful (see Box 18). Considering the interest in parrots in the Neotropics and Australasia, for example, the state of knowledge of Africa's parrots is very poor. Consequently, opportunities to raise awareness of the plight of these species among wildlife managers, legislators, researchers, bird-watchers, and the public in general must be taken wherever possible.

More knowledge is required on birds in the field before their conservation status can be determined with any

confidence, and realistic and effective conservation measures can be proposed. For example, the yellow-faced parrot *Poicephalus flavifrons* from Ethiopia is thought to have a small distribution and to favour juniper and yellow-wood forests. The current status of both the species and the habitat is not known. A second example is the grey-headed lovebird *Agapornis cana* from Madagascar, which was previously thought to be common throughout most of the island (Langrand, 1990). There is now concern that trapping is beginning to seriously affect its status in the wild (O. Langrand *per* Mike Perrin pers. comm. 1997) and consequently there is a need to survey the species and determine the severity of its plight. Whilst trade is thought to have been responsible for the dramatic crash in the population of the black-cheeked lovebird, it is not clear why numbers have remained low since trapping stopped, although several explanations have been advanced (see Box 19).

It is clear that trade can be a problem and addressing this complex task is difficult. The money brought in by trading in these birds is important in many rural economies. Although appropriate legislation often exists, enforcement is typically poor for a variety of reasons. From the biological view point it is obvious that far too little is known of wild populations of traded parrots to be confident of their continued survival. Assessments similar to those recently provided for Fischer's lovebird (Moyer 1995) of the status of populations from which birds are caught are urgently needed.

Statutory protection

The level of protection accorded to parrots by existing protected areas is quite variable. Whilst notification of an area as protected is no guarantee of security, it can be the first step in ensuring the long-term survival of a species. No comprehensive assessment exists of the extent to which protected areas are effective in maintaining parrot populations. Where such knowledge does exist it indicates considerable variation across the group in the level of legal protection offered. Some species are well represented in protected areas, such as Fischer's lovebird, which has a substantial part of its range within the Serengeti National Park, Maswa Game Reserve, and Ngorongoro Conservation Area in north-central Tanzania. Other species, however, are quite under-represented. The distribution of the threatened Rüppell's parrot barely reaches the Etosha National Park in Namibia and much of the home ranges of known Cape parrot groups lie outside protected areas (Craig Symes pers. comm. 1997), making them vulnerable despite some level of protection (see Box 20). The recent designation of the 70km² Black River Gorges National Park on Mauritius includes the entire known range of the echo parakeet and provides the secure habitat that is a crucial component in the recovery programme for this

species. This programme has used, and is continuing to use, biological knowledge to underpin creative recovery techniques (see Box 21).

In some cases, however, protected areas may not be required. For example, Meyer's parrot is distributed in areas of low human density and is not often disturbed. Consolidating this knowledge of protected area coverage and, perhaps more importantly, the effectiveness of these areas for parrots is a prerequisite for an overall strategy for the conservation of Africa's parrots.

Priority projects in Africa

- **Increasing the effectiveness of parrot conservation activities in Africa.** (Box 18)
- **Status survey and conservation of the black-cheeked lovebird in Zambia.** (Box 19)
- **Status survey and conservation of the Cape parrot in South Africa.** (Box 20)
- **Intensive management of the echo parakeet *Psittacula eques* on Mauritius.** (Box 21)

Box 18. Increasing the effectiveness of parrot conservation activities in Africa.

Mike Perrin and Philip McGowan

Aim: To build a network of interested individuals and organisations that will gather and distribute information in order to assist parrot conservation.

Justification: Information on parrots in Africa is both scarce and difficult to locate, despite the considerable efforts of a few individuals. In order to build upon several recent parrot-orientated initiatives on the continent it is vital to establish and maintain a network of motivated parrot conservationists who will be able to assist with the development, execution, and evaluation of project proposals, and provide advice for government agencies and both local and international organisations.

Project description: An African parrot network will require a base from which to work. An ideal base would be the Research Centre for African Parrot Conservation at the University of Natal in Pietermaritzburg, South Africa. A facility to enable a group of interested parties to be set-up is required. This process however is likely to require considerable effort. Relevant personnel are likely to be involved in a wide variety of activities, including research, bird-watching, general natural history, trade monitoring, or government service. Identifying appropriate personnel and making them aware of the network will involve announcements and articles in appropriate magazines, direct contact, and displays at relevant conferences. Countries where contacts are particularly sought at the moment include Ethiopia, Tanzania, Senegal, Zambia, and Madagascar. Once established, a means of managing communication, such as a newsletter, should be considered. A newsletter, together with efficient communication will incur routine administrative costs.

Contact: Mike Perrin.

Box 19. Status survey and conservation of the black-cheeked lovebird in Zambia.

Louise Warburton

Aim: To identify the ecological requirements of the black-cheeked lovebird *Agapornis nigrigenis* so that a conservation strategy for its survival can be prepared.

Justification: The black-cheeked lovebird is Africa's most threatened lovebird. It is thought to have suffered a major decline in numbers in the 1920s (Collar *et al.* 1994) because of very heavy exploitation. This resulted in a ban on its export from Zambia from 1930, but trade is thought to have remained brisk up to the 1960s (Dodman 1995). At the peak of trapping in 1929, 16,000 lovebirds were trapped in four weeks (Moreau 1948), a figure that is almost certainly impossible today as the population is estimated to number around 10,000 individuals (Dodman 1995). Why this species has not increased in numbers since extensive trapping declined is a mystery, although a change to sowing maize crops locally between the 1930s and 1950s may have led to a food shortage for a species that eats smaller seeds, such as the previously farmed millet and sorghum. Inspection of rainfall data over the last 45 years has shown a marked downward trend, coinciding with a reduction in the availability of surface water (Dodman 1995). This surface water may be critical during the dry season for a species thought to need water daily and which is apparently selective about the sources from which it will drink. A detailed assessment of the species' distribution in relation to habitat features, such as various types of water sources, crop coverage, and vegetation, is required before a realistic conservation strategy can be advocated. In addition, other factors that may affect lovebird abundance, such as the importance of crops as food sources, and breeding success, should be investigated.

Project description: Fieldwork should address three issues: population surveys, use of crops and water, and breeding success. Surveys should aim to determine the distribution and abundance of lovebirds in both the wet and dry seasons and attempt to identify factors that are associated with high densities. Data collection will probably rely on both local interviews and counts of birds. Counts can be made at pools where lovebirds drink and habitat measurements should be made at such sites. Comparison with habitat measurements from other sites, such as unused water-sources, may then reveal habitat features that are associated with high lovebird numbers. Such a survey would provide a baseline for the establishment of a long-term monitoring programme. As the change in agricultural practices has been suggested as a cause for concern for black-cheeked lovebirds, it is desirable to establish how dependent the species is upon crops, the amount they consume and the damage that they cause. Finally, the species may not have increased in the absence of trapping and in the presence of apparently favourable sorghum and millet because of constraints implicit in its breeding behaviour. Other lovebirds are able to reproduce rapidly, and an investigation of the breeding biology of this species may reveal why it has so far failed to do so. If feasible, movements should also be studied so that monitoring can track changes in numbers and resource availability and use more effectively.

Contacts: Mike Perrin, Louise Warburton.

Box 20. Status survey and conservation of the Cape parrot in South Africa.

Colleen Downs and Craig Symes

Aim: To assess the distribution and abundance of the Cape parrot *Poicephalus robustus robustus* throughout its range and assess its ecological requirements so that appropriate management can be advocated.

Justification: Whilst numbers of this taxon, which should probably be considered a full species (Wirminghaus unpublished data), are reasonably well known in the Natal Midlands, there is very little information from the other 70% or so of its range since the 1960s (Skead 1964, 1971). Considered Vulnerable in the South African Red Data Book (Brooke 1984), numbers are known to have declined considerably in the Natal Midlands during the last 10–20 years (Wirminghaus unpublished data, C.J. Skead *per M. Perrin pers. comm.* 1997). An assessment of its current status throughout its range is urgently required. The deterioration of the Afro-montane forests during this period appears to have led to the decline of the parrot and thus the status of the species' habitat also requires investigation. Of particular concern is the availability of trees with suitable nesting sites which seems to be limiting the reproductive output of the Natal Midlands population. Whilst the decline in the extent of habitat is an obvious pressure on the Cape parrot, the increasing distances between shrinking forest patches may also be causing stress to the species (Wirminghaus unpublished data). If different forest patches are used for different activities, then increasing distances between forest patches may be adversely affecting the species (Wirminghaus unpublished data).

Project description: Fieldwork should address three issues: population surveys, forest quality, and the species' use of available resources. Surveys should aim to determine the distribution and abundance of the Cape parrot throughout its entire range and attempt to identify factors associated with high densities. The network of informed and enthusiastic bird-watchers in much of the species' range can help to identify potentially important forests. This information might then be supplemented by searches made by a survey team, which will be able to target previously identified areas. In each area detailed counts of birds should be made and forest quality determined. If possible, the impact of understorey cattle grazing on tree regeneration should be assessed, as should the effects of other human activities, such as the collection of small saplings and the debarking of trees for medicinal uses. These practices may ultimately influence nest and roost site availability. The movements of individual birds between forest patches (Wirminghaus 1997) should be investigated in order to understand whether the reduction in size of many forest blocks is adversely affecting the parrots. Ideally, this would be achieved by comparing breeding success in a population inhabiting an area where forest blocks are relatively large and close together with a population that is reliant on forest blocks that are smaller and more widely dispersed. Following marked birds (perhaps using radio-telemetry) should reveal which patches are used for which activities and consequently what management is required.

Contacts: Colleen Downs, Mike Perrin, Craig Symes.

Box 21. Intensive management of the echo parakeet *Psittacula eques* on Mauritius.

Kirsty Swinnerton

Aim: To increase the number and success of breeding echo parakeets *Psittacula eques* using intensive management techniques until there is a stable population in excess of 300 birds dependant on minimal management.

Justification: Widespread clearing of native forests, invasion of forests by woody weeds, introduction of alien predators and competitors greatly reduced echo parakeet numbers to 8–12 individuals and a 50km² range by 1986. If the management programme had not begun in 1973 it is probable that the echo parakeet would have become extinct. The continuing existence of the echo parakeet population is dependant on addressing several factors: degradation of forests by introduced woody weeds, predator control, food shortages, and competition with alien species for nest sites and food supplies. The management programme and extensive surveying of the Black River Gorges National Park (the echo parakeet's last refuge) has resulted in a population increase from 16–22 individuals in 1993 to 84–95 individuals in March 1997.

Project description: The echo parakeet management programme is run in conjunction with the Government of Mauritius and the Mauritian Wildlife Foundation alongside other endangered species programmes. Additional sponsors include the World Parrot Trust and the Jersey Wildlife Preservation Trust. The programme determines the conservation needs of the echo parakeet using a "learn as you go" approach building on the previous breeding season's results and knowledge.

There are several key components to the management programme. Predator control (aimed primarily at ship rats *Rattus rattus*) using intensive anti-coagulant poison grids or surrounding cavity entrances with a barrier which cannot be climbed. Food shortages are resolved using a supplementary feeding programme and during chick-rearing clutches are reduced from a maximum of three to a single nestling. Frequent nest checks allow underweight nestlings to be rescued. Productivity is increased by removing first clutches from selected breeding groups. Parasite (mainly nestfly *Passeromyia heterochaeta*) and fungal (*Aspergillus*) infestations are reduced by using treated nest linings. Eggs and chicks are fostered between wild nests to spread productivity and reduce risk. Harvested clutches and rescued nestlings are hand-reared in a special facility and then released into the wild population using ultra-soft release techniques. These released birds are trained to use supplementary food in special food hoppers and nest boxes. Research activities include ringing as much of the population as possible to determine breeding success and mortality and monitoring the survival and recruitment to the breeding population of both the released and wild fledged juveniles. Small fenced and weeded Conservation Management Areas are allowing impressive regeneration of the native vegetation and these are important echo parakeet feeding and nesting sites. Veterinary support is provided by the International Zoo Veterinary Group.

Flexibility is an important attribute to the programme enabling fast response to management changes and problems. The echo parakeet population will need for the foreseeable future some form of management assistance in the form of supplementary feeding and alternative nest sites to overcome environmental deficiencies.

Contact: Carl Jones.

Species accounts

Table 5. A list of African parrot species that are considered threatened using IUCN Red List criteria, including one threatened subspecies for which there is evidence that it may be a distinct species. Species are listed in alphabetical order by their scientific name, together with their distribution and threat status. The criteria under which each species qualifies are given in the appropriate species account. *Denotes changes from *Birds to Watch 2* (and, therefore, the 1996 IUCN Red List of Threatened Animals), which have been agreed to by BirdLife International who maintain the IUCN list of threatened birds.

English name	Scientific name	Distribution	Threat category
Black-cheeked lovebird	<i>Agapornis nigrigenis</i>	South-west Zambia	Endangered
Echo parakeet	<i>Psittacula eques</i>	South-west Mauritius	Critically Endangered
Possible species			
Cape parrot	<i>Poicephalus (robustus) robustus</i>	Eastern Cape, Natal Midlands and eastern Transvaal in South Africa	Vulnerable
Species proposed for consideration for inclusion on the Red List			
Rüppell's parrot	<i>Poicephalus rueppelli</i>	Central and north-western Namibia and extreme southern Angola	To be considered

Black-cheeked lovebird *Agapornis nigrigenis*

Contributor: Louise Warburton.

Conservation status: IUCN: Endangered (B1+2c; C1; C2b; D1; D2).

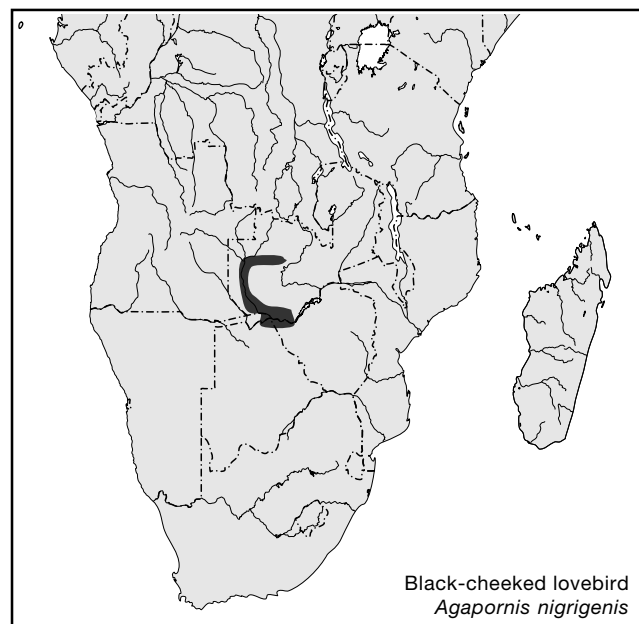
CITES: Appendix II.

National protection status: Information unavailable.

Distribution and status: The black-cheeked lovebird appears to occupy approximately 2,500km² within a core extent of occurrence of 4,550km² in *Colophospermum mopane* woodland between the Zambezi River to the south and the Kafue River to the north in south-west Zambia. It may still occur in small patches elsewhere, such as in

Namibia's Caprivi Strip (Dodman 1995), although there are no recent reports (R.E. Simmon *per* Mike Perrin *in litt.* 1997.). During the dry season the birds retreat into two blocks of mopane woodland along the Zambezi (3,200km²) and Kafue (1,350km²) Rivers. It seems never to have recovered from heavy exploitation for the cagebird trade in the 1920s, which probably continued into the 1960s (Dodman 1995) despite a 1930 wild-caught trade ban.

Threats: The current threats to this species are not clear, although the number of suitable water-sources is thought to be declining, reflecting gradual (presumed natural) desiccation (Dodman 1995) and which may be seriously affecting dry season water availability (see also ZOS 1994). Additional reasons for continued low numbers may include the change in agriculture from sorghum and millet to



maize crops, and presumed specific habitat requirements. Threats include habitat loss and, more speculatively, hybridisation and/or competition with feral or naturally invasive Lilian's lovebird *A. lilianae* (ZOS 1980, 1982), and the spread of disease from captive birds (see Kock 1989). There were 212 specimens recorded in international trade between 1991 and 1995, 170 of which were in 1992 (CITES Annual Report database). The species is now captive bred in South Africa.

Action: Fieldwork recently started is addressing three issues: population surveys, use of crops and water resources by birds, and breeding success. (See Box 19)

Echo parakeet *Psittacula eques*

Contributor: Kirsty Swinnerton.

Conservation status: IUCN: Critically Endangered (D1).
CITES: Appendix I.
National protection status: Fully protected.

Distribution and status: This species is now confined to 40km² of highly degraded remnant native forest within the 70km² Black River Gorges National Park in the uplands of south-west Mauritius. On Rodrigues a related species *Psittacula exsul* survived until about 1876 (Cheke 1987) and on Reunion a form, probably conspecific with the Mauritius echo parakeet, disappeared much earlier.

The population plummeted from 600–800 individuals in the 1750s (Jones and Owadally 1988) to an estimated 8–12 individuals in 1986 (Jones and Duffy 1993). As a result of an intensive management campaign and recent surveys, the population in March 1998 was 93–107 birds, with 20 of these in a captive breeding programme and individuals in a release programme (Thorsen *et al.* 1998). Surveys in 1996 and 1997 located 8 new breeding groups giving a total of 15 wild breeding groups. In the 1997/98 season, 12 of these groups bred and produced 17 fledglings, seven in the wild and 10 in captivity. Fifty-eight nestlings have now fledged from wild eggs in the past three breeding seasons, significantly increasing the total population, although only 19 individuals have fledged into the wild (Thorsen *et al.* 1998). In 1997 three captive-bred or reared birds were successfully released into native forest and a further 11 individuals are currently being released.

Threats: Food shortage and lack of suitable habitat as a result of massive habitat loss is considered a major factor in the species' decline. Only 1.27% of native forest remains (Dwivedi and Venkatasamy 1991, in Duffy 1994). Depredation of eggs and nestlings, competition for food sources by introduced mammals (particularly rats and



macaques), nest fly infestations, and competition for nest cavities, compounded by cyclones, are the major factors in the species' decline and continuing vulnerability. Two birds were moved internationally (as *P. echo*) between 1991 and 1995 (CITES Annual Report database); both went to Jersey Zoo from Mauritius in 1991, for the breeding programme.

Action: Conservation efforts were initiated in 1973 and intensified in 1987, focusing on habitat protection and improvement (fenced and weeded forest plots), rat control around nest sites, manipulation of breeding, supplementary feeding, and provision of nest boxes. Between 1993 and 1995 the programme was further refined. The main emphasis is now on predator control, nest cavity improvement, clutch manipulations (including harvesting eggs, downsizing of broods to one chick per nest, fostering of removed chicks and eggs, and hand-rearing removed chicks), frequent examination of active nests, and rescuing chicks and eggs from failing nests. A release programme of hand-reared chicks began in 1997 and is continuing. It is intended that released birds will encourage wild birds to take supplemented food. The captive breeding programme will continue. The echo parakeet population is likely to be dependent upon some form of management in the near future. (See Box 21).

Account for threatened taxa that may be a full species

Cape parrot *Poicephalus (robustus) robustus*

Contributors: Colleen Downs, Mike Perrin, and Craig Symes.

Conservation status: IUCN: To be considered.
CITES: Appendix II.

National protection status: Information unavailable.



Reason for taxonomic uncertainty: The Cape parrot is usually considered to be one of three subspecies. Multivariate morphometric analyses suggest that it is more appropriately considered a full species, based on electrophoresis, karyology (the study of cell nuclei), DNA (deoxyribonucleic acid) fingerprinting, and vocalisations (Wirminghaus unpublished data).

Distribution and status: This species is now restricted to small, widely dispersed populations in the KwaZulu-Natal Midlands and eastern Mpumalanga in South Africa. The Cape parrot is a habitat specialist that has declined gradually and continually over the last 10–20 years (Wirminghaus unpublished data, C.J. Skead *per* M. Perrin pers. comm. 1997) through habitat loss and fragmentation. Large blocks of Afro-montane forest have become much reduced in size (Cooper 1985), so populations are further apart than historically and are also separated by intensively managed farms and exotic tree plantations that occur throughout most of its range. The taxon may qualify as Vulnerable (B1+2b,c).

Threats: Fragmentation may be reaching the point where the distances that birds travel between patches is adversely affecting foraging efficiency (Wirminghaus unpublished data). This, in turn, may be reducing individual survival and breeding success. Legal and illegal extraction of potential nest trees (predominantly old and dead *Podocarpus* spp.) is likely to have a serious impact on breeding as nest sites are already limited (Wirminghaus unpublished data). Increased rarity in the wild and the lack of breeding success in captivity has led to a ten-fold increase in price and demand, resulting in birds now being trapped for trade. Any harvesting of birds from the wild would further damage already depleted numbers. The impact of incidental, illegal hunting is not known. There were 6,354 wild caught specimens of the species as currently accepted (i.e., including all three subspecies) recorded in international trade between 1991 and 1995, with an annual

maximum of 3,871 individuals in 1994 (CITES Annual Report database). Most of this trade, however, is from Tanzania and, therefore, unlikely to be this taxon. During a recent nationwide census of the wild parrots, two birds were seen that were apparently feather plucked, mimicking the symptoms of beak and feather disease. Recently, eight of eight wild caught parrots have shown to be positive for the disease. This has potentially drastic consequences for wild and captive birds. Any wild caught birds introduced to existing colonies of African or other species of parrots may well spread infection. It is not known whether the wild parrots have natural resistance or are particularly sensitive to the disease.

Action: Clarification of the taxonomic status is currently underway at the Research Centre for African Parrot Conservation at the University of Natal at Pietermaritzburg and involves morphometric analysis, DNA fingerprinting, and vocalisations. Fieldwork on behalf of this taxon should address three issues: population surveys, forest quality, and the species' use of available resources. Surveys should aim to determine the distribution and abundance of the Cape parrot throughout its entire range (through the continuation of the Cape parrot Big Birding Day) and attempt to identify factors that are associated with high densities. Following marked birds (perhaps using radio-telemetry) should reveal which patches are used for which activities. The monthly monitoring of populations at Hlabeni Forest should indicate the viability of this population and the current nest box erection project will determine whether nest sites are a limiting factor for the population. Subsequently, necessary conservation measures for the survival of this species and its habitat can be identified. (See Box 20.)

Account for species proposed for consideration for inclusion on the Red List

Rüppell's parrot *Poicephalus rueppelli*

Contributors: Mike Perrin and Richard Selman.

Conservation status: IUCN: To be considered.

CITES: Appendix II.

National protection status: Information unavailable.

Distribution and status: Rüppell's parrot is found in dry thornbush, riverine woodland, and wooded hills of the highlands of central and north-western Namibia and south-western Angola (R. Selman *in litt.* 1998). The patchy distribution of the species makes assessing population size difficult. However, the population was recently estimated at 9,700 individuals \pm 6,665 individuals on the basis of



atlas data (Robertson *et al.* 1995). This has subsequently been revised to 29,466 individuals \pm 16,392 individuals (Jarvis and Robertson 1997) using knowledge of the species' habitat and the distribution of vegetation, climate patterns, and altitude in Namibia. There are no recent data on the

species' status in Angola, but it is believed that much of its range lies in Namibia (Robertson *et al.* 1995).

Threats: Illegal capture for export through South Africa to Europe and North America is believed to have led to a decline in numbers of this species. The capture of wild birds is illegal in Namibia and only captive-bred birds can be sold. However, wild caught birds are being traded, leading to concerns about a decline in the population caused by an estimated 1,000 birds being taken from the wild per year. This suggests a decline rate that may put the species at risk. Locals report the loss of Rüppell's parrots from some sites and dwindling numbers elsewhere, citing illegal capture as the reason. The reproductive rate, availability of nest sites, etc. suggest that the population would be at low risk of extinction if illegal capture were stopped. There were 12 wild caught specimens recorded in international trade between 1991 and 1995. Ten were recorded in 1994 and two in 1995 (CITES Annual Report database).

Action: An existing review of wildlife trade legislation in both Namibia and South Africa may help to resolve the problem of illegal capture. Conservation action on behalf of this species should concentrate on supporting this legislation and promoting its implementation.

The Neotropics (Americas)

Overview

Alejandro Grajal

With nearly 4,130 species, the Neotropics harbour almost 44% of the world's avifauna and a generous representation of parrots (148 species in 27 genera: Wege and Long 1995). Parrot species diversity is especially great in the genera *Amazona* and *Aratinga* (31 and 19 species respectively), although the Neotropics also hosts 10 monotypic genera such as *Leptosittaca*, *Myiopsitta*, and *Gypopsitta*. Sizes range from the diminutive species of parrotlet, *Forpus*, to the hyacinth macaw, the largest parrot in the world. Neotropical parrots live in many different ecological settings and have evolved different life history traits. Some species show significant ecological and behavioural flexibility, and have become naturalised outside their regular ranges. For example, today it is not rare to see feral populations of parrots in suburban and urban areas both in the Neotropics and in warmer subtropical regions. Other species are restricted to specific habitats (for example, *Anodorhynchus leari* is restricted to Sertão palm habitats of the Brazilian Caatinga and *Ognorhynchus icterotis* is restricted to *Ceroxylum* palm forests of the high Andes). Yet others are highly nomadic (e.g., *Nannopsittaca panychlora*, *Leptosittaca branickii* and *Rhynchopsitta pachyrhyncha*).

Parrots are distributed from Northern Mexico to Tierra del Fuego at the southernmost tip of South America, and from the edge of glaciers in the high Andes to the steaming forests of Amazonia. The distribution ranges of some species are large, particularly those parrots associated with lowland humid rainforests and savannas. However, many species have extremely restricted ranges, particularly those of the Northern Andes, the Atlantic forest of south-eastern Brazil, the dry habitats of the Cerrado and Caatinga of Brazil, and the Lesser Antillean Islands of the Caribbean.

The species accounts in this Action Plan discuss 50 species of Neotropical parrots that are classified as globally threatened by Collar *et al.* (1994). Several others have become extinct in historic times, including the Carolina parakeet *Conuropsis carolinensis* in eastern North America, the Cuban macaw *Ara tricolor*, and the glaucous macaw *Anodorhynchus glaucus* in the Misiones forest of southern Brazil, northern Argentina, and Paraguay. Spix's macaw *Cyanopsitta spixii* is now believed to exist almost entirely in captivity (Collar *et al.* 1992, Juniper and Yamashita 1990, 1991, Wege and Long 1995).

The Neotropical species accounts also include several parrot species that were not considered globally threatened

by Collar *et al.* (1994) but for which current information suggests a rapid decline in conservation status or for which discrete populations are under substantial threat. Four species (yellow-billed parrot *Amazona collaria*, Hispaniolan parrot *Amazona ventralis*, great-green macaw *Ara ambigua*, and grey-cheeked parakeet *Brotogeris pyrrhopterus*) are herewith included on the List, in agreement with BirdLife International, bringing the number of threatened species to 46. A further four taxa are noted as being worthy of further investigation of their status. These include the yellow-naped parrot *Amazona auropalliata*, which is under tremendous current trade pressure and deserves priority attention. Also included is the Cuban amazon *Amazona leucocephala*, particularly for its fragile distinct subpopulations in the Bahamas and Cayman Islands. Similarly, the scarlet macaw *Ara macao*, which is relatively common and has a large distribution in South America, probably numbers fewer than 1,000 individuals in all Central America, fewer than 200 in Costa Rica, and possibly a few hundred in the Maya forests of Belize, Mexico, and Guatemala (Wiedenfeld 1994). Without urgent attention, the Central American populations can be expected to disappear in the near future. Finally, the elusive saffron-headed parrot *Pionopsitta pyralia*, is included as populations are considered very small and its habitat in Colombia is dwindling rapidly.

Threats

The main threats to Neotropical parrot species are habitat loss, hunting, and the live bird trade. Species such as *Anodorhynchus leari* and *Cyanopsitta spixii* face imminent extinction largely due to the live bird trade (Reynolds 1997). Some of the most threatened Neotropical parrots suffer from the apocalyptic double threats of trade and habitat loss. These species include the most attractive parrots and macaws in severely pressurised or impacted habitats, including *Anodorhynchus leari*, *Cyanopsitta spixii*, *Ara militaris*, *Ara ambigua*, *Guarouba* (*Aratinga*) *guarouba*, and a number of *Amazona* species including *A. brasiliensis*, *A. oratrix*, and *A. pretrei*. Table 6 provides a list of threatened parrot species in the Neotropics.

The bird trade

Trapping for the bird trade in the Neotropics has occurred since pre-European times, as Amerindians valued macaws,

parrots, and feather ornaments as ritualistic and trade objects. At present, owning wild parrots as pets remains socially acceptable in most Neotropical countries, even where it is known that their ownership is technically illegal.

International trade in parrots has been significantly reduced during the 1990s, mainly as a result of adoption of national legislation, tighter enforcement of CITES regulations, the reviews of significant trade in Appendix II species by the CITES Animals Committee, adoption of stricter domestic measures under the European Union legislation, adoption of the Wild Bird Conservation Act in the USA, and transportation restrictions imposed by commercial airlines. These measures have contributed to the significant reduction in the overall volume of birds traded from the Neotropics to the rest of the world.

As a result of this reduction in volume, the remaining international trade has concentrated on illegal smuggling of uncommon species that command high prices, such as Lear's and hyacinth macaws and several amazon *Amazona* species. Illegal trade in smuggled parrots apparently continues across the US-Mexico border (Wiedenfeld 1993, 1995) and is sometimes associated with sophisticated smuggling rings dealing mainly in illegal migrant workers or illicit drugs. An international trade route to European markets still exists, perhaps using the Caribbean islands that are commonwealth territories of European countries, such as the Netherlands Antilles and the UK Virgin Islands. The volume reaching the European Community, from mainland Central and South America seems substantial, given the results of a six year monitoring in one European port of entry (Guix *et al.* 1997).

Local and national trade is thought to remain substantial throughout the Neotropics although it is extremely hard to quantify. Most experts are still documenting dramatic downward trends of wild populations of heavily traded species that already have low numbers (e.g., *Amazona pretrei*, *Amazona brasiliensis*, *Amazona barbadensis*, *Guarouba* (*Aratinga*) *guarouba*, the Central American *Ara macao* populations, and *Ara ambigua guayaquilensis*). Indeed, even though most countries ban trade in wild birds, it is still possible to see wild parrots being sold in markets, along rural roads, and even in pet shops. Legislation in most Neotropical countries criminalises trade but not the ownership of wild birds. As a result, enforcement is usually negligible or erratic, and in most cases government agencies are legally unable to confiscate parrots owned by individuals.

The root causes of this continuing pressure on wild parrots are a complex mix of several factors: widespread social and cultural approval of parrots as pets, poor enforcement of existing laws, growing purchasing capabilities of urban populations, and the need for supplementary income in impoverished rural communities.

Habitat loss and fragmentation

Habitat loss is an important threat to some of the most threatened parrots in the Neotropics, although understanding of specific "cause and effect" relationships between parrot population declines and changes in land-use patterns remains rudimentary at best, particularly for extremely threatened species such as *Ognorhynchus icterotis*. However, many parrots are not habitat specialists and thrive in heterogeneous mosaics of different successional habitats. For example, many species of lowland forest habitats seem to do relatively well in modified human environments as long as a mosaic of habitats in different successional stages is maintained and the poaching of nestlings and the shooting and trapping of adults remain at low levels.

Parrots that appear to be most threatened by habitat loss occur in the following regions:

- a) Species in the tropical Andes that require altitudinal migrations between different elevations (e.g., *Ognorhynchus icterotis*, *Leptosittaca branickii*, *Ara ambigua guayaquilensis*, and *Hapalopsittaca fuertesi*);
- b) Species living in isolated forest remnants of the Atlantic forest of east and south-east Brazil, (e.g., *Pyrrhura cruentata*, and *Triclaria malachitacea*);
- c) Species restricted to dry or seasonally dry forest habitats such as the Cerrado or the Caatinga of South America (e.g., *Amazona xanithops*, *Ara rubrogenys*, *Brotogeris pyrrhopterus*, and *Forpus xanithops*);
- d) Species restricted to forest remnants in the lesser and Greater Antilles of the Caribbean (e.g., *Amazona vittata* and *Aratinga euops*) or in small islands (*Amazona oratrix tresmariae*, and *Aratinga brevipes*).

These biogeographic regions have several factors in common, particularly high rates of deforestation and extensive fragmentation of natural habitats. The factors that induce land clearing for cattle production or agriculture are complex. However, existing economic and social inequalities throughout the Neotropical region continue to push the agricultural frontier further into natural habitats. The sinister persistence of "hidden" subsidies for land clearing in Central America, Northern Andes, and the Atlantic forests of Brazil, continues to accelerate the rate of habitat degradation. Some of these "hidden" subsidies include legal provisions that require habitat conversion to attain legal ownership of the land and corporate or individual tax shelters for industrial-scale land conversion.

Conservation solutions

Conservation solutions have to be locally tailored, as what works in one setting may not in another (see Chapter 2).

Some of the most interesting research and conservation strategies occur in the Neotropics, an example being the conservation of Lesser Antillean parrot species using education and national pride (Butler 1992), law enforcement and foster nest use in Margarita Island, Venezuela (Sylvius 1997), ecotourism based on macaws in Peru, Bolivia, and Brazil (Munn 1992), and artificial nest boxes to enhance populations in Peru (Nycander *et al.* 1995). Some of the conservation biology research needs are discussed in Chapter 2, while other more specific strategies are discussed below.

Education

Surprisingly, few people in the Neotropics (beyond the specialists) understand or appreciate the dire conservation status of many parrot species. Nevertheless, parrots are often excellent species to use in campaigns to raise public awareness of conservation issues or as emblematic species. Parrots are well known to the general public, and inspire high levels of human empathy. Several examples show that, if properly orientated, raising environmental awareness based on parrot conservation can be very effective (Butler 1992, Sanz and Grajal 1998, Sylvius 1997). In some cases, national or local pride is a key to successful conservation campaigns. However, environmental education campaigns need to be properly designed, implemented, and evaluated to avoid unintended consequences (such as the desirability to “save the parrot” by keeping it in a cage!). The threat of national and local trade demands creative studies of the social acceptability of private ownership of wild parrots. Whenever appropriate, environmental campaigns should vigorously attack private ownership of wild parrots, to reduce or eliminate national or local trade. The build-up of significant public opinion against wild bird trade does generally increase scrutiny by enforcement agencies, and eventually limits the overall volume of parrots traded locally or nationally.

Land tenure

As human populations keep growing and natural habitats shrink throughout the Neotropics, it is not surprising that the areas of highest human densities are those which have the largest numbers of threatened species (e.g., Central America, the Caribbean islands, the tropical Andes, and the Atlantic forest of eastern Brazil). The effects of burgeoning populations and habitat destruction have been historically accelerated by unstable land tenure regimes and hidden subsidies for land conversion. Increasing the stabilisation (and equitability) of land tenure can be an important factor in slowing the growth of the agricultural frontier. Similarly, more transparent fiscal policies can

eliminate subsidies for land clearing. Incentives to encourage the maintenance of wildlands must be found. While many of these actions transcend the Psittacine taxonomic scope of this Action Plan, conservationists and decision-makers should be aware of these factors and act opportunistically and appropriately to minimise their impact upon parrots and other threatened species.

Parrot biologists can help to identify critical linkages in habitat connectivity for species facing severe habitat fragmentation. For example, this Action Plan has identified priority actions (land purchases or strict protection) for severely threatened parrots in the Andes of Colombia and Ecuador. Concentrating at a regional scale can make such conservation efforts more effective and efficient.

Similarly, spatial analysis of the ecological representation of various habitats in protected areas can provide an idea of habitat conservation priorities in heavily fragmented areas such as in Brazil’s Atlantic forests and Central America. In fact, the current multi-national effort to implement the Mesoamerican Biological Corridor in Central America should maintain and in some cases, create, key linkages for habitat connectivity.

Brazil’s recent strategic plans to establish a network of biological corridors between protected areas may advance conservation possibilities for severely threatened parrots in dry habitats of north-east Brazil (Caatinga), the Brazilian Cerrado, and the Atlantic forests of south-east Brazil. In the tropical Andes of Venezuela, Ecuador, and Colombia, protected area boundaries should be rethought, with the idea of increasing both the connectivity between reserves as well as the altitudinal representation of mosaics of important habitats. Since most Andean reserves were historically designed with altitudinal lower limits, many parrot species appear to be suffering from lack of continuous altitudinal habitats for seasonal foraging or reproductive migrations.

Ecotourism

Ecotourism has the potential to provide economic value to large and colourful parrots or macaws. However, most tourism operators are concerned with very localised tourism attractions (such as parrot roosts), and local people are rarely prepared to become fully-fledged tourism operators. As a result, few tourism projects are designed in a way that benefit local people or enhance parrot conservation. The challenge remains to create tourism operations that enhance parrot conservation and therefore add local value to these birds (for more on ecotourism, see Chapter 2).

Not all valuation needs to be financial. Indeed, pride and nationalism can play important incentives in parrot conservation (Butler 1992). This has been particularly valuable in the Caribbean islands, where using emblematic

species of parrots has increased their protection and has built popular support for conservation, enforcement, and legislation.

This global Action Plan should be used as a guide to produce participatory national Action Plans. Concentrating as it does on global priorities, many subspecies or subpopulations are poorly represented in this Action Plan. Therefore, each country or region should develop plans that address its own threatened species or subspecies and which build upon the worldwide priorities outlined here. Venezuela developed a comprehensive Action Plan as part of a national symposium on conservation priorities for parrots. The symposium included the participation of government representatives, non-governmental organisations (NGOs), universities, and aviculturists. The organisers also produced a book with the most recent information on parrot biology and conservation for the country (Morales *et al.* 1994). A similar effort in Brazil resulted in a special edition of the journal of the Brazilian Ornithological Society, *Ararajuba* (Vol.5 No. 2, December 1997), with a section dedicated to parrot biology and conservation. The production of national Action Plans should be encouraged, as they will properly address conservation issues at an appropriate scale, and will provide outlets for existing information.

Species accounts

Black-billed parrot *Amazona agilis*

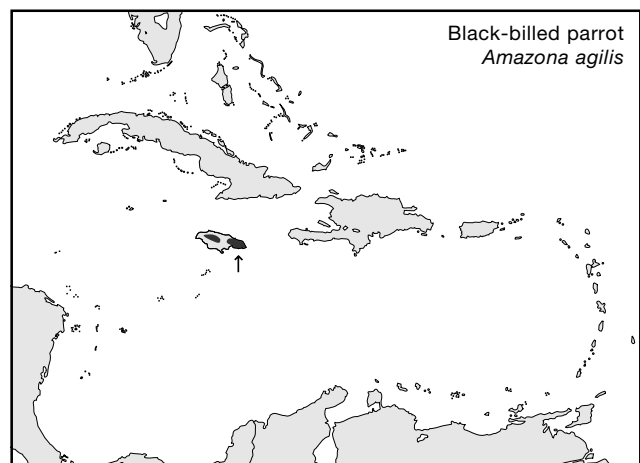
Contributors: Herlitz Davis, Susan Koenig, Wendy A. Lee, Catherine Levy, and Noel Snyder.

Conservation status: IUCN: Vulnerable (C2a).

CITES: Appendix II.

National protection status: Protected under the Jamaica Wildlife Protection Act of 1945.

Distribution and status: The black-billed parrot is endemic to the island of Jamaica. Its range is restricted to mid-level wet limestone forest, which has been severely reduced over the past 40 years. Locally common throughout the Cockpit Country, particularly in disturbed edge habitat where it is more common than the yellow-billed parrot *A. collaria*, with which it occasionally associates. Populations are also found at Worthy Park and Mount Diablo in the centre of the island. Historical reports also placed it at the eastern end of the island, although recent sightings in that area are uncommon. Small flocks have, however, been seen recently in the John Crow Mountains. Preliminary surveys indicate much greater population estimates than previously described, and possibly over 10,000 individuals in the Cockpit Country region (C. Levy *in litt* 1999).



Threats: The greatest threat to population persistence is habitat loss, although illegal hunting and collecting for the pet trade continues. There are reports of birds being shot for food and as crop pests, particularly in areas with cultivated ackee *Blighia sapida*, pimento *Pimenta* spp., and corn *Zeamays*. The most notable impact of chick harvesting is the destruction of nest trees by poachers. Nesting success is 30–50%, with successful nests producing an average of 1.9 chicks. Nests that fail due to natural or anthropogenic factors have a very low likelihood of being used the following breeding season. Poaching, even without destruction, may increase nest switching and cause birds to abandon otherwise suitable cavities for those affording less protection from predators and inclement weather/flooding, two important natural causes of nest failure. Most failed nests do so in the early nestling period, resulting from predation by yellow boa *Epicrates subflavus* (Gruber 1980) and to a lesser extent Jamaican crow *Corvus jamaicensis*. However, low reproductive performance does not appear to be limiting population health. Of unproven, but realistic threat is the possibility of disease transmittal and competition between Jamaica's native parrot species and the several introduced Psittacine species on the island (Long 1981, Lever 1987).

Table 6. A list of Neotropical parrot species that are considered threatened using IUCN Red List criteria.

Also included are additional taxa that may be threatened and are proposed as candidates for the Red List. Species are listed in alphabetical order by their scientific name, together with their distribution and threat status. The criteria under which each species qualifies are given in the appropriate species account. *Denotes changes from *Birds to Watch 2* (and, therefore, the 1996 IUCN Red List of Threatened Animals), which have been agreed to by BirdLife International who maintain the IUCN list of threatened birds.

English name	Scientific name	Distribution	Threat category
Black-billed parrot	<i>Amazona agilis</i>	Jamaica	Vulnerable
Red-necked amazon	<i>Amazona arausiaca</i>	Dominica in the Lesser Antilles	Vulnerable
Yellow-shouldered amazon	<i>Amazona barbadensis</i>	Dry coastal scrub of Venezuela and outlying islands of Margarita, La Blanquilla, and Bonaire	Vulnerable
Red-tailed amazon	<i>Amazona brasiliensis</i>	Brazil's Serra do Mar	Endangered
Yellow-billed parrot*	<i>Amazona collaria</i>	Jamaica	Vulnerable
St Vincent amazon	<i>Amazona guildingii</i>	St Vincent in the Lesser Antilles	Vulnerable
Imperial amazon	<i>Amazona imperialis</i>	Dominica in the Lesser Antilles	Vulnerable
Yellow-headed parrot	<i>Amazona oratrix</i>	Mexico and Belize	Endangered
Red-spectacled parrot	<i>Amazona pretrei</i>	Araucaria forests of south-east Brazil	Endangered
Red-browed amazon	<i>Amazona rhodocorytha</i>	Lowland hardwood areas of Brazil's Atlantic forest	Endangered
Hispaniolan parrot*	<i>Amazona ventralis</i>	Hispaniola	Vulnerable
St Lucia parrot	<i>Amazona versicolor</i>	Saint Lucia in the Lesser Antilles	Vulnerable
Vinaceous amazon	<i>Amazona vinacea</i>	Submontane 'mixed' regions of Brazil's Atlantic forest	Endangered
Red-crowned parrot	<i>Amazona viridigenalis</i>	North-eastern states in Mexico	Endangered
Puerto Rican parrot	<i>Amazona vittata</i>	Forested parts of Puerto Rico	Critically Endangered
Yellow-faced amazon	<i>Amazona xanthops</i>	Cerrado (dry woodland) of interior eastern Brazil	Vulnerable
Hyacinth macaw	<i>Anodorhynchus hyacinthinus</i>	Pantanal of Brazil and Bolivia, and North-eastern Brazil	Vulnerable
Lear's macaw	<i>Anodorhynchus leari</i>	Raso da Catarina, Bahia State, Brazil	Critically Endangered
Great-green macaw*	<i>Ara ambigua</i>	Lowland wet forests between eastern Honduras and western Colombia, western Ecuador	Vulnerable
Blue-throated macaw	<i>Ara glaucogularis</i>	Seasonally flooded Beni Lowlands (Llanos de Moxos) of Central Bolivia	Endangered
Blue-winged macaw	<i>Ara maracana</i>	Gallery forest and forest edge in parts of Brazil, eastern Paraguay, and northern Argentina	Vulnerable
Military macaw	<i>Ara militaris</i>	Mexico, Colombia, Venezuela, Peru, and Bolivia	Vulnerable
Red-fronted macaw*	<i>Ara rubrogenys</i>	Arid intermontane valleys of south-central Bolivia	Vulnerable
Golden-capped parakeet	<i>Aratinga auricapilla</i>	Semi-deciduous forests of the Paraná River Basin, Brazil	Vulnerable
Socorro parakeet	<i>Aratinga brevipes</i>	Socorro Island in the Revillagigedo Islands of Baja California, Mexico	Vulnerable
Hispaniolan parakeet	<i>Aratinga chloroptera</i>	Hispaniola, including the offshore islands	Vulnerable
Cuban parakeet	<i>Aratinga euops</i>	Cuba	Vulnerable
Rufous-fronted parakeet	<i>Bolborhynchus ferrugineifrons</i>	Forest-páramo ecotone of the Central Andes of Colombia	Endangered
Grey-cheeked parakeet	<i>Brotogeris pyrrhopterus</i>	Deciduous and dry forests of south-west Ecuador and north-western Peru	Endangered
Spix's macaw	<i>Cyanopsitta spixii</i>	Caatinga woodland and scrub of the dry region of north-east Brazil	Critically Endangered
Yellow-faced parrotlet	<i>Forpus xanthops</i>	Riparian thickets and desert scrub of the upper Marañón valley in north-central Peru	Vulnerable
Golden parakeet	<i>Guarouba (Aratinga) guarouba</i>	Northern Brazil	Endangered
Rusty-faced parrot	<i>Hapalopsittaca amazonina</i>	High Andean forests of Colombia and Venezuela	Endangered

Table 6 ... continued. A list of Neotropical parrot species that are considered threatened using IUCN Red List criteria.

English name	Scientific name	Distribution	Threat category
Azure-winged parrot (Fuertes's parrot)	<i>Hapalopsittaca fuertesi</i>	Andean forests of the west slope of the central Andes of Colombia	Critically Endangered
Red-faced parrot	<i>Hapalopsittaca pyrrhops</i>	High cloud forests near Páramo on the East Andean slopes of Ecuador and Peru	Endangered
Golden-plumed parakeet	<i>Leptosittaca branickii</i>	Cloud forests of central Colombia, Ecuador and southern Peru	Vulnerable
Yellow-eared conure	<i>Ognorhynchus icterotis</i>	Wax palm forest in the Central Cordillera of Colombia and Northern Ecuador	Critically Endangered
White-breasted parakeet	<i>Pyrrhura albipectus</i>	Upper tropical and subtropical forest of south-east Ecuador	Vulnerable
Flame-winged parakeet	<i>Pyrrhura calliptera</i>	Upper montane forest and páramo on the central eastern Cordillera of Colombia	Vulnerable
Blue-throated parakeet	<i>Pyrrhura cruentata</i>	Atlantic Forest of Brazil	Vulnerable
El Oro parakeet	<i>Pyrrhura orcesi</i>	Very humid upper tropical forest on the west slope of the Andes of south-west Ecuador	Vulnerable
Santa Marta parakeet	<i>Pyrrhura viridicata</i>	Premontane to montane forests of the Sierra Nevada de Santa Marta, Colombia	Vulnerable
Thick-billed parrot	<i>Rhynchopsitta pachyrhyncha</i>	Pine forests in mountain areas of northern Mexico	Endangered
Maroon-fronted parrot	<i>Rhynchopsitta terrisi</i>	Pine forests in mountain areas of northern Mexico	Vulnerable
Brown-backed parrotlet	<i>Touit melanonota</i>	Mid-altitude humid forests of Rio de Janeiro, São Paulo and Bahia, Brazil	Endangered
Spot-winged parrotlet	<i>Touit stictoptera</i>	Upper tropical and lower subtropical montane forests of Colombia, Ecuador, and northern Peru	Vulnerable
Golden-tailed parrotlet	<i>Touit surda</i>	Humid lowland forests of north-eastern and south-eastern Brazil	Endangered
Blue-bellied parrot*	<i>Triclaria malachitacea</i>	Atlantic forest of south-eastern Brazil	Vulnerable
Species proposed for consideration for inclusion on the Red List			
Yellow-naped parrot	<i>Amazona auropalliata</i>	Mesoamerica	To be considered Vulnerable
Cuban amazon	<i>Amazona leucocephala</i>	Cuba, the Bahamas Islands, and Cayman Islands	To be considered Vulnerable
Northern Central American populations of the scarlet macaw	<i>Ara macao cyanoptera</i>	Southern Mexico through Central America	To be considered Endangered
Saffron-headed Parrot	<i>Pionopsitta pyrrilia</i>	Humid montane forest and cloud montane forest of Venezuela and Colombia	To be considered Vulnerable

There were no wild caught specimens of the species recorded in international trade between 1991 and 1995 (CITES Annual Report database). The species was proposed for inclusion in CITES Appendix I in 1997 but this was rejected by the Parties on the basis that international trade did not appear to threaten the species.

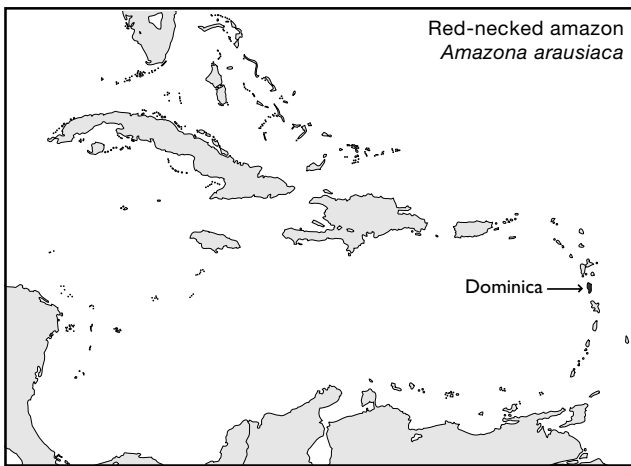
Actions: The black-billed parrot has been bred in captivity (Noegel 1979). The Blue and John Crow Mountain National Park was declared in 1993, but topography, lack of awareness, and lack of human resources for protection deter effective conservation action. The Cockpit Country has been identified as a priority area for conservation but has not yet been declared a protected area. Two research

projects are in progress under the sponsorship of the Gosse Bird Club. These projects are compiling information on distribution and population estimates, and breeding biology.

Red-necked amazon *Amazona arausiaca*

Contributors: Paul Butler, Billy Christian, Susan Koenig, and Noel Snyder.

Conservation status: IUCN: Vulnerable (D1; D2).
CITES: Appendix I.



National protection status: In 1976, the Forestry and Wildlife Act made it illegal to hunt parrots (Evans 1991).

Distribution and status: This species is found only on the island of Dominica in the Lesser Antilles. Recent surveys indicate that the main stronghold of the population is in and around the forests of Morne Diablotin from 300–800m, although the species is also found in other forested areas of the island. Numbers have apparently risen in recent years, from a low of 150 in 1980 to more than 500 by 1993 (Collar *et al.* 1994). Biologists of the Dominican Ministry of Agriculture place the population at not less than 2500 birds. *Amazona arausiaca* occurs at much higher densities than the sympatric *A. imperialis*. Flocks of up to five individuals can be seen regularly, although pairs and trios are more common. Parrots have been observed eating citrus fruits, opening the rind, and eating seeds.

Threats: The historic decline was presumably caused by a combination of hunting for food, habitat conversion, trade, and hurricanes (Evans 1991).

Actions: Although biological research on this species has been intermittent since the late 1970s, key aspects of its biology remain unknown. Such studies are needed and desired by the local government. Efforts to establish the proposed Morne Diablotin National Park should be continued, since the long-term survival of the two endemic parrots will be largely dependent on the continued existence of the intact forest in this proposed protected area (Lambert *et al.* 1993). Methods of protecting crops from damage by red-necked amazons should also be investigated as it may help reduce the human-wildlife conflict with citrus farmers. With the growing tourist trade in Dominica, this species, along with the imperial amazon, holds great promise as a target of ecotourism development.

Yellow-shouldered amazon ***Amazona barbadensis***

Contributions: Adriana Rodriguez-Ferraro, JonPaul Rodriguez, Franklin Rojas-Suarez, Virginia Sanz, and Chris Sharpe.

Conservation status: IUCN: Vulnerable (C2a).

CITES: Appendix I.

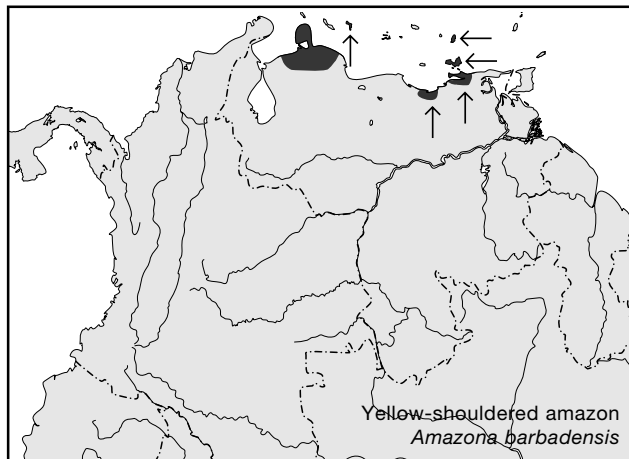
National protection status: Information unavailable.

Distribution and status: This species is endemic to the Falcon, Sucre, and Anzoátegui States of Venezuela, and to the outlying islands of Margarita, La Blanquilla, and Bonaire. It is considered extinct in Aruba. *Amazona barbadensis rothschildi* occurs on Margarita Island (1900 individuals) and on Isla La Blanquilla there are an estimated 80–100 individuals (Rodriguez-Ferraro 1996). *A. b. barbadensis* is found in Falcon and Anzoátegui states. The total population of Falcon is estimated at 400–700 individuals and at least 100 for Cerro La Misión (M. Goodwin pers. comm. 1997, Wege and Long 1995). The subspecific designation for the two races may not be valid (Amato 1995). There are also populations of unknown size in the states of Lara (Carora), and Sucre (Peninsula de Araya). On the island of Bonaire, Netherlands Antilles, the population is estimated at 450 individuals (R. Hensen pers. comm. 1992).

Threats: The main threat continues to be the trade for the national and international pet market, which particularly affects the western populations of Falcon and Lara states. In Cerro La Misión, birds are captured as local household pets. Nearly 120 individuals were confiscated in the islands of Aruba and Curaçao between 1994 and 1996, all



Alejandro Grajal



originating in the Western mainland population. There were 60 wild caught specimens recorded moving internationally between 1991 and 1995, with an annual maximum of 37 in 1994; 33 parrots were sent to Venezuela from the Netherlands Antilles where they had been seized (CITES Annual Report database).

In Margarita, habitat destruction still poses a significant threat to the recovering population of Macanao peninsula, particularly as seasonal watercourses are mined for construction materials (sand and gravel). These seasonal watercourses (quebradas) are the main nesting and feeding grounds for *A. barbadensis*. In some areas, this parrot is hunted as it is considered a pest of *Spondias purpurea* orchards.

Actions: For the Margarita and La Blanquilla island populations, Provita (a Venezuelan conservation organisation) is running a successful programme, which should be supported. This programme has combined a successful environmental education campaign (*A. barbadensis* was declared the State bird in 1990) with strong linkages to local enforcement agencies (National Guard, Ministry of the Environment), resulting in arrests for poachers, confiscations, and a fruitful foster nest programme to relocate chicks from nests at risk from poaching. Yearly census have shown the population to increase from 800 individuals in 1989 to 1900 in 1996. Detailed studies of its diet and habitat use were pivotal in an experimental and successful re-introduction project for eight animals using radio-telemetry techniques (Sanz and Grajal 1998). As the only protected area that (marginally) protects the species, La Restinga National Park in Margarita Island should be strengthened. A proposal for the creation of a dedicated wildlife refuge in the Macanao Peninsula (Rodriguez and Rojas-Suarez 1995), although supported by local government and institutions, has been stalled by the national government.

Further actions should include a census of western populations of Falcon and Lara States to assess population trends. The talks and awareness campaigns at La Blanquilla Island should be continued. An ecotourism programme in Margarita Island, focusing on the natural habitats of Macanao Peninsula, might be developed. The possibility of re-introducing *A. barbadensis* in Aruba should be explored.

Red-tailed amazon *Amazona brasiliensis*

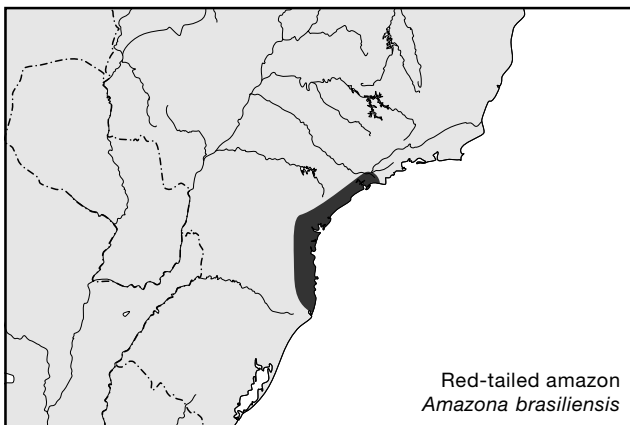
Contributions: Paulo Martuschelli, Fábio Olmos, and Pedro Scherer-Neto.

Conservation status: IUCN: Endangered (A1b,c; A2c,d; B1+2c,e; C1; C2a).

CITES: Appendix I.

National protection status: Information unavailable.

Distribution and status: The red-tailed amazon is endemic to the eastern slopes of Brazil's Serra do Mar (from sea level to 700m), in southern São Paulo and Paraná states, and northern Santa Catarina state. The total area of distribution of this species is approximately 3,000km². The species inhabits a mosaic of habitats, including mangroves, restinga flooded forests, and dense rainforest (six recognised habitat types) that occur in the narrow stretch of land (10–30km wide) from the sea to the mountains. The range includes several islands immediately offshore that are used by the parrots as overnight roosts. The most important islands are Peças, Rasa, and Superagui,



with the largest roost at Pinheiro Island. Pinheiro island is considered within the category of “Areas of relevant ecological interest”, and part of the “Area of environmental protection of Guaraqueçaba”. The population of red-tailed amazons for Paraná State, once thought to be relatively stable with circa 3,000 birds in 1988, is estimated to have declined by a third, to about 2,000 individuals in 1992 (P. Scherer Neto *in litt.* 1992). The total population of red-tailed amazons in 1997 was estimated between 3,500 and 4,500 individuals (P. Scherer-Neto *in litt.* 1997).

Threats: The main threat is capture of both adults and young for the pet trade, particularly by local people and fishermen on the offshore islands. Guarani Indians invaded Superagui National Park and Ilha Cardoso State Park and are believed to be partly responsible for low recruitment rates, through shooting of adults. These reserves receive almost no protection while the proposed Ilha Comprimida State Park and Itapanhapina Ecological Station are still in

the design phase. The proposed construction of a bridge to the mainland at Ilha Comprimida will increase tourism pressure and habitat conversion (F. Olmos *in litt.* 1997). About 356 birds were taken from the wild in the municipality of Cananeia alone in 1991/1992. Three wild caught specimens were recorded in international trade between 1991 and 1995, all in 1993 (two seized birds and one circus bird: CITES Annual Report database). Shooting, loss of nest-trees to boat builders, and deforestation for banana plantations, cattle grazing land, and beach houses are additional serious threats.

Actions: Regular monitoring of all the significant remaining populations of the species, and a major public awareness and education programme for guards and local inhabitants are urgently required. Vigilance against poaching, hunting, and tree felling should be increased in and around all the twelve protected areas within the range of the species, and the small but important Ilha do Pinheiro should be included in the adjacent Superagui National Park.

Yellow-billed parrot ***Amazona collaria***

Contributions: Herlitz Davis, Susan Koenig, Wendy Lee, Catherine Levy, and Noel Snyder.

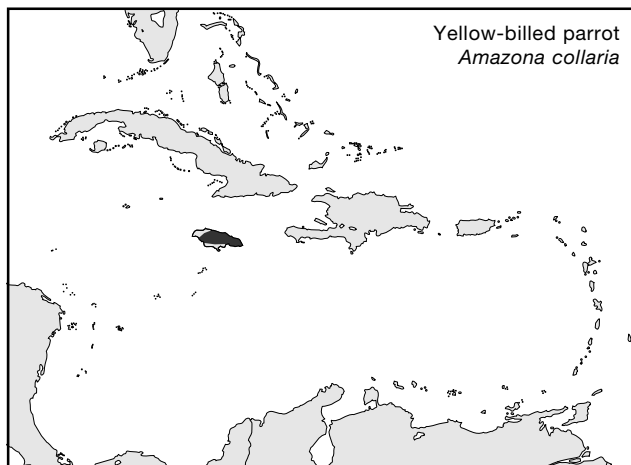
Conservation status: IUCN: Vulnerable (A1c,d).

CITES: Appendix II.

National protection status: Since 1986, both *A. collaria* and *A. agilis* have been listed as “threatened” by the Jamaican government.

This is an addition to Collar *et al.* (1994) and hence the IUCN Red List. Although there are still moderate numbers of yellow-billed parrots, it is included because it is believed to have suffered a precipitous population decline and there is strong pressure on its populations from both cagebird harvest and habitat destruction.

Distribution and status: The yellow-billed parrot is endemic to Jamaica, this species is still widespread, more so than the other Jamaican *Amazona* species, the black-billed parrot *Amazona agilis*, although no thorough island-wide surveys have yet been conducted. Flocks of 50–60 individuals are observed year-round, particularly in the non-breeding season, moving from the forest interior to edge habitat to forage. This species is particularly found in Cockpit Country, Mt. Diablo, and the John Crow Mountains. A small (presumably feral) population is also established at Hope Gardens in Kingston. In the Cockpit Country, an area which has long been considered the stronghold of this species, recent studies indicate that *A. collaria* is less abundant than *A. agilis*, possibly a result of



A. collaria being a more colourful species and preferred in trade. While *A. agilis* is currently found nesting throughout Cockpit, including disturbed plantation areas along the edges, *A. collaria* now nests almost exclusively in relatively remote interior regions. Local reports suggest a significant overall decline in Cockpit and a higher degree of threat than for *A. agilis*. Preliminary population counts suggest 5,000 individuals in the Cockpit Country, Mt. Diablo, and the John Crow Mountains (C. Levy *in litt.* 1999). The species is often difficult to distinguish from *A. agilis* at a distance and potential misidentifications may have affected the validity of some earlier reports on its abundance and distribution.

Threats: Illegal trade has been a much greater threat to *A. collaria* than to *A. agilis*, presumably because the latter is relatively difficult to keep healthy in captivity and is less

colourful. Existence of a feral *A. collaria* population in disturbed habitat in Kingston suggests that the species may have been more threatened by trade than by habitat destruction, although both factors appear to have been involved. One wild caught specimen was recorded in international trade in 1991 and none between 1992 and 1995 (CITES Annual Report database). Some persecution for crop and garden damage, especially citrus, has also been reported. Nesting success in recent studies in Cockpit Country has been lower than for *agilis*, with a high percentage (circa 70%) of pairs exploring and defending nest sites but failing to lay eggs.

Actions: A major study of both Jamaican amazons was initiated in 1995 by the Gosse Bird Club with the ultimate goal of developing conservation recommendations. Conservation efforts important to both *A. collaria* and *A. agilis* include protection of habitat, control of harvesting for the pet trade, and control of shooting. The Forestry Acts of 1937 and 1973 provide certain forms of protection to some habitat, such as the Cockpit Country Forestry Reserve, and other areas have been established as sanctuaries. Portions of the lands important to native parrots (Blue Mountains, John Crow Mountains, Portland Ridge, Cockpit Country, and major swamps) have been designated potential (and in some cases established as) national parks under the National Physical Plan for Jamaica. In 1986, both *A. collaria* and *A. agilis* were listed as “threatened” by the Jamaican government. Also, stringent gun control has been instituted by the Jamaican government. All of these policies have resulted in a general awareness of the legal status of parrots among Jamaicans. However, they are still harvested illegally for local and international trade, and a stricter enforcement policy on poaching of nests is needed. Cockpit Country is not yet an officially established national park, and comprehensive protection of this area is believed to be a central need for conservation of Jamaica’s parrots.

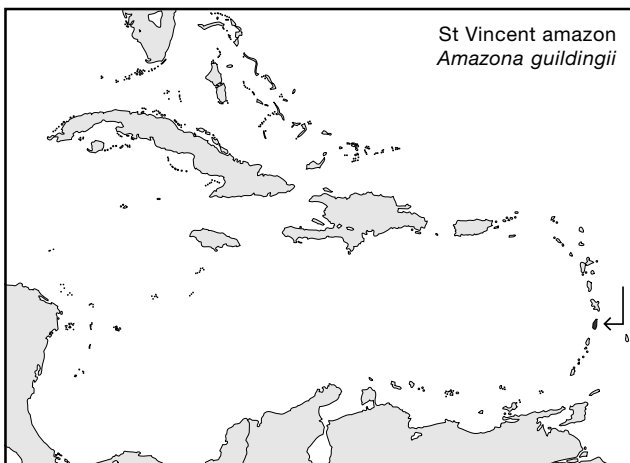
St Vincent amazon *Amazona guildingii*

Contributors: Paul Butler, James Gilardi, David Jeggo, and Fitzroy Springer.

Conservation status: IUCN: Vulnerable (D1; D2).
CITES: Appendix I.

National protection status: Information unavailable.

Distribution and status: This species is found only in the forested areas of the island of St Vincent in the Lesser Antilles. Biennial surveys conducted since the late 1980s suggest that the population is quite stable, possibly increasing recently to 800 birds (Collar *et al.* 1994).



Approximately 30 individuals are currently in captivity in an aviary in the Botanical Gardens in St Vincent. Approximately 60 birds are also found in Barbados, North America, and Europe combined. All known captive birds are registered in a studbook for this species.

Threats: Historically the major threats have been hunting for both food and the pet trade, and to a lesser extent, habitat conversion. Chicks were taken from nests which partially explains why there are more of these birds in captivity than there are St Lucia parrots, which were apparently never collected.

Intermittent hurricanes may have reduced population numbers in the past, particularly Hurricane Allen in 1980. The eruption of the Soufriere volcano in 1979 directly eliminated undetermined numbers of parrots as well as destroying a considerable amount of the remaining forest

on the island (Nichols 1981). Both types of natural disasters are to be expected in the future and can only be effectively countered by a healthy population of parrots in a healthy quantity of habitat.

Actions: As with all the amazons of the Lesser Antilles, this species has received considerable domestic and international attention (Butler 1992). Initiated in the late 1980s, education campaigns and political action have led directly to meaningful protection of the rainforest and of this species. This species has itself become the St Vincent and the Grenadines' National Bird (Butler 1988).

This species remains one of the least studied of all the Caribbean amazons. Beyond the population surveys and the description of several nest sites, little is known of its biology. In addition to continued protection and censusing, a study of the reproductive success, movement patterns, and habitat requirements of this species is fundamental to its continued recovery.

Imperial amazon *Amazona imperialis*

Contributors: Paul Butler, Billy Christian, Susan Koenig, and Noel Snyder.

Conservation status: IUCN: Vulnerable (D1; D2).

CITES: Appendix I.

National protection status: Dominica's Forestry and Wildlife Act of 1976 prohibits the hunting of parrots.

Distribution and status: This species is found only in the rainforests of Morne Diablotin and in the southern mountains east of Rousseau on Dominica in the Lesser Antilles. In the early 1990s it numbered less than 100 individuals (Evans 1994), although recent observations suggest higher numbers. In 1994 close to 100 individuals were observed in just one valley on the west side of Morne Diablotin. The total population was roughly estimated to be in the low 100s (N. Snyder *in litt.* 1997). Biologists at the Dominican Ministry of Agriculture estimate the population for 1998 at 250 to 300 birds.

Threats: Shooting for food was historically the most important threat but this threat has been much reduced in recent years. There has been some deforestation but the occupied habitat of the species is still in relatively good shape. Presumably Hurricane David in 1979 reduced the population somewhat, but the main effects of the storm were in the southern part of the island.

Little is known of the threats from potential competitors. Red-necked parrots apparently initiate nesting earlier in the season, and in one instance a pair of red-necks used an historic imperial amazon nest site.



Actions: In recent years the imperial amazon has benefited from joint government and NGO efforts to protect its habitat and sensitise local citizens to its needs. Although biological research on the biology of this species has been intermittent since the late 1970s, key aspects of its biology remain unknown.

Efforts to establish the proposed Morne Diablotin National Park should be of top priority, since the long-term survival of the two endemic parrots will be largely dependent on the continued existence of the intact forest in this proposed protected area. With the growing tourist trade in Dominica, this species along with the red-necked amazon holds great promise as a target of ecotourism development. Very little is known about the ecology of this species and what factors are currently affecting its status. Such studies are needed and desired by the local government. Late news: the Morne Diablotin National Park was established in January 2000.

Yellow-headed parrot ***Amazona oratrix***

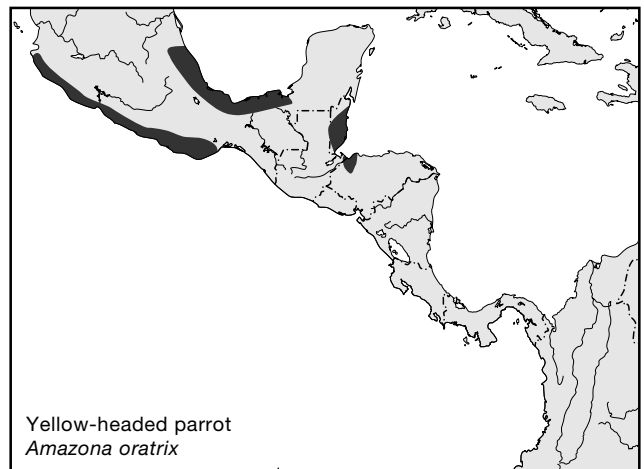
Contributors: Sergio Aguilar, Alvaro Aragón-Tapia, Mauro Berlanga, Jack Clinton-Eitniear, Ernesto Enkerlin-Hoeflich, Jaime Gonzalez-Elizondo, José Luis Manzano-Loza, Carolyn Miller, Ernesto Ruelas, Mario A. Vazquez, and Paul Wood.

Conservation status: IUCN: Endangered (A1a,c,d; A2c,d; C1; C2a).

CITES: Appendix II.

National protection status: Endangered in Mexico (Peligro de extinción, NOM-ECOL-059-1994).

Distribution and status: This species is native to Mexico, Belize, Guatemala, and Honduras. Populations have dramatically declined through most of its range. Four forms or races are considered but have yet to receive official subspecific recognition (Clinton-Eitniear *in litt.* 1997). *A. o. oratrix* and *A. o. "magna"* are respectively found primarily along the eastern and western coasts of Mexico. *A. o. tresmariae* is endemic to the Tres Marias Archipelago off the coast of Nayarit, Maria Madre, Maria Magdalena, and Maria Cleófas in Mexico. *A. o. belizensis*, once formerly widespread in coastal Belize, is now primarily found in north-western Belize, and along the northern Guatemala-Honduras border. Its present range is very similar to its historic range although its distribution is



currently contracting and is now reduced to isolated populations within its core range (see also map in Howell and Webb 1995).

Threats: *A. o. oratrix* is highly sought after by both the national and international pet market (Enkerlin-Hoeflich and Packard 1993). It is evidently still present in illegal national trade since juvenile and yearling birds (recognised by the extent of yellow on the head and other subtle characteristics) are still found openly exhibited by proud owners who upon questioning argue that they have had the pet for “many years” (Enkerlin-Hoeflich *in litt.* 1997). *A. oratrix* is the second most important species in the number of confiscated parrots at the Mexico-Texas border after *A. auropalliata* (Gobbi *et al.* 1996). *A. oratrix* most likely originate in Mexico, whereas *A. auropalliata* are presumed to be passed through Mexico from Honduras and Guatemala. There were 53 wild caught specimens of the whole species recorded in international trade between 1991 and 1995, with an annual maximum of 25 individuals in 1995 (CITES Annual Report database).

Actions: Increased awareness campaigns are the greatest hope for the species. Several organisations within Mexico such as TEYELIZ and Naturalia have initiated country-wide campaigns to educate the public of those Psittacines species that may be traded legally. Colourful posters depicting illegal species are posted in every airport and customs check points throughout the country. Mexican wildlife authorities through PROFEPA have greatly improved their capabilities for law enforcement and confiscation. Jail sentences and follow-up actions are still the exception but the exposure of offenders is creating enough awareness amongst the great majority of the public.

Ample opportunity lies with education and pride generation in rural areas. The majority of the land in Mexico is privately owned. Co-operation with landowners appears to provide the greatest opportunity to ensure effective conservation measures. The Centre for the Study of Tropical Birds in conjunction with Mexican institutions has started the “Día de los Loros”, a one day festival in the remaining core area for the species in north-east Mexico (J. Clinton-Eitniear *in litt.* 1997). In terms of intensive population management, reduction of pre-fledging mortality seems to hold most promise as *A. oratrix* do not commonly double clutch and do not seem limited by nest sites. Elimination of predation by snakes might allow for minimum increased recruitment of approximately 10% of active nests in Mexican areas. Such an increase in productivity would be considerable for a population comprising a few thousand individuals. Other alternatives would be to implement nest guarding. This approach has been used in the conservation of the Puerto Rican parrot (Lindsey 1992). We envision however that the use of

intensive techniques for conservation of species *per se* is unlikely to be required. Instead, such techniques will remain to be used only as a last resort especially when the cost effectiveness of education and enforcement is considered.

Tres Marias population (*A. o. tresmariae*)

Distribution and status: *A. o. tresmariae* is endemic to Tres Marias Archipelago off the coast of Nayarit, Maria Madre, Maria Magdalena, and Maria Cleófas in Mexico.

Threats: *A. o. tresmariae* individuals continue to be trapped by local island residents. Reports of Tres Marias parrots being moved within the market in mainland Mexico are frequent but impossible to substantiate (J.C. Cantata *in lit.* 1997). The Mexican Government recently authorised the extraction of nine pairs for “conservation through aviculture” to a private breeding facility, which might increase demand by other aviculturists. The Government of Mexico has also announced a national programme to establish “units for wildlife use and conservation” (UMAs) around Mexico. Whilst this scheme may eventually prove to be successful, at present it poses a serious threat to a number of parrot species, including *A. oratrix* for which increased trade will result as these facilities start. As controls are currently lax, it will also greatly increase the probabilities for laundering wild caught birds. Fifty three wild caught specimens of the whole species were recorded in international trade between 1991 and 1995, with an annual maximum of 25 in 1995, together with an individual noted as this subspecies in 1992 and another 1994 (CITES Annual Report database).

Actions: Fortunately for the future of *A. o. tresmariae*, the archipelago will remain under the control of Mexican prison authorities. The Secretaría de Gobernación (Ministry of Government Affairs) intends to afford protected status designation to the islands and include a sea buffer area around them (J. Díaz de Leon *in litt.* 1997). A proposed project will evaluate the state of endemic birds, with special emphasis on the two parrots *A. o. tresmariae* and *Forpus cyanopygius insularis*, and mammals. Another project will propose and implement measures to reduce and ultimately eradicate introduced goats, cats, and deer.

Belize population (*A. o. belizensis*)

Distribution and status: Once widespread in suitable habitat in coastal Belize, this species is now primarily found in north-western Belize, and along the northern Guatemala-Honduras border. There is reportedly a “good” population in a private reserve, the Rio Bravo Conservation and Management Area, in the north-western part of Belize.

Interestingly, this area includes Hillbank where the species was reported to be common in the 1960s (Russell 1964). Another population is reported from Monkey Bay Wildlife Sanctuary in the central part of the country along the Western Highway. (See Collar *et al.* 1992 for an ample description and account).

Threats: Although *A. o. belizensis* is well protected at the Rio Bravo and Monkey Bay properties, the population is thought to be declining throughout the country. Recent development of extensive housing tracts presents a new threat to populations in unprotected savanna areas. *A. o. belizensis* is also frequently shot as a citrus pest and citrus development is currently expanding in Belize. There is limited, if any, export of *A. o. belizensis*. There were 53 wild caught specimens of the whole species recorded in international trade between 1991 and 1995, with an annual maximum of 25 individuals in 1995 (CITES Annual Report database).

Actions: Government conservation officials in Belize have expressed interest in developing a captive parrot banding registration scheme for *A. o. belizensis*. After captive birds are banded and registered, newly captured birds can be confiscated, and owners can be prosecuted. The Belize Zoo has been active over the years in discouraging parrots as pets, and most school children visit the Belize Zoo. However, there has been no widespread campaign targeted at this species. The Belize Audubon Society is initiating a publicity campaign beginning with a press release and they are developing further educational efforts targeting this species.

Ecotourism is the second largest revenue generator in Belize but it has tended to bypass savanna areas. Ecotourism is being developed at the Rio Bravo Conservation Area and *A. oratrix* could conceivably be an aspect of ecotourism. Bird watchers constitute a large percentage of Belize's tourists and they would no doubt be delighted to add this bird to their list. The following actions are suggested for the conservation of *A. oratrix* in Belize: evaluation of existing wild populations to determine the distribution and quality of protection; banding and registering captive populations, and an education campaign in English, Spanish, and Chinese creating conservation awareness of the species.

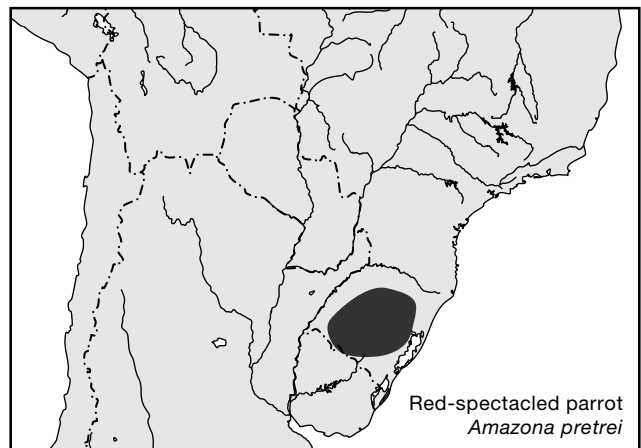
Red-spectacled parrot *Amazona pretrei*

Contributors: Jaime Martinez, and Nemora Prestes.

Conservation status: IUCN: Endangered (A1c,d; A2c,d; C1).
CITES: Appendix I.

National protection status: Information unavailable.

Distribution and status: This species is endemic to south Brazil, and distributed only in the states of Rio Grande do Sul and Santa Catarina (Martinez 1996). A few individuals have been recorded in the Misiones forests of north-eastern Argentina (Chebez 1994) and it has also recently been reported from Paraguay (see Lowen *et al.* 1997). A nomadic species, *A. pretrei* tends to concentrate in the remaining *Araucaria* forests of south-eastern Santa Catarina between March and June to feed on the mass seed production of *Araucaria augustifolia*. During August and January, *A. pretrei* disperses in small flocks that range from tens to hundreds of individuals in a wide distribution throughout Rio Grande do Sul, particularly at the habitats of Campos da Cima da Serra, Planalto Medio, Alto Uruguai, Depression Central, and Serra do Sudeste. A census in 1994 estimated total population at 10,000 individuals, repeated censuses have shown population sizes of about 12,600 individuals in 1996, and approximately 16,300 individuals in 1997 (J. Martinez *in litt.* 1997, N. Prestes *in litt.* 1997).



Threats: The main threat is thought to be the illegal domestic trade, particularly occurring in the municipalities of Lagoa Vermelha, Barracão, Esmeralda, and Muitos Capões. Approximately 500 chicks are taken annually from nests to be sold in the large urban centres of Caixas do Sul, Florianópolis, Curitiba, and São Paulo (Prestes *et al.* 1997). Reductions in the *Araucaria* seed supply may have been the cause for the change in feeding grounds from Aracuri Biological Station in 1991 (Muitos Capões municipality) to the areas around the south-east of Santa Catarina. Here the remaining *Araucaria* forest patches may provide enough seed to feed the populations of *A. pretrei*. Intense cattle grazing and agriculture have nearly eradicated *Araucaria* forest habitat. These habitat impacts have reduced natural regeneration, and may have also reduced the number of nesting sites in old trees.

Actions: The continuing monitoring programme in southern Brazil, through regular censuses in its feeding and reproduction areas, together with recent advances in radio-telemetry, are providing information on yearly movements and population dynamics. Many land owners are engaged in protection of the trees where the parrot nests. The awareness programme includes an intense environmental education programme directed at students, professors, ranchers (fazendeiros), and rural workers, using posters, presentations, and other publications. One of the communal roosts in the middle of a reproductive area was protected with the creation of the Carazinho Municipal Park. In the last two years artificial nests have been installed, but these boxes have not been used despite a potential limitation in suitable nesting trees. Further intensification of environmental education campaigns, enforcement of anti-poaching regulations, and provision of alternative sources of income for trappers could diminish the capture for the pet trade.

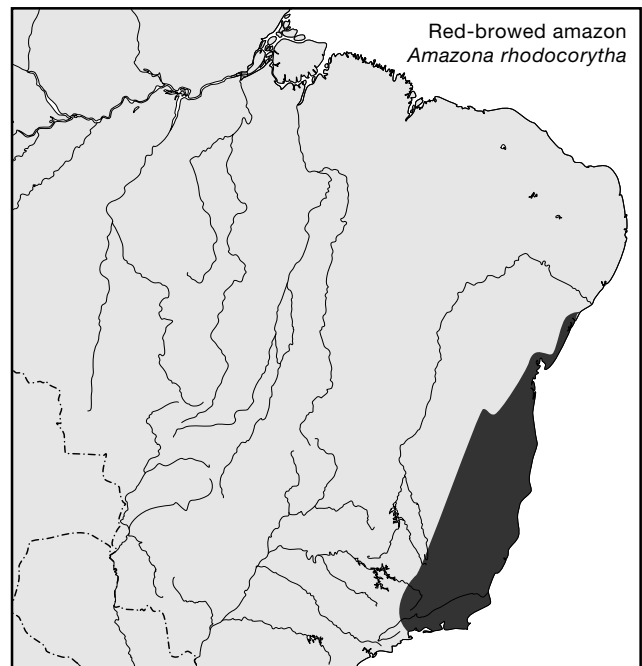
Red-browed amazon *Amazona rhodocorytha*

Contributors: Paulo Martuschelli, Fábio Olmos, and Carlos Yamashita.

Conservation status: IUCN: Endangered (B1+2c,e; C2a; D1).
CITES: Appendix I.
National protection status: Information unavailable.

Distribution and status: This species is endemic to the lowland hardwood areas of Brazil's Atlantic forest, ranging from southern Alagoas state to extreme northern São Paulo state. Its population size is unknown but it is assumed to be rapidly declining as habitat diminishes.

Threats: Habitat destruction is the main threat; the forest where this species occurs is now highly fragmented. Cocoa production was formerly the main economy in the parrot's most suitable habitats (southern Bahia state). The decline of cocoa production has led to large trees that provide suitable shade and nest sites being felled. Landless people



(“sem terras”, many of whom formerly worked the cocoa plantations) have expanded into protected areas, where they are involved in illegal logging operations. Illegal trade may also be a threat, as it is for all large parrots in Brazil (i.e., macaws and amazons).

Actions: The red-browed amazon’s most pressing need is for the location and immediate protection of additional remnant forest areas within its range. A major survey to identify the key sites for the conservation of parrot populations ranging from the eastern part of Minas Gerais in the south, to Ceará in the north is therefore the most pressing priority. The impacts of illegal trapping and other threats should be assessed by a study of parrots in Sooretama Reserve. Specifically, it is important to recognise the biological importance of the Porto Seguro Reserve (also known as Estação Veracruz) in Bahia and assign total protection to it. This reserve was purchased by a cellulose producing company from the (electric utility) Companhia de Vale do Rio Doce. All forest patches left in southern Bahia State deserve protection. These forests are vanishing quickly, as cocoa prices are dropping and landowners are selling timber to earn money. Authorities in Rio de Janeiro state should take the necessary steps to protect forests outside park boundaries where the species has been recorded, i.e., at Desenganho State Park and on Ilha Grande. The removal of nestlings as well as the capture and shooting of adult birds may be reduced by an education campaign in the areas adjacent to the breeding sites. In addition, curbing and enforcing anti-trafficking laws on the roads connecting Monte Pascoal National Park with the rest of southern Brazil may reduce the pressure on the local bird population.

Hispaniolan parrot *Amazona ventralis*

Contributor: James Wiley.

Conservation status: IUCN: Vulnerable (A1c,d).

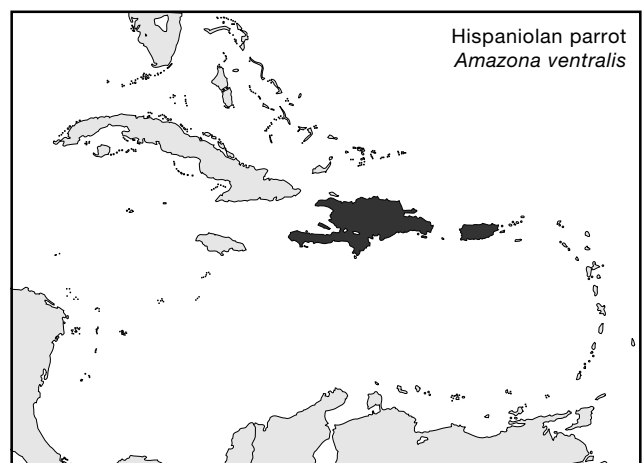
CITES: Appendix II.

National protection status: The parrot is protected by law (DR- 1975-Regulation 601) against chick harvesting and hunting in the Dominican Republic.

This is an addition to Collar *et al.* (1994) and hence the IUCN Red List. Although a relatively common parrot in Hispaniola, there has been an inferred substantial recent reduction in available habitat. Deforestation in the last protected areas and habitat strongholds is likely to accelerate in the next few years.

Distribution and status: This species is endemic to Hispaniola and outlying islands, including Grande

Cayemite, Gonäve, Saona, and Beata. The species was formerly common throughout the main island, but is now greatly reduced in numbers to the point of being extirpated or uncommon in most areas (Woods and Ottenwalder 1987, 1992; Dod 1992). In Haiti, it still occurs in suitable numbers in the Massif de La Selle and Massif de La Hotte (Woods and Ottenwalder 1992). It is considered threatened throughout its native range, where it is rapidly decreasing in distribution and number. Dod (1978, 1992) reported that its numbers declined dramatically in the 1970s and that the parrot would soon become extinct in the Dominican Republic. Woods and Ottenwalder (1992) classified the parrot as Threatened throughout its range, but noted that



the populations in Haiti are Endangered. It was introduced to Puerto Rico where it is established and locally common, especially in western and north-central parts of the island (Long 1981, Lever 1987, Raffaele and Kepler 1992).

Threats: The main threat is the loss of habitat from conversion to agriculture uses. The parrots form small to large foraging flocks that sometimes depredate crops, whereupon birds are shot or poisoned. Demand in the local and international pet trade has apparently affected most populations. Despite legislation and some vigorous efforts to curb that trade, parrots are still being harvested throughout the island. Trade was thought to be partly driven by the high price these birds command on the international market, although only 15 birds were recorded in international trade from 1991–1995 (CITES Annual Report database). Although several important parrot habitats have been established as protected areas, at least some of these (e.g., Parque Nacional Los Haitises) are poorly protected and parrot populations have continued to decline. Parrot populations in other protected areas (e.g., Parque Nacional Sierra de Baoruco) have shown relatively positive population increases, from low levels of the early 1980s, as a response to adequate habitat conservation and protection against shooting and harvesting of chicks.

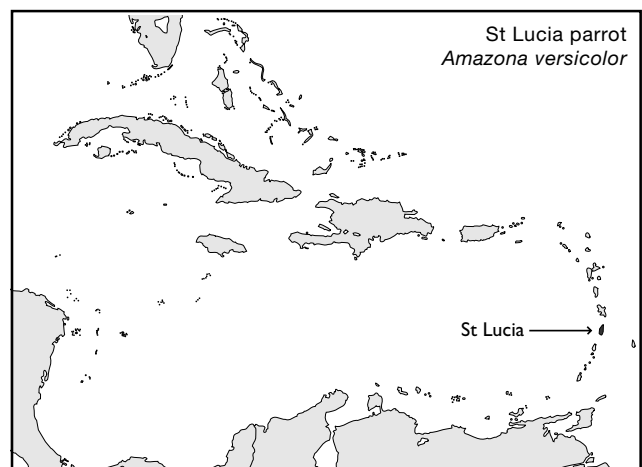
Actions: Additional protected habitat is needed. Much of the habitat which has been established as reserves requires stronger enforcement of wildlife laws and regulations. The Hispaniolan parrot has been bred in captivity in several facilities, but there is currently no need for a captive propagation and release programme (Gates 1971, Carpenter 1977, Wiley and Gee 1981, Snyder *et al.* 1987).

St Lucia parrot ***Amazona versicolor***

Contributors: Andrew Alexander, Donald Anthony, Michael Bobb, Paul Butler, Alwin Dornelly, James Gilardi, David Jeggo, C. Lyndon John, and Noel Snyder.

Conservation status: IUCN: Vulnerable (D1; D2).
CITES: Appendix I.
National protection status: Information unavailable.

Distribution and status: The St Lucia parrot is found only in the rainforests of St Lucia in the Lesser Antilles. Although once depleted from much of its range, surveys in 1996 and 1997 found the St Lucia parrot in most of the island's intact forests above 300m. Pairs have recently been observed north of the Barre de Lisle ridge (Forestiére) and flying over the town of Soufrière. Estimates from the mid-1970s suggested that the population may have dipped to as



few as 100 individuals (Jeggo 1976, Butler 1987). A survey in August 1996 roughly estimated the population to number 350–500 birds (D. Jeggo unpublished data).

There are currently five captive individuals in St Lucia, approximately 20 birds in a captive breeding programme at the Jersey Wildlife Preservation Trust (JWPT) in the British Isles, and two males at Paradise Park in England. No other St Lucia parrots are known to be in captivity.

Threats: The primary causes of the decline were a combination of habitat destruction, shooting for food, sport, and the pet trade. Currently the forest is well protected, as is the parrot. Hunting of all native wildlife is currently banned, but this legislation is in the form of a temporary moratorium that is reinstated annually.

Actions: Since the late 1970s, this species has received considerable attention both locally and internationally. Censuses have been conducted on a roughly biennial basis by the Forest and Lands Department and JWPT (see Jeggo and Anthony 1991). A large scale and highly successful education campaign was launched in 1978 involving educating adults and children, designing a

“parrot bus” as a mobile display, designating the species as the National Bird, and protecting a large portion of the species’ remaining habitat in the Parrot Reserve.

Since 1992, intensive efforts to study the ecology of this species have been undertaken by the Department of Forest and Lands, JWPT, and for the last few years by their sister group, Wildlife Preservation Trust International (WPTI). Breeding success appears to be normal for a Caribbean amazon; approximately half of the nests produce fledging chicks each year. Parrot densities in the core of the parrots’ range (Quillesse and Edmond Forests) may be approaching pre-human impact levels. Outside this area however, particularly in the northerly forests, densities remain quite low and should continue to be monitored.

While it remains to be seen what effect changes in the banana industry will have on the health of St Lucia’s forests, there remains significant pressure to resume hunting of wildlife species in the Parrot Reserve. The presence of firearms in the forest will almost certainly lead to parrot deaths and disturbance even if they are not targeted by the hunt. It would be impossible to monitor illegal hunting of parrots. Legislation to permanently ban hunting in the forest or in the country as a whole is likely to be the most constructive conservation action that could be taken in the next few years. The recent history of the St Lucia parrot has been one of the great success stories in wildlife conservation and has brought together important changes in legislation, education of native St Lucians, development of ecotourism, and scientific exploration. To allow hunting for a few individuals at this time would be a most unfortunate reversal of this tremendous success.

Vinaceous amazon ***Amazona vinacea***

Contributors: Jaqueline Goerck, Paulo Martuschelli, Fábio Olmos, and Carlos Yamashita.

Conservation status: IUCN: Endangered (A1a,c,d; A2c,d; C1; C2a).

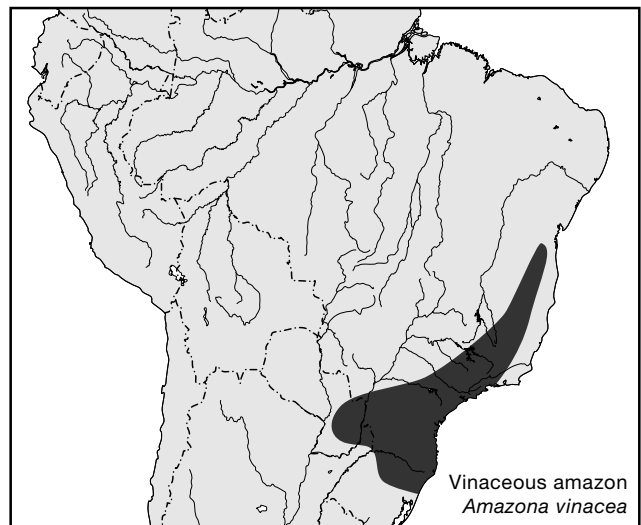
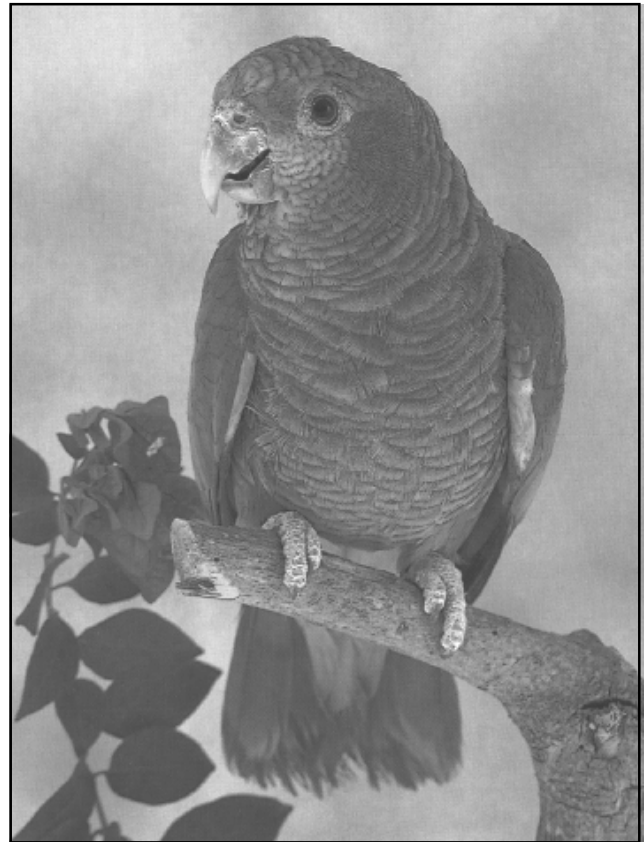
CITES: Appendix I.

National protection status: Information unavailable.

Distribution and status: This species is endemic to submontane “mixed” regions of Brazil’s Atlantic forest, ranging from Minas Gerais state to extreme northern Rio Grande do Sul state. The range consists of mixed *Podocarpus* and *Araucaria* subtropical forest. Fruit orchards also occupy much of the habitat. In Santa Catarina and Rio Grande do Sul *A. vinacea* is partially sympatric with (i.e., originated within part of the range of) *A. pretrei*.

Threats: All the populations are isolated on “islands” of suitable habitat (usually steep hills e.g., Serra de

Paranapiacaba, and Serra de Mantiquiera). Habitat destruction is the main threat, the forest being highly fragmented. Cocoa production was the main economy and was cultivated within habitat most suitable for parrots (southern Bahia state). The decline of cocoa production has led to felling of the larger trees that provided shade and suitable nest sites. Landless people (“sem terras”, many of whom formerly worked the cocoa plantations) have expanded into protected areas, where they are involved in illegal logging operations. The threat from the local pet



Vinaceous amazon
Amazona vinacea

trade is a greater threat for *A. vinacea* than it is for *A. rhodocorytha* due to its popularity.

At Campos do Jordao State Park (São Paulo), approximately 20 pairs suffer thefts of nestlings and no recruitment. The park is not adequately protected despite having field personnel. A population of approximately 180 birds occurs in the 1,500km² Jacupiranga State Park near the Paraná border. Nearly 500km² have been destroyed by just under 5,000 squatters since the 1970s. In addition to land speculation and nestling theft, a major road (the BR116) that cuts through the park is being expanded by two additional lanes with money from the Inter American Development Bank (IADB). Despite payments by the bank for environmental mitigation, these scarce funds have been used to develop tourism facilities and community development projects instead of resettling people or strengthening the park management and protection. Jacupiranga Park is an important site for parrot conservation as it still harbours significant amounts of suitable habitat for *Amazona brasiliensis*, *Triclaria*, and probably *Touit surda* and *melanonota*. A major project to turn this park into a real conservation area should be considered.

Actions: See *A. rhodocorytha*

Red-crowned parrot *Amazona viridigenalis*

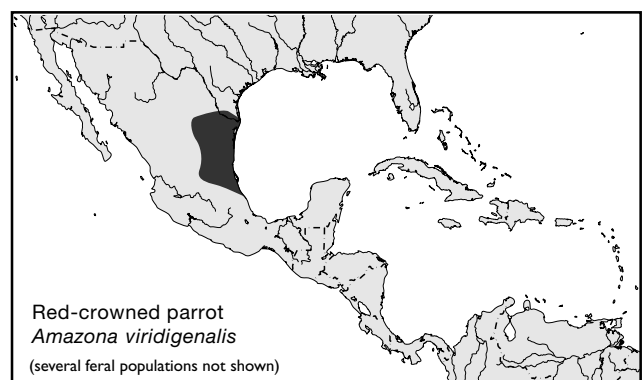
Contributors: Alvaro Aragón-Tapia, Jack Clinton-Eitniear, Ernesto Enkerlin-Hoeflich, Jaime Gonzalez-Elizondo, Teresa Lopez de Lara, José Luis Manzano-Loza, and Mario A. Vazquez.

Conservation status: IUCN: Endangered (A1a,c,d; A2c,d; C1; C2a).

CITES: Appendix I (it was transferred from Appendix II in 1997).

National protection status: Endangered in Mexico (Peligro de extinción, NOM-ECOL-059-1994).

Distribution and status: This species is resident within suitable habitat in a limited distribution of approximately 50,000km², mainly in Tamaulipas, San Luis Potosí, Nuevo León and north-eastern Veracruz, Mexico. Established feral populations are increasing in several cities in Texas, Florida, California, Puerto Rico, and Hawaii, and in the cities of Monterrey, Villa de Garcia, Mérida, Montemorelos, Tijuana, and Tampico, Mexico. The ability of this bird to colonise new habitat, especially urban and suburban, poses questions as to the validity of declaring an extension of the “natural” range to areas such as Uxpanapa in southern Veracruz, the Sierra in Queretaro State, or Tampico. As of 1995, the southern California population was estimated at



750–1,000 individuals (Garret 1997), a striking increase since 1972 when it was considered very rare (Hardy 1973).

The density estimate in 1992–94 of 5.7 birds/ha (Enkerlin-Hoeflich 1995) is within the range of estimates from two previous studies (7.3 for 1985 and 4.72 for 1986: Perez 1986), but considerably less than the 25.2 birds/ha reported in 1970s (Castro 1976). The 1992–94 estimate is based on number of nests per hectare, in contrast to the variable circular plot technique used by previous researchers. Part of the difference in density estimates could be due to problems in identification of *A. autumnalis*. Observers not thoroughly familiar with particular species can easily mistake *A. autumnalis* with historically more regionally abundant *A. viridigenalis* (Enkerlin-Hoeflich and Packard 1993).

Threats: Local eradication of *Amazona* parrots in many areas of north-eastern Mexico are due to habitat loss and capture (Enkerlin-Hoeflich 1995). However, the ability of *A. viridigenalis* to successfully make use of disturbed habitat mosaics, leads one to assume that capture is the main problem. Sixteen thousand four hundred and ninety individuals (Iñigo-Elias and Ramos 1997), largely nestlings, of *A. viridigenalis* were legally exported to the USA between 1970 and 1982, with estimates of similar numbers illegally

leaving Mexico. Pre-export mortality was estimated at greater than 50% (Enkerlin-Hoeflich and Packard 1993). The estimated minimum level of harvest was approximately 5,000 *A. viridigenalis* per year for a 12 year period, based on combined legal and illegal trade, and expected mortality. This is a very large number of individuals considering the limited range of the species. There were 63 wild caught specimens recorded in international trade between 1991 and 1995, with annual peaks of 23 in 1993 and 29 in 1995 (CITES Annual Report database).

Poaching also effects nest site availability in Mexico as poachers often fell trees to extract chicks from nest cavities. Tree-felling facilitates poaching and increases the overall impact of direct habitat loss. *A. viridigenalis* does not appear sensitive to clearing if enough nesting cavities are available (Enkerlin-Hoeflich and Hogan 1997). Given the high availability of suitable cavities, destruction of nest cavities itself is not one of the major threats to the viability of *A. viridigenalis* (Enkerlin-Hoeflich 1995).

Actions: Red-crowned parrots use cavities with a wide range of characteristics, in a variety of tree species. Acceptance of different cavity characteristics and vegetation assemblages suggests conservation of *A. viridigenalis* could be successful in mosaics of disturbed vegetation if tree replacement by native species, such as ebony, coma, and strangler fig is authorised and promoted (Enkerlin-Hoeflich and Packard 1993). If adequately promoted, pastures could instead be used as a basis for protection through education and agreements with landowners. While conservation measures should include an array of approaches, those that can rapidly reduce levels of unsustainable harvest should receive priority over more long term habitat management (Enkerlin-Hoeflich and Packard 1993). Woodlots are crucial for maintaining nesting habitat and providing germplasm for the regeneration of trees in presently treeless areas. The prevalent practice in north-eastern Mexico of clearing understorey vegetation from cattle pastures (leaving standing trees at densities of nine or more per hectare), would still provide nesting habitat for parrots in the short-term. While ranchers are becoming increasingly aware of the benefits of maintaining large trees on pastures, current pasture management schemes will continue to reduce tree density within pastures. Large expanses of land used for cattle production could be integrated into parrot conservation schemes. Given that knowledge of parrots ecology is still in its early stages, a policy of enhancing tree regeneration and maintenance of all remaining forest patches seems the safest strategy. It may be the most important component of long-term conservation, not only for *A. viridigenalis*, but for many additional species as well (Enkerlin-Hoeflich and Packard 1993).

Re-introductions have been considered for some parrot species, but given the risks inherent in such efforts (Wiley

et al. 1992) and the current status of *A. viridigenalis*, this approach does not seem to be needed or warranted. Conservation practice would benefit by considering aggregated nesting in a selection of areas targeted for management or protection of *A. viridigenalis* (Enkerlin-Hoeflich and Hogan 1997). A site- and species-specific approach for protecting known nesting areas (similar to clusters or colonies of red-cockaded woodpecker *Picoides borealis*: Haig *et al.* 1993), coupled with broader-scale but less intense protection of areas for feeding and dispersal, can be more efficient than protecting large tracts of “parrot-empty” areas. Whilst conservation of large tracks is a safe and proven strategy, it is frequently not feasible. Thus, strategies combining both conservation and development are needed, especially in developing countries such as Mexico (Enkerlin-Hoeflich 1995). CITES Appendix I listing of this species should prevent international trade, although illegal international trade from Mexico to the USA has been well documented (Gobbi *et al.*, 1996). National trapping and commercial trade of this species were banned in 1983, but more creative thought on how to implement this ban is needed.

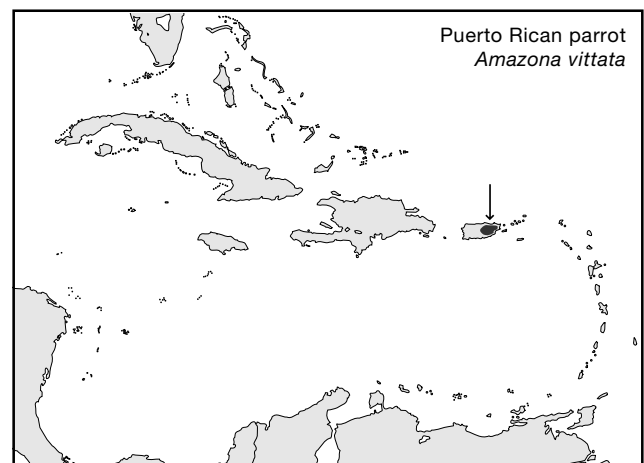
Puerto Rican parrot *Amazona vittata*

Contributors: James Wiley, Joseph Wunderle, Ann Smith, Fernando Nuñez, and Jose Chabert.

Conservation status: IUCN: Critically Endangered (D1; D2). CITES: Appendix I.

National protection status: Protected by Puerto Rico Commonwealth and United States federal laws.

Distribution and status: The endemic Puerto Rican parrot was formerly common and widespread. It occurred throughout the forested areas of Puerto Rico and the islands of Culebra (where an endemic subspecies, *A. v. gracilipes*, is extinct), Mona, and Vieques (Snyder *et al.*



1987). An estimated 100,000 parrots existed when Columbus arrived in Puerto Rico in 1493 (Wiley 1980). Now it is Critically Endangered and one of the rarest birds in the world. In 1975, only 13 parrots were known to survive in the wild (with an additional eight birds in captivity), all in the rainforest of the Luquillo Mountains (Snyder *et al.* 1987). By 1989, the wild parrot population had increased to 48 birds, but Hurricane Hugo, which swept across Puerto Rico on 18 September of that year, reduced the population to approximately 20–22 birds. As of August 1996, the Puerto Rican parrot numbered 48 wild birds and 87 in captivity.

Threats: The most important factor contributing to the decline of the parrot was the near island-wide removal of its original habitat (Wiley 1980, 1985, Snyder *et al.* 1987). Other factors included persecution by farmers, harvesting for the pet trade, and competition with and predation by native and exotic species (Snyder 1978, Snyder and Taapken 1978, Snyder *et al.* 1987). Important current threats include disease spread from exotic species of parrots, and competition with these and other species of birds and other introduced animals. The small, local (restricted to one area) population of parrots is at risk from another direct hit by a hurricane (Wiley and Wunderle 1993). There is also concern regarding genetic problems resulting from the depressed diversity of a population consisting of no more than six breeding pairs per year for three decades.

Actions: The parrot's habitat, now entirely confined within the boundaries of the Caribbean National Forest, is protected from most threats. Nevertheless, a recent threat to this reserve came from the USA Forest Service to harvest timber from the reserve in 1986. Those plans were thwarted by negative public response. The latest threat is the proposal to reopen a major highway through parrot habitat in the forest that has been closed for sometime. Through seed money from the World Wildlife Fund for Nature (WWF) and the interest of the US Fish and Wildlife Service and the US Forest Service, an intensive programme of research and conservation began in 1968. The programme has continued through to the present, with the primary involvement of the US Fish and Wildlife Service, US Forest Service, and the Commonwealth of Puerto Rico Department of Natural Resources. A captive breeding programme was begun in 1970. The captive flock consists of 93 birds, split between aviaries in the Luquillo Mountains (50 birds) and Río Abajo (43). The stock is of good genetic diversity and is genetically representative of the wild population. The first captive-produced chick was raised in 1979. That chick, as well as several other captive-produced parrots, has been used to bolster wild production through fostering into wild nests or releases of free-flying birds.

The goal of the conservation programme is to develop a strategy for the parrot's recovery, based on sound

biological data. The programme consists of (i) predator and competitor control; (ii) management of nest cavities; (iii) close guarding of active nests to maximise chick survival; and (iv) captive breeding and release.

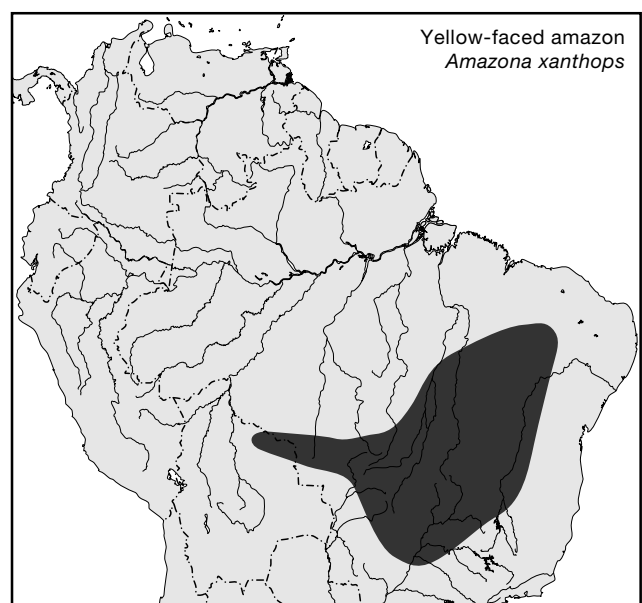
Yellow-faced amazon *Amazona xanthops*

Contributors: Paulo Martuschelli, Carlos Yamashita.

Conservation status: IUCN: Vulnerable (A1b).

CITES: Appendix II.

National protection status: Information unavailable.



Distribution and status: This species is endemic to the formerly extensive Cerrado (dry woodland) of interior eastern Brazil (found within the states of Maranhão, Piauí, Tocantins, Goiás, Mato Grosso, Mato Grosso do Sul, Bahia, Minas Gerais, and São Paulo), eastern Bolivia, and northern Paraguay. Nearly 60–70% of this area has been converted to mechanised soybean croplands in the past 20 years and the species has become extremely scarce in many areas. It moves semi-nomadically, ranging over huge areas. Although it occurs in protected areas, such as Brasília National Park, Grande Sertões Veredas, Chapada dos Veadeiros, Chapada dos Guimarães, and Emas National Park, its nomadic nature means that no protected area can permanently hold a population (A. Whittaker *in litt.* 1993).

Threats: Habitat conversion to mechanised soybean cultivation is among the threats facing this species. Nine wild caught specimens were recorded in international trade between 1991 and 1995, with an annual maximum of four in 1994 (CITES Annual Report database).

Actions: Information is urgently required on distribution, population status, and threats.

Hyacinth macaw

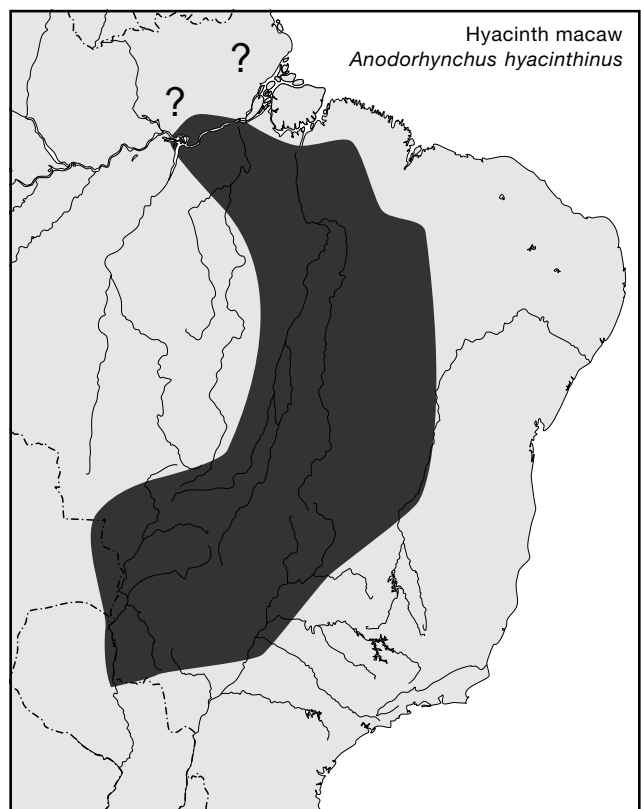
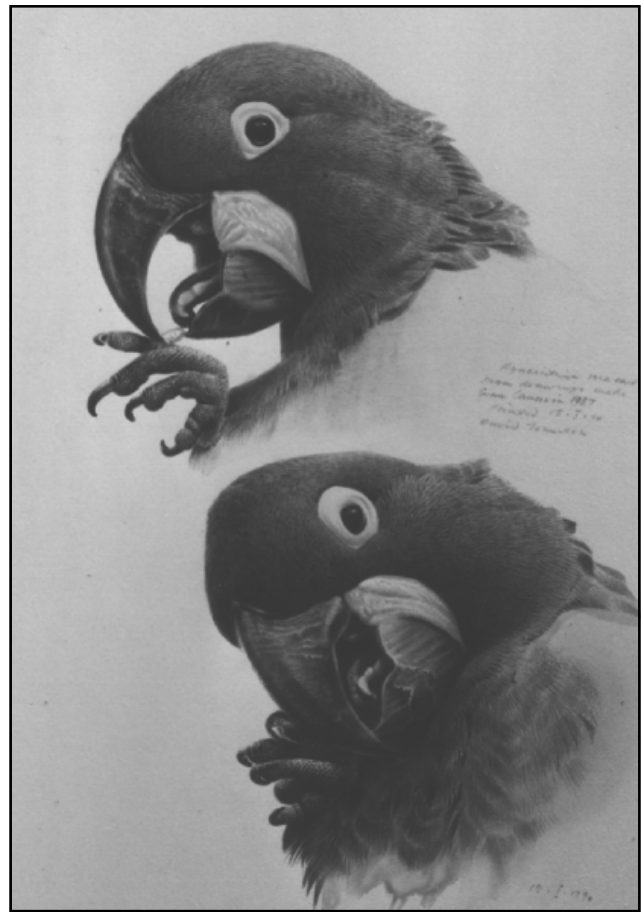
Anodorhynchus hyacinthinus

Contributors: Jaqueline Goerck, Neiva Guedes, Charles Munn, and Carlos Yamashita.

Conservation status: IUCN: Vulnerable (A1c,d; A2c,d).
CITES: Appendix I.
National protection status: Protected under Brazilian law.

Distribution and status: The Pantanal population may number a maximum of 5,000 birds (N. Guedes *in litt.* 1997). Recent work in the Chapada das Mangabeiras by BioBrasil has confirmed that a population of between 1,000 and 2,500 hyacinths still thrives in the cliff and dry forest regions of south-western Piauí State, south-western Maranhão State, north-western Bahia State, and extreme eastern Tocantins State, Brazil.

Threats: Nest-trees are still often cleared to provide areas for cattle. Illegal trapping remains a problem in some areas. The hyacinth macaw is protected under Brazilian law and has been listed on Appendix I of CITES since 1987, and is thus banned from international trade. There were 54 specimens recorded in international trade between 1991 and 1995, with an annual maximum of 17 in 1993 (mostly zoo animals and pets: CITES Annual Report database). In the Pantanal, deforestation and forest burning are a serious threat to the supply of nesting trees.



Conservation of stands of the palms *Schellea phalerata* and *Acrocomia aculeata* is considered a keystone for their survival.

Actions: Accurate studies of the species' current range and population numbers in all parts of its range are needed. Investigations of the possible illegal trading of the species throughout its range are also required. Experimental ecotourism should be developed at one or two key sites. To support this work, a broad political constituency must be built to attract donors (both from Brazil and the public abroad) to broaden funding and to protect this species in the wild.

Assessing the effectiveness of experimentally erected nest boxes should also continue. Of 11 boxes hung in 1992, all but two were visited or used. The colonisation of artificial nests by aggressive Africanised bees is a problem.

Lear's macaw ***Anodorhynchus leari***

Contributors: Pedro Lima, Charles Munn, Jaqueline Goerck, and Michael Reynolds.

Conservation status: IUCN: Critically Endangered (A2b; B1+2C, C1; C2b; D1).

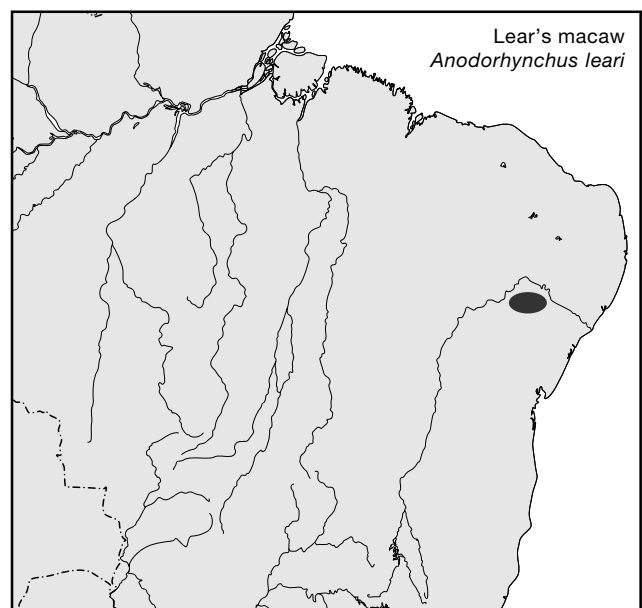
CITES: Appendix I.

National protection status: Information unavailable.

Distribution and status: This species occurs in Raso da Catarina, Bahia State, Brazil and the municipalities of Jeremoabo, Canudos, and Euclides da Cunha. Between 100 and 200 individuals are confirmed living in the wild. In 1997, Marcus de Ra counted 30 birds in a recently discovered second population. There are officially six in captivity. However, according to Yamashita and Martuschelli (*in litt.* 1997), more than 25 birds were trapped for trade over the last three years. Caught birds have been reported from Singapore, Switzerland, eastern Europe, the UK, and Brazil.

Threats: The main threat to this species is the illegal pet trade by specialised trappers who systematically catch adults and chicks with mist nets at the nest cliffs of the Toca location. This area is still only partially protected by IBAMA, the national wildlife authorities. These populations are also thought to experience food shortages as the Licuri palm nut *Syagrus coronata* experiences poor recruitment due to cattle overgrazing. This palm is a slow growing species with a long lifetime (probably several centuries).

Actions: Following the extreme drought of 1993, 50,000 *Licuri* palm seedlings were planted in plastic containers at



Fazenda Piauí near the town of Ituberá, and will be transplanted to fenced areas to protect the seedlings from livestock grazing.

In an unorthodox, but effective way to investigate the trade in Lear's macaws, the tight trading network was infiltrated with an ex-poacher-turned-conservationist. This individual proved crucial in deactivating trading within clandestine networks and providing information on key buyers and witnesses.

The recently formed BioBrasil Foundation of Bahia, Brazil, has maintained guards since 1997 at the Serra Branca nest cliffs at the suggestion and full co-operation of the land owner. A detailed plan for land acquisition and/or the establishment of reserves, including the Ecological Station close to the site, has been developed (Machado and Brandt 1990).

Priorities and funds needed to conserve this species require an absolute stop to the illegal pet trade, through

private police work in the trapping region, guarding the cliff nests, and through investigations in Rio and São Paulo. International investigations would also assist conservation of the species. It is estimated that the cost of local patrolling to stop trapping would be more cost effective and safer than trying to investigate, detain, and prosecute Brazilian and international smugglers.

Further actions for the conservation of this species should include a study of the nesting ecology to estimate reproductive success and to determine home range. Once this nesting information has been gathered, it might be possible to consider double clutching. This has been undertaken with the echo parakeet *Psittacula echo* and many others species. Additional reproductive output may require the provision of supplemental food. A further field study should describe the ranging patterns of birds at both known sets of nest cliffs, both during the nesting and non-nesting seasons. Finally, a long-term strategy should seek to mitigate the effects of long-term habitat degradation from livestock overgrazing by planting Licuri palms in safe (i.e., fenced), ungrazed locations for populations of Lear's macaw that appear to experience food shortages. Food limitations might be detectable through ranging studies and from accumulating nestling growth data in wild nests.

Great-green macaw

Ara ambigua

(also known as Buffon's macaw)

Contributors: Thomas Arndt, Robin Bjork, Eric Horstman, Niels Krabbe, Robert Pople, George Powell, Paul Salaman, and David Waugh.

Conservation status: IUCN: Endangered (A2c,d; C2a).

CITES: Appendix I.

National protection status: Information unavailable.

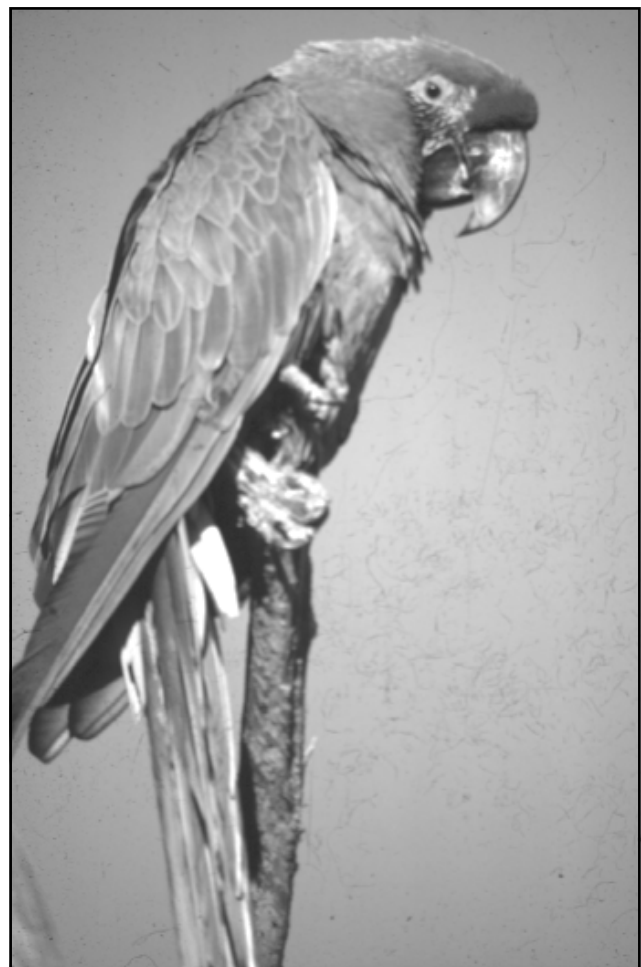
This is an addition to Collar *et al.* (1994) and hence the IUCN Red List. The great-green macaw has a small and isolated population in Ecuador, and low but unknown population numbers in Central America. It may well number fewer than 2,500 mature individuals, with no subpopulation greater than 250 mature birds. With many threats facing the species (including habitat loss, trapping, and persecution), a decline of 50% over three generations in terms of range and number of mature individuals is projected.

Central America and Colombia populations

Ara a. ambigua

Distribution and status: *Ara a. ambigua* occurs in humid lowland forests on the Atlantic slope of eastern Honduras,

Nicaragua, and Costa Rica, locally on both slopes in Panama, and north-western Colombia (AOU 1983, Ridgely 1982, Forshaw 1989, Sibley and Monroe 1990, Stiles and Skutch 1989). The Central America populations apparently exist in four separated subpopulations that are restricted primarily to Atlantic lowland forests. The westernmost population occurs in north-eastern Honduras and north-western Nicaragua. J. Barborak (*in litt.* 1997) reports that it is uncommon in Rio Plátano, Honduras, its primary refuge in that country. Its status in north-western Nicaragua is unknown. The second Central American population of *A.a.ambigua* is restricted to Atlantic wet forest in eastern Nicaragua and Costa Rica. Stiles (1985) reported that on the Costa Rican side, the species had been reduced to dangerously low levels and attributed its decline during the previous 15 years primarily to habitat loss and fragmentation. That situation has continued to worsen and there are now thought to be fewer than 36 pairs nesting in Costa Rica (Powell *et al.* 1996). Another discrete Central American population is a small relic of perhaps only a few individuals in the wetter forests on the southern tip of the Azuero Peninsula (D. Tovar *in litt.* 1997). The Darien populations in eastern Panama and the Chocó of western Colombia are still relatively common at least in



the Darien Biosphere Reserve (R. Ridgely 1982, G. Angehr *in litt.* 1996). In Colombia it has been reported at Los Katíos National Park and around Utría National Park in Serranía de Baudó (P. Salaman *in litt.* 1997).

The most detailed information comes from Costa Rica, where fragmented distribution reports of the species suggest that it is dependent on a diverse array of Caribbean slope forests throughout their annual cycle. The sequences of their use is not clear (Stiles and Skutch 1989, Loiselle and Blake 1992). Preliminary data from a radio-telemetry study of nesting great-green macaws in Costa Rica revealed that some individuals migrate at least 150km north into south-eastern Nicaragua during the non-breeding season (Bjork and Powell 1994).

Threats: The greatest threats to great-green macaw populations are loss of habitat, poaching of nestlings for the cage-bird trade, and to some extent, poaching birds for food. With the exception of fragmented habitat in western Costa Rica, where remaining forest remnants are in private hands, most of the Central American habitat has been given some level of legal protection. However, the declaration of large protected areas, such as the Rio Plátano Biosphere Reserve in Honduras, Bosawas and the Indio-Maíz Reserve in Nicaragua, has not stopped the destruction of remaining macaw habitat in those areas. Colonisation around and within these reserves continues to lead to extensive habitat loss.

In Costa Rica, nestlings were reported to be worth approximately US\$150 to US\$300 each. Poaching in the relatively accessible breeding range of the Costa Rican population is widespread (Bjork and Powell 1995). Although, all Psittacines in Costa Rica receive legal protection against being taken from the wild, rarely are the laws enforced; poachers have little fear of being apprehended. The situation in eastern Panama with the Darien reserve is apparently more stable. In Colombia's upper Sinú Valley in 1995, this species was trapped intensively and the area is in danger of deforestation (T. Arndt *in litt.* 1997). Eight specimens of the entire species were recorded in international trade between 1991 and 1995, with an annual maximum of five in 1995 (zoo animals, pets and pre-CITES-listing birds: CITES Annual Report database).

What may be a more immediate threat in some parts of the species range, is loss of a specific component of the forest: large trees for nesting. As exemplified in Costa Rica, in the first documented description of nesting by the species, 10 of the 11 observed ($n = 3$) or reported ($n = 8$) nests were located in natural cavities of large *D. panamensis* trees (Bjork and Powell 1995). The diameter at breast height of all these nest trees was greater than four metres. Furthermore, the seeds of this leguminous tree species are important in the birds' diet (Bjork and Powell 1995, Stiles and Skutch 1989, G. Mayne *in litt.* 1997). Until recently,

the trees were protected *de facto*, because their wood was too hard for processing in the saw mills (K. Batchelder *in litt.* 1994). Consequently, they were generally left standing in the selectively logged forests and even in the clear-cut pastures. This undoubtedly has allowed the macaws to exist in areas that otherwise have been heavily fragmented and degraded. However, the technology has recently been developed to process this wood as other, formerly abundant, hardwoods become depleted.

Actions: In Central America, it is urgent that the reserves in Honduras and Nicaragua are fully implemented and maintained as protected areas. International support of these national efforts is critical to their success and fully justified in recognition of their global significance. Hard wood of *D. panamensis* is now highly sought after (K. Batchelder *in litt.* 1994) and trees are being removed both from pastures and remaining forest. A moratorium on logging of *D. panamensis* trees was recently announced by the Costa Rican government, but its effects remain to be seen.

Ecuador populations *Ara ambigua guayaquilensis*

Distribution and status: The Guayas great-green macaw is found on the Pacific slopes of west-central Ecuador, in Esmeraldas and Guayas provinces (lowlands up to 600m, Pople *et al.* 1997). In Esmeraldas province, it is estimated that there are no more than 100 birds (Waugh 1995). In Bosque Protector Cerro Blanco, there is a remnant population that "barely survives" (Parker and Carr 1992), however a successful nesting pair was recorded there in 1994. It is recently thought that there are nine birds in the reserve (Waugh 1995). Said to be "easily seen" at Hacienda Gonzalez (40km north-west of Guayaquil, Ecuador), it is not known whether the population breeds there. Recent sightings have been confined to Machalilla National Park, the Chongón-Colonche Cordillera (in 1991: Parker and Carr 1992), and Bosque Protector Cerro Blanco which forms the end of the Chongón hill range (Parker and Carr 1992, R. Ridgely *in litt.* 1997). These rare sightings are undoubtedly of very small, relict populations. Fjeldsa *et al.* (1987: in Sibley and Monroe 1990) suggested that the population in western Ecuador is intermediate between *A. ambigua* and *A. militaris* and probably of hybrid origin.

Threats: In Ecuador, habitat loss, pet trade, and hunting as a cultivation pest appear to be the primary threats (Pople *et al.* 1997, Waugh 1995, Fjeldsa *et al.* 1987). Large scale clearance of the lowland wet and dry forests, where it occurs in very small numbers, is continuing rapidly. An illegal internal market still operates as may be evident by the number of captive birds in private hands; a minimum of 20 individuals were recorded in Guayaquil city alone (E. Horstman *in litt.* 1997) Eight specimens of the entire

species were recorded in international trade between 1991 and 1995, with an annual maximum of five individuals recorded in 1995 (zoo animals, pets, and pre-CITES-listing birds: CITES Annual Report database).

Actions: In Ecuador, Fundación Natura continues to try to confiscate birds as a deterrent to would-be owners and to dampen demand. This organisation also distributes large amounts of educational materials, which could feature *A. a. guayaquilensis* to a greater extent than at present. No known sustainable use of forest projects are operational in the region nor are any planned in the near future. Cemento Nacional, the country's largest cement-producing company, has formed Fundación Pro-Bosque which is working jointly with Fundación Natura (in a project named Proyecto Aspiazu). The aims of this group are to map all remaining forests, and to protect forested areas near Manglaralto using the community-owned forest approach. Fundación Pro-Bosque is studying the species in the Cerro Blanco Protection Forest in the Guayas Province of Ecuador and conducting an environmental education campaign.

The potential exists to use captive birds very effectively in education programs, and possibly for captive breeding purposes and release into the reserve. Fundación Pro-Bosque has the possibility to establish a great-green macaw captive centre within the Bosque Protector Cerro Blanco Reserve (BPCBR), and to receive a donated captive *A. a. guayaquilensis* from a rescue centre in Ecuador. It seems appropriate that when other conservation actions are more advanced for wild *guayaquilensis* in the reserve, the BPCBR could have a productive centre for captive macaws. Other areas of conservation activity that merit support are: (i) the continuing integration of neighbouring farmers (campesinos) into the guarding of macaws and the reserve in general by offering inducements, at least in the short-term; (ii) support for the Fundación Pro-Bosque education programme focused around *A. a. guayaquilensis*; and (iii) the centre for rescued captive *A. a. guayaquilensis*.

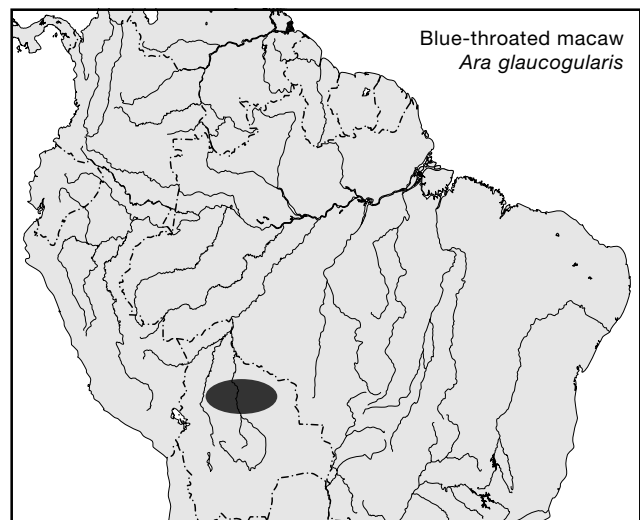
Blue-throated macaw *Ara glaucogularis*

Contributors: Paulo Martuschelli, Charles Munn, and Carlos Yamashita.

Conservation status: IUCN: Endangered (C2b; D1).
CITES: Appendix I.

National protection status: Information unavailable.

Distribution and status: This species is endemic to forest islands in the seasonally flooded Beni Lowlands (Llanos de Moxos) of Central Bolivia (Jordan and Munn 1993). The minimum population in 1994 was 54 individuals. The



most optimistic figure is 200 (Yamashita and Machado de Barros 1997). Recent estimates indicate that there are between 75 and 150 individuals in the wild.

Threats: Trapping for the pet trade could still be a problem although some protection for known populations is in place (see below). There were 14 specimens in international trade between 1991 and 1995, with an annual maximum of 12 in 1992 (probably captive-bred: CITES Annual Report database). Not enough is known of the ecology and behaviour of this species. It may always have been competitively inferior to the larger and more abundant blue-and-yellow macaw *Ara ararauna*.

Actions: A local guard of the Eco Bolivia Foundation (Bolivia) patrols known populations by foot and by motorbike. Parallel to this, the Armonía Association of Santa Cruz, Bolivia, is searching the Beni for more scattered populations of this species. It is also working on an environmental awareness campaign. This will be aimed at

the cattlemen's association to ensure trappers do not hunt these birds.

Priorities for the conservation of this species include the continuation of protection by full time guards; searching for additional populations of the species; a study of the nesting and non-nesting ecology of this bird; and a study of ecological interactions with the blue-and-yellow macaw *Ara ararauna*.

Blue-winged macaw *Ara maracana*

Conservation status: IUCN: Vulnerable (A1a,b; C1; C2)
CITES: Appendix I.
National protection status: Information unavailable.

Distribution and status: *Ara maracana* formerly occupied a large range in central-eastern South America, including parts of Brazil (Perbambuco, Piaui, Maranhão, Pará, Tocantins, Goiás, Mato Grosso, Mato Grosso do Sul, Minas Gerais, Bahia, Espiritu Santo, Rio de Janeiro, São Paulo, Paraná, Santa Catarina, and Rio Grande do Sul), eastern Paraguay, and northern Argentina (Misiones). Its habitat preferences include gallery forest and forest edge. It has undergone a steep decline, although it is recolonising one area in Rio de Janeiro State and may be more common there than anywhere else in its range. C. Yamashita (cited by Collar *et al.* 1994) has reported its last strongholds to include the Serra Negra in Pernambuco and the Serra do Cachimbo in southern Pará.

Threats: Habitat destruction has apparently contributed to the decline of this species, but the rate of decline suggests involvement of other factors as well (see Ridgely 1982, Forshaw 1989, Olmos 1993, Collar *et al.* 1994).

Actions: Information is urgently needed on the current distribution, population status, and threats to this species.

Military macaw *Ara militaris*

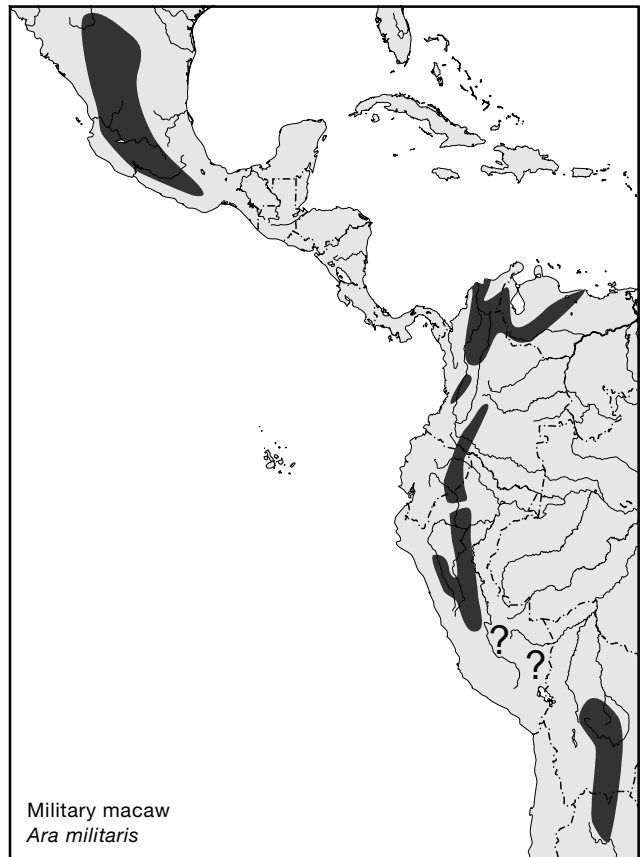
Contributors: Ernesto Enkerlin-Hoeflich, Niels Krabbe, Charles Munn, JonPaul Rodriguez, Chris Sharpe, Paul Salaman, and David A. Wiedenfeld.

Conservation status: IUCN: Vulnerable (A1c,d; C2a). Formerly Vulnerable (A1b; C2a: see Collar *et al.* 1994).
CITES: Appendix I.
National protection status: Information unavailable.

Distribution and status: This is a species with a large geographic distribution in mostly localised populations.

Its status is difficult to evaluate because these birds have ranges over large areas in rugged mountains.

In Mexico, populations are reported in and around El Cielo Biosphere Reserve in Tamaulipas, at El Naranjo in San Luis Potosí, in the Sierra Gorda de Queretaro (recently declared a Biosphere Reserve), on the Cuixmala Ecological Reserve, and other sites on the Pacific slope of the Sierra Madre Occidental. See also recent map in Howell and Webb (1995).



Military macaw
Ara militaris

The species does not currently occur in Guatemala although it may have in the past (Gardner 1972). A recent attempt to introduce captive-bred *A. militaris* to volcanoes in south Guatemala failed.

In Venezuela, it is recorded on the north slopes of El Ávila, Guatopo, Cerro La Misión, and Sierra de Perijá National Parks. There are also apparently exceptional records of numbers in Cojedes State (Desenne and Strahl 1994), and on the northern slopes of Henri Pittier National Park (Fernández-Badillo *et al.* 1994).

In Peru and Bolivia, military macaws have a patchy distribution throughout the eastern foothills of the Andes. In Peru, flocks of 40–50 individuals are seen daily at Atalaya on the Madre de Dios. They are also seen on the upper Tambopata River up to elevations of 900m near the border with Bolivia. In Bolivia, this species occurs in small flocks on the southern edge of the Amboró National Park, and is also reported from the hills of the south central Madidi National Park (near the Canyon del Beo). It is also reported by the Native Americans to live in the forests just above or around the Pongo de Mainique of the Urubamba River, Peru.

In Colombia, little is known about the five or so disjunct populations in the central Andes (see map and description in Hilty and Brown 1986). The species was recorded recently from Guajira peninsula, Tayrona, Las Orquídeas, and Cueva de los Guácharos National Parks. At Cueva de los Guácharos National Park large flocks (up to 16 individuals) were observed daily, particularly just before dusk, flying overhead.

In Ecuador, approximately 20 individuals occur on Sumaco, and the same or less in Zamora-Chinchi. No information is currently available on the population(s) in northern Argentina.

The military macaw may be conspecific with the great-green macaw *Ara ambigu* (Fjeldsø *et al.* 1987). However, until further studies are made to establish its taxonomic status, they are retained here as separate species.

Threats: This large macaw lives in some of the most fragmented habitats in the Neotropics, the lower montane wet forests of the Andes. Its deciduous forest habitat in Mexico is in a similar state. Habitat destruction in the Andes and Mexico threaten the viability of many local populations. Surprisingly, *A. militaris* is still traded nationally in Mexico and other countries (Gobbi *et al.*, 1996).

Actions: Many populations need to be surveyed to assess its status and habitat use. In Mexico, the use of “sinkholes” (cenotes) as an ecotourism spectacle could have some potential (for example at Sierra Gorda and El Cielo Biosphere Reserve), although it is unknown whether human presence will interfere with successful nesting. In the case of the El Cielo sinkhole, where at one time over 50 birds

circled in and out of the sinkhole several times a day, the population was decimated by a single trapper in the mid-1980s (Aragón-Tapia *in litt.* 1989). The populations in Peru and Bolivia require detailed surveys.

In Venezuela, controls on national movement and sales, although difficult to implement, could help all parrot species. Fortunately, most of *A. militaris*' range falls within existing protected areas (El Ávila, Guatopo, Henri Pittier, and Sierra de Perijá National Parks). Nevertheless, although this may reduce the speed at which habitat is lost, it does little to prevent capture for trade. Improved methods of enforcement are needed. Sierra de Perijá is in a particularly bad situation, being deforested for narcotics, land speculation, and cattle.

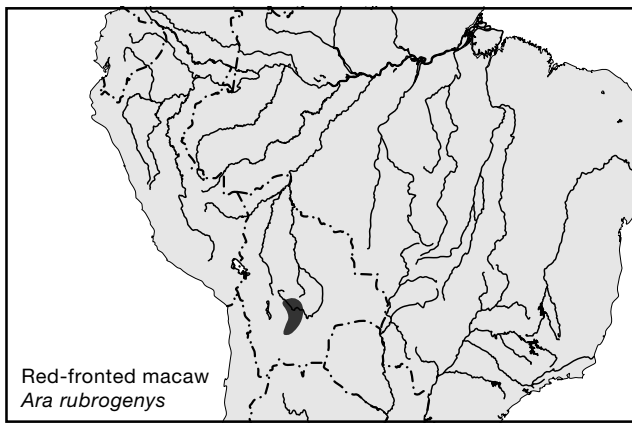
Red-fronted macaw ***Ara rubrogenys***

Contributors: Mette Bohn Christiansen, and Elin Pitter.

Conservation status: IUCN: Vulnerable (C1). Formerly considered Endangered (C2a; D1: see Collar *et al.* 1994). CITES: Appendix I.

National protection status: Information unavailable.





Distribution and status: This species is endemic to Bolivia, where it inhabits fairly arid, scrubby inter-montane valleys in south-central Bolivia (Santa Cruz, Cochabamba, and Chuquisaca provinces: Collar *et al.* 1992). Found from 1,100 to 2,500 metres. The species is resident and locally common here, but is restricted to the drainage areas of the Mizque, Grande, and Pilcomayo rivers. Pitter and Christiansen (1995) estimated the total population at 2,000–4,000 individuals and do not believe it to be “severely fragmented” as was suggested previously (Collar *et al.* 1992). Since they occur in gallery forests of large rivers, the populations are believed to be interconnected. In two areas studied, populations seemed healthy and stable, although a local trapper noted that the population had declined during the last 12 years due to habitat destruction and trapping.

Threats: Although the situation is not considered critical, rapid conversion of riparian habitats to agricultural land is forcing *Ara rubrogenys* to feed in other drier areas and on domestic crops. Nearly 40% of its original habitat may have been already destroyed (Clarke and Durán Patiño 1991). It is locally considered a serious pest to maize cultivation, and is persecuted by farmers. Trapping for the pet trade also threatens this species and still continues along the Chico River and Vallegrande. There were 23 specimens recorded in international trade between 1991 and 1995, with an annual maximum of 14 in 1994 (pets and zoo animals: CITES Annual Report database). The birds nest semi-colonially in cliffs, making them particularly vulnerable to trapping and nest destruction.

Actions: Further protection of the habitat of *Ara rubrogenys* should be a high priority. Although locally common, the conservation situation can change rapidly, since pressures to develop agricultural lands along rivers is increasing. Methods to minimise attacks on maize crops should be designed with local farmers. Several large conservation and development projects are working in the area; these should focus on maintaining natural semi-deciduous vegetation on the edges of rivers, both for the red-fronted

macaw and for local people. Fencing of key patches of gallery forests will limit cattle grazing and allow regeneration of natural vegetation.

Golden-capped parakeet *Aratinga auricapilla*

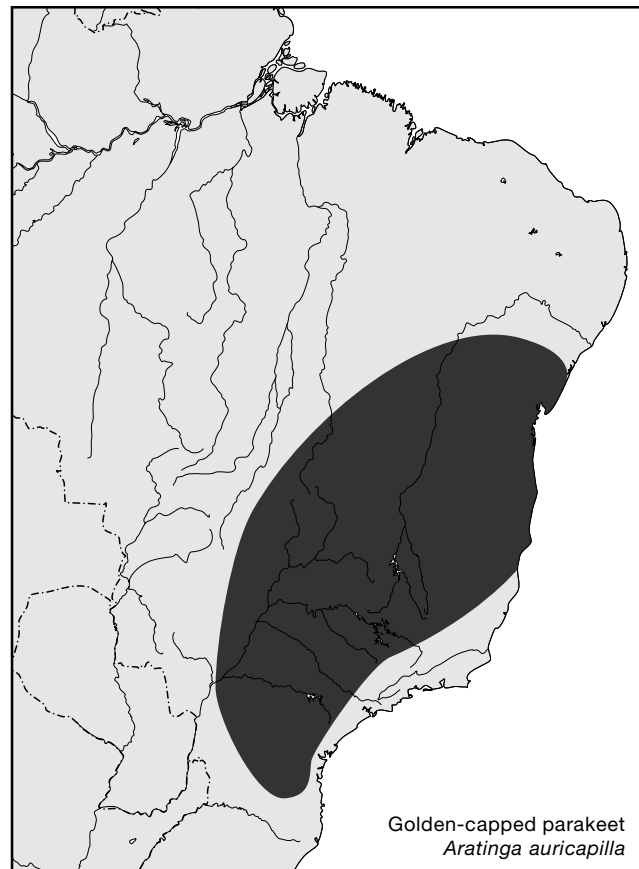
Contributors: Rita Cerqueira de Souza, Paulo Martuschelli, Fábio Olmos, and Carlos Yamashita.

Conservation status: IUCN: Vulnerable (A1a,b; C1; C2a).
CITES: Appendix II.

National protection status: Information unavailable.

Distribution and status: The golden-capped parakeet is found in semi-deciduous forests of the Paraná River Basin, Brazil, occurring in the following states: Goiás, São Paulo (Lins, Guararapes, Ilha Solteira, and Agua Vermelha), Paraná, Minas Gerais (Vale do Jequitinhonha, Furnas do Bom Jesus), Bahia, and Espírito Santo. It has disappeared from much of its original range. In São Paulo state for example, whilst there are many records of skins, there are no signs of this species today.

Threats: Habitat destruction for coffee, soybean, and sugar cane plantations occur in São Paulo. Cattle ranching



is a serious problem in Goiás and Minas Gerais. There were 16 specimens recorded in international trade between 1991 and 1995, with an annual maximum of 10 in 1991 (CITES Annual Report database).

Actions: Information is urgently required on distribution, population status, and threats.

Socorro parakeet ***Aratinga brevipes***

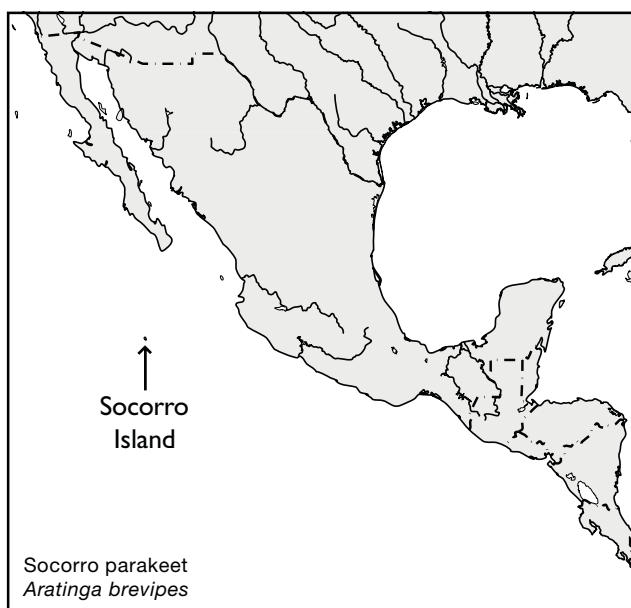
Contributor: Ernesto Enkerlin-Hoeflich.

Conservation status: IUCN: Vulnerable (D1).
CITES: Appendix II (as *Aratinga holochlora*).
National protection status: Threatened in Mexico (NOM-ECOL-059-1994).

Distribution and status: The Socorro parakeet is found only on Socorro Island in the Revillagigedo Islands south-west of the tip of Baja California. The population in 1991 was estimated to be 400–500 birds and numbers appear to be stable (Rodriguez-Estrella *et al.* 1992).

Threats: The range of this species is thought to have contracted over the past 30 years. Overgrazing by sheep may be degrading the parakeets' habitat, and predation by introduced cats remains a potential threat (Rodriguez-Estrella *et al.* 1992).

Actions: Although the Socorro parakeet is not presently threatened, the spread of soil erosion caused by overgrazing by sheep could put the status of this and other endemic birds species at risk.



Hispaniolan parakeet ***Aratinga chloroptera***

Contributor: James Wiley.

Conservation status: IUCN: Vulnerable (C2a).
CITES: Appendix II.
National protection status: Information unavailable.

Distribution and status: This species is endemic to Hispaniola, including the offshore islands. Formerly common throughout Hispaniola and on several offshore islands with suitable habitat. Still fairly common in undisturbed habitat, but elsewhere the Hispaniolan parakeet is rapidly declining in numbers and reduced in distribution. Whilst not found in the Massif de la Hotte, Haiti, it is found in the Morne la Selle (Woods 1982, Woods and Ottenwalder 1987, 1992). Introduced and established locally in Puerto Rico (Lever 1987, Raffaele and Kepler 1992). Dod (1992) considers the parakeet declining toward extinction.

Threats: Hispaniolan parakeets are not favoured as captives, but they are severely persecuted as crop pests. The most serious threat is from habitat loss (Wiley 1991). There were 12 specimens in international trade between 1991 and 1995, with an annual maximum of eight in 1994 (CITES Annual Report database).

Actions: The parakeet is protected by law against hunting and harvesting for pets in the Dominican Republic, although its legislation is not adequately enforced to ensure the species' continued survival. Even though several nature reserves and national parks have been established in the Dominican Republic, protection has not been



sufficient to save the parakeet from total eradication in some of these, such as in the Parque Nacional Los Haitises. Additional areas need protection and all areas should be provided with better enforcement of wildlife protection laws. The Hispaniolan parakeet has been successfully bred in captivity (e.g., Ottenwalder 1980, Low 1991, van der Heyden and Paulmann 1987), although captive propagation is not a conservation need at this time.

Cuban parakeet ***Aratinga euops***

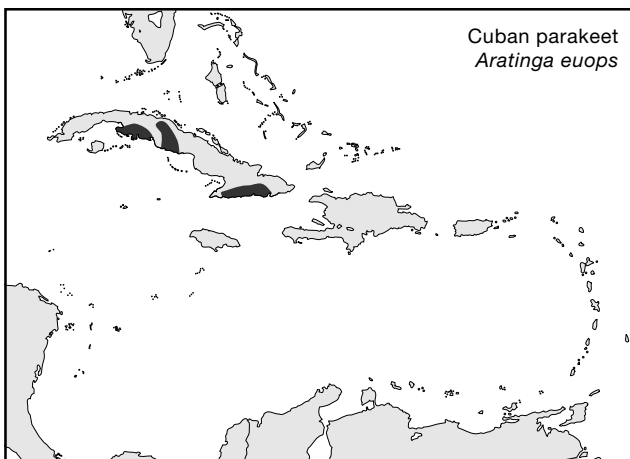
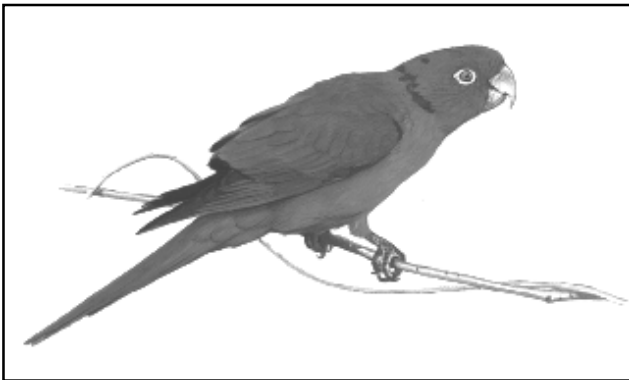
Contributors: Xiomara Gálvez, and James Wiley.

Conservation status: IUCN: Vulnerable (A1c,d; B1+2c; C1; C2a).

CITES: Appendix II.

National protection status: Information unavailable.

Distribution and status: The Cuban parakeet is endemic to Cuba, where it has declined and now has a fragmented distribution. It remains fairly common in Peninsula de Zapata, Trinidad mountains, Sierra de Najasa, and in the eastern part of the island. With the exception of Peninsula de Zapata, the parakeet is absent from the western



provinces. In Central Cuba, it occurs in Guasimal, Trinidad, Peralejo, and Camagüey (Najasa). It is found also in the eastern provinces of Holguín, Santiago de Cuba, and Guantánamo. Formerly common on the Isla de la Juventud (formerly Isla de Pinos), it was extirpated there in the late 1800s. Gálvez (1996a and b) considers the species seriously endangered. Of 14 populations studied, four are in serious decline. Paradoxically, while *A. leucocephala* has been increasing its effective population size (in response to intense habitat manipulation and protection), *Aratinga euops*, the only true endemic species of Cuban psittacid, is close to extinction.

Threats: The parakeet is in less demand as a pet than the Cuban amazon *A. leucocephala*, although 10 specimens were recorded in international trade between 1991 and 1995, all in 1995 (CITES Annual Report database). The main cause of its decline has been large-scale destruction of forest and the dependence of *A. euops* on dead palms for nest sites (*Roystonea regia* and *Sabal palviflora*: de las Pozas and González 1984, Gálvez 1996a,b). This rigid nest site preference appears to make the parakeet more vulnerable than *Amazona leucocephala*, which exhibits more flexibility in its nesting behaviour. Habitat alteration and the exposure of individual palms results in nesting sites becoming more vulnerable to the effects of fires, hurricanes, and human disturbances.

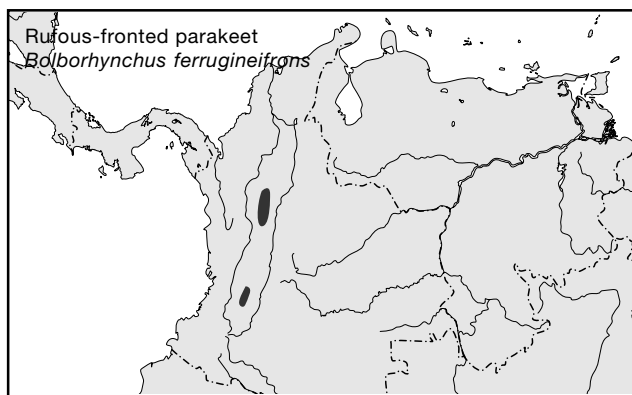
Actions: The parakeet is protected by law and receives additional protection within seven environmental reserves, including the Ciénaga de Zapata National Park and Refuge, and six other sites administered by the Empresa Nacional para la Conservación de la Flora y la Fauna. Further research is needed on the species' biological requirements, especially its nesting habitat needs. Additional habitat must be conserved for the parakeet. Given its small and fragmented populations, conservation efforts for this species should be locally tailored and should include environmental awareness campaigns and protection of nesting sites (dead palms). Ecotourism programmes in the areas of Mogotes de Jumagua and Hanabanilla have been initiated. This species has not bred in captivity despite numerous attempts. A plan to translocate mainland Cuban parakeets to the Isla de la Juventud is being developed to re-establish the extirpated population.

Rufous-fronted parakeet ***Bolborhynchus ferrugineifrons***

Contributors: Luis Miguel Renjifo, and Paul Salaman.

Conservation status: IUCN: Endangered (B1+2c; C2a; D1).
CITES: Appendix II.

National protection status: Information unavailable.



Distribution and status: This species is endemic to the shrublands in the temperate forest-páramo ecotone (3,200–4,000m) of the Central Andes of Colombia. It is known from a few specimens and observation in the Puracé Volcano in Cauca, and the Ruiz-Tolima volcanic massif complex along the junction of Caldas, Risaralda, Quindío, and Tolima. It may occur in the páramos of Las Hermosas along the border of Tolima and Valle del Cauca, and in Nevado del Huila at the junction of Cauca, Huila, and Tolima (Graves and Giraldo 1987, Collar *et al.* 1992); the latter two areas are located between Tolima and Puracé Volcanoes.

Although this species is a páramo and a forest-páramo ecotone inhabitant, it has been recorded in areas as low as 2,835m (Ridgely 1982). Little is known of the natural history of this species. A few sightings indicate that this species eats grass seeds (Graves and Giraldo 1987) and achenes of *Espeletia hartwegiana* (Renjifo 1991, J. Hernández *in litt.* 1995), and nests in burrows in banks (D. Uribe *in litt.* 1996, J. Hernández *in litt.* 1997). The total population has been estimated at 1,000–2,000 individuals (Graves and Giraldo 1987) but is perhaps lower (Collar *et al.* 1992). Rufous-fronted parakeets were seen in 1993 and 1994 between 3,000m and 3,900m in Los Nevados National Park (Salaman and Giles *in litt.* 1997).

The species' habitat is far from intact. The species is considered common by farmers in the vicinity of Laguna del Otún. The rufous-fronted parakeet was observed twice (four and six individuals respectively) during circa 30 days of bird censuses over a one year period. Other rare parrots such as *Hapalopsittaca fuertesi* were seen more often (Renjifo 1991). *B. ferrugineifrons* may be more at risk than previously suspected.

(See multi-species remarks in *Ognorhynchus icterotis*.)

Threats: Information on wild *B. ferrugineifrons* appears to have been so scarce because of its restricted range, and particularly because of its specialised niche in the forest-páramo ecotone. Although this zone, the “potato-belt”, has been highly modified, it still appears suitable for the species and most recent observations are from agricultural fields.

Given the species' apparent preference for feeding in old fields it seems questionable that deforestation poses an immediate risk. It would also appear that, like *B. orbynesius*, the species nests in ground burrows on a cliff-face/steep slope, thus tree-cavity nests largely restricted to old growth forest do not seem to limit nesting resources. Other, more subtle medium-term changes may be affecting this and other parrot species within its range, these include agricultural intensification (e.g., widespread use of herbicides), and increasing páramo overgrazing and burning.

The two areas from which the species is known are currently located within national parks, namely Los Nevados National Park and Puracé National Park. Nevertheless, extensive habitat loss has occurred and is still continuing within these and other areas where the species could potentially be found (N. Gomez and W. Vargas *in litt.* 1997, L.M. Renjifo *in litt.* 1997). The underlying problem is that although these areas have received legal protection, the Colombian State has been unable to purchase pre-existing landholdings within the national parks. As a result, extensive overgrazing, seasonal páramo burning to obtain new sprouts for cattle, and agriculture to a minor extent, are modifying most of the range of this species within and outside “protected” areas. Failure to protect the remaining good quality habitat and to restore altered habitat will result in further decline of this already endangered species.

Actions: Clearly, studies of the species population movements and its densities and distribution would be ideal; threats could be clarified and future conservation action proposed. Also, confirmation of nesting habits is very important in assessing the species' conservation priority.

Grey-cheeked parakeet *Brotogeris pyrrhopterus*

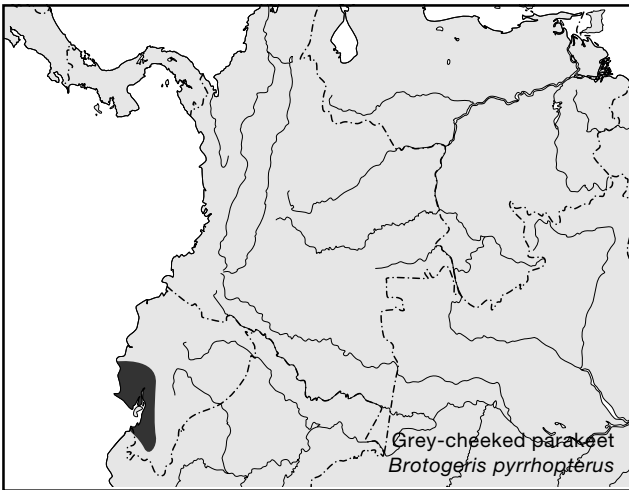
Contributors: Niels Krabbe, Michael Parr, Felipe Campos, and David Wege.

Conservation status: IUCN: Endangered (A1b, c,d).

CITES: Appendix II.

National protection status: Information unavailable.

Distribution and status: This species is endemic to deciduous and dry forests of south-west Ecuador and extreme north-west Peru and occurs in the Manabi south and Los Rios, Guayas, Azuay to Loja and crosses into Peru in the Tumbes and Piura regions (Juniper and Parr 1998). Two main and possibly disjunct populations exist, one in the coastal area of Manabi and Guayas in Ecuador and a second in the Ecuador and Peru border (Juniper and Parr



1998). Birds are seen in small groups and feed on a variety of local fruits and sometimes in local maize and banana crops (Best *et al.* 1995).

Threats: An estimated 59,320 birds were recorded in international trade between 1983 and 1988 (Best *et al.* 1995). It is suspected that the population may have declined by more than 70% in the last ten years (Juniper and Parr 1998). Although locally common, local trade and accelerated habitat destruction (Campos *et al.* 1998) may have lead to catastrophic pressure being exerted on existing populations.

Actions: International trade is banned from both Ecuador and Peru (Juniper and Parr 1998). The bird occurs in four protected areas: the Cerro Blanco protected forest, Arenilla military reserve, and Manglares Churute Ecological reserve in Ecuador; and the Tumbes Reserve Zone in Peru. Rapid habitat destruction for marginal cattle and goat herding are the main threats. Priority actions include an education

campaign and further research of the species habitat needs and population size.

Spix's macaw *Cyanopsitta spixii*

Contributors: David Waugh and Carlos Yamashita.

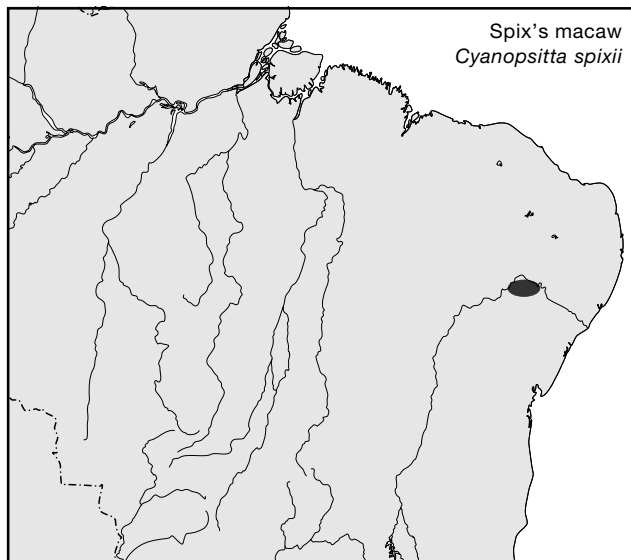
Conservation status: IUCN: Critically Endangered (D1; D2). CITES: Appendix I.

National protection status: Protected by Brazilian legislation.

Distribution and status: With only one known bird remaining in the wild, and at least 42 in captivity spread over three continents, the Spix's macaw is one of the most threatened parrot species in the world. Its Caraiba woodland habitat has suffered long-term habitat destruction, and has always been a small and scarce habitat within the more widespread Caatinga woodland and scrub of the dry to semi-arid region of north-east Brazil. However, the trapping of adult birds has been the most significant force in its population decline. In 1995 a wild caught female was re-introduced from captivity. During the second month the female paired with a wild male though after this second month the female could not be found.

Threats: The Spix's Caraiba woodland habitat has suffered habitat destruction for a very long time, possibly centuries. The trapping of adult birds during the 1970s was the main cause for the recent decline of an already threatened species with a very restricted range. With only one lone male remaining in the wild, and all other known individuals in captivity, strong co-ordination of the captive breeding programme is the only hope for this parrot. However, co-ordination among parties has not been entirely transparent, despite efforts by the Brazilian authorities and the Recovery Committee (see below). Prospects for the captive breeding





programme are not optimistic. As a former holder of this parrot, Smith (1991) commented: “The truth is that captive breeding attempts so far have been appalling. The few reared do not make up for the numbers of adults that have died, and continue to die”. There is scant information on the most recent captive-rearing results, and they do not tend to offset this pessimistic outlook. All parties should remember that time is the most critical factor in the conservation of Spix’s macaw (Collar *et al.* 1992, Reynolds 1997).

Actions: An extensive account of previous actions is reported by Collar *et al.* (1992: 266–282). A meeting co-ordinated by the CBSG (Captive [now Conservation] Breeding Specialist Group of the Species Survival Commission of IUCN-The World Conservation Union) at Loro Parque, Spain in 1987, established the basis for combined *in situ/ex situ* action. In 1989 the Brazilian Government formed a Special Working Group on the Spix’s macaw, followed in 1990 by the establishment of the Permanent Committee for the Recovery of the Spix’s macaw (CPRAA). Also, in October 1990 the Brazilian government issued a decree (Portaria 2161) providing amnesty to current holders of captive specimens that agreed to participate in the Permanent Committee to manage the captive populations. A Population and Habitat Viability Analysis (PHVA) was carried out in Brazil in October 1992. A workshop of the CPRAA at the 1989 CITES meeting in Lausanne recommended the re-introduction from captivity of the female Spix’s macaw, released in 1985. Although it is considered of high priority to establish, finally, whether further Spix’s macaws occur in the wild, after various searches this now seems unlikely. Since 1990 a major *in situ/ex situ* combined programme has been in operation under the direction of the CPRAA. This includes management of the global population, with 42 captive birds (all the Spix’s macaws declared to IBAMA/CPRAA) held by some

members of the CPRAA. New pairings are expected to increase breeding success from the presently low rate of captive reproduction. However, recent negotiations for movement of individuals among breeding facilities have often been tortuous. Rumours of captive Spix’s macaw individuals outside the declared population tend to surface at regular intervals, but none have been verified.

The field programme is studying the species’ ecological needs and is preparing the ground for an eventual re-establishment of the species in the wild. As a prerequisite for re-introduction, protection efforts for remaining habitat in addition to habitat restoration are in progress, as are botanical studies in view of the paucity of information on exact habitat requirements. The possible need for habitat management is also being examined. An assessment of the extent of Caraiba gallery forest forms part of this work. The possibility of purchasing important areas of Caraiba should also be considered. The field programme also includes a strong element of local community involvement, with school-house construction, provision of an environmental/cultural centre, and training of teachers and students from local colleges and universities.

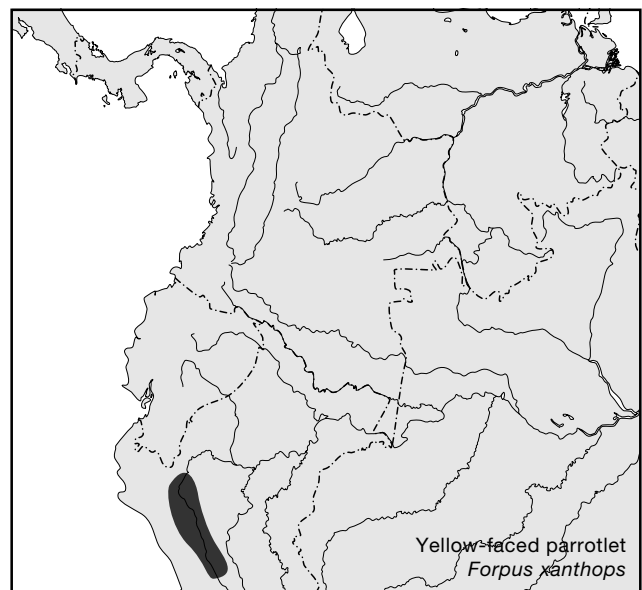
Yellow-faced parrotlet ***Forpus xanthops***

Contributors: Alfredo Begazo, Charles Munn, and Thomas Valqui.

Conservation status: IUCN: Vulnerable (A1a,c; B1+2c,e; C1; C2a).

CITES: Appendix II.

National protection status: Resolucion Directorial No. 014-83-DGFF prohibits capture and trade in this species, effective 1983.



Distribution and status: The yellow-faced parrotlet occurs in the arid woodland, riparian thickets, and desert scrub of the upper Marañón valley at 600–1,700m in three areas (southern Amazonas, Cajamarca, and extreme eastern La Libertad) in north-central Peru (Girdler 1982, Riveros *et al.* 1991, Begazo 1996).

Threats: Trapping for the domestic pet trade is the main threat to this species. Captive birds suffer very high mortality rates. Its typical habitat is not well suited for agriculture or intensive grazing. Some habitat loss by subsistence farmers and their goat herds may be occurring in the region.

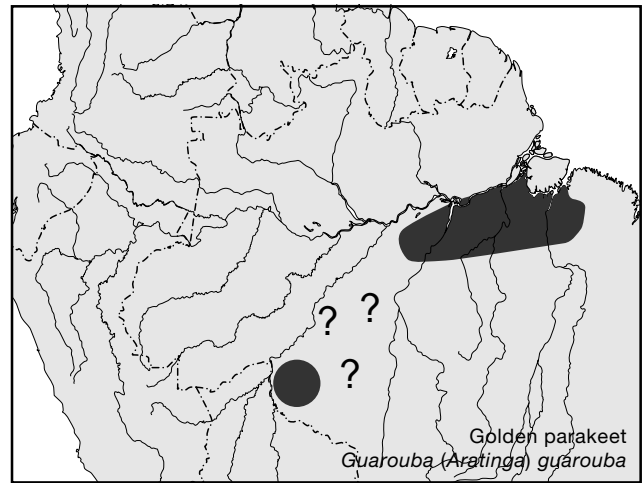
Actions: This species may require a back-up population in captivity as the wild birds are unlikely to attract ecotourism or other attention that might lead to habitat protection. In the Huallaga valley it is not yet possible to predict whether conservation is possible over the short, medium, or long-term. This area is a major coca producing area and the social, political, and the environmental situation is very unstable. This species seems to do well in forest patches comprising of secondary growth and original forest. Therefore it may not need primary habitat. Possibly only two to three families trap this species, which has low local value because of its similarity with *Forpus coelestis*. Given also that the birds breed in colonies in rocky ravines, it might be possible to effectively involve key local people in conservation efforts (A. Begazo *in litt.* 1997).

Golden parakeet *Guarouba (Aratinga) guarouba*

Contributors: Paulo Martuschelli, and Carlos Yamashita.

Conservation status: IUCN: Endangered (A2c,d; C1; C2b).
CITES: Appendix I (as *Aratinga guarouba*).
National protection status: Information unavailable.

Distribution and status: The golden parakeet is restricted to Brazil, where it occurs in northern Maranhão (comprising of five localities, four of them close to or



within the Gurupi Biological Reserve), south-eastern Amazonas, northern Pará (many localities all north of 5°S), and north-central Mato Grosso. Recently the species has been recorded from Rondônia. The most important area is in Pará state, between the Tocantins and lower Xingú Rivers. This species appears to roam widely and is not predictably found in one area at any given season.

Threats: This species suffers from both the destruction of its (almost exclusively *terra firme*) rainforest habitat and illegal trapping (being a much desired aviary bird, both internationally and nationally) and hunting for food. Its main distribution range is centred in an area of land conflicts between farmers, ranchers, forest loggers, Indians, and landless peasants, including the controversy over mining at the Carajas site (Serra Leste). In the eastern part of the range (the Tocantins-Xingú area) illegal logging and mahogany exploration is resulting in habitat destruction. As *Guarouba* roosts in tree cavities at night it is relatively easy to trap.

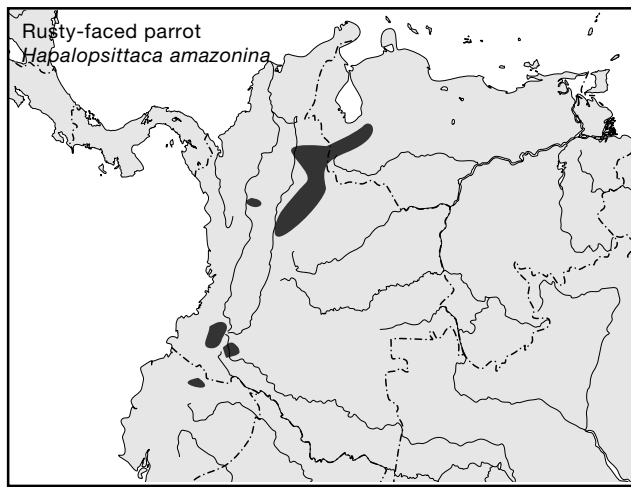
Actions: Information is urgently required on its distribution (including habitat use), status, and threats.

Rusty-faced parrot *Hapalopsittaca amazonina*

Contributors: Luis Miguel Renjifo, JonPaul Rodriguez, Franklin Rojas-Suarez, and Chris Sharpe.

Conservation status: IUCN: Endangered (A1c; A2c; B1+2c,d; C1).
CITES: Appendix II.
National protection status: Information unavailable.

Distribution and status: The rusty-faced parrot is confined to Colombia and Venezuela, are is very local throughout its range. In Venezuela, *H. a. teresae* occurs in Mérida and



northern Táchira states, from 2,000–3,000m. It is found mainly in the Sierra Nevada National Park, but also in Páramos Batallón and La Negra National Park. A small population may also exist in La Carbonera on the north-west side of the Rio Chama. *H. a. amazonina* occurs in El Tamá and apparently also in Sierra de Perijá National Park (Desenne and Strahl 1994). In Colombia it is found in Norte de Santander, Santander, Cundinamarca, Caldas, and possibly Cauca and Huila. Of the three subspecies, one is endemic to Colombia (*H. a. velezi*), one (*H. a. amazonina*) occurs mainly in Colombia and whose range marginally covers Venezuela, and the third (*H. a. theresae*) is endemic to Venezuela. The two protected areas of relevance to the species in Venezuela are the most threatened areas in the country: Tamá National Park (which may have a population of *H. a. amazonina*) and Sierra Nevada National Park (the only conservation area in existence for *H. a. theresae*). In Colombia the species is recorded in protected areas including Chingaza National Park, Puracé National Park, and Cueva de los Guácharos National Park. It is not known whether it frequents these areas only seasonally. A well protected but probably small population of *Hapalopsittaca amazonina velezi* is found in the Rio Blanco watershed in the outskirts of the city of Manizales. Here the species seems to be a permanent resident (D. Uribe *in litt.* 1996). The area lies within the city boundaries and is conserved for watershed protection. Probably fewer than 1,100 individuals (of both subspecies) occur in Venezuela (Rodriguez and Rojas-Suarez 1995) and population trends are not known.

Threats: In Venezuela, the loss of habitat for cattle raising, subsistence agriculture, and settlements is the main threat to this species. The Andean forests where this species is found are becoming increasingly fragmented. However, even in suitable habitats the species is rare.

Actions: Research should be carried out on the distribution and ecology of the species to clarify whether the existing

protected area system is adequate to ensure the survival of the three subspecies. Preparation of a long-term management plan and protection of Sierra Nevada National Park in Venezuela is also needed. Unprotected forests in the Andes need identifying and require urgent protection, not only for this species, but also for the 25 other endemic birds found there (Collar *et al.* 1992). Currently the environmental group PROVITA is targeting this species in Venezuela. The first steps must be a census and ecological study of their breeding biology and habitat requirements.

Azure-winged parrot *Hapalopsittaca fuertesi*

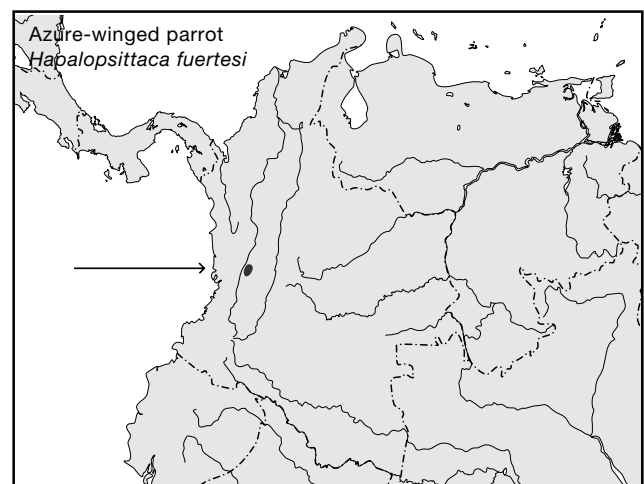
(Fuentes's parrot in Collar *et al.* 1994. Name changed here to conform to Colombian usage.)

Contributor: Luis Miguel Renjifo.

Conservation status: IUCN: Critically Endangered (D1; D2). CITES: Appendix II.

National protection status: Information unavailable.

Distribution and status: The azure winged parrot is known only from the humid temperate forest on the western slope of the central Andes of Colombia in the Alto Quindío, Quindío area. This area is found close to the border of Risaralda, and Tolima areas. The species is known to survive only in the Acaime Reserve and in the Quindío Canyon (2,600–3,500m), where the population is thought to be less than one hundred individuals. It may also occur in the adjacent upper parts of the Toche Canyon. Unfortunately, this pass is being cleared. Local habitat protection efforts such as purchasing discrete parcels of forests can protect impressive forested habitats and would be more effective for this species than for *Ognorhynchus* or *Leptosittaca*. *H. fuertesi* appears to be rather sedentary but is difficult to observe because of its reticent behaviour (as with other species of the genus *Hapalopsittaca*). Often,



the only evidence of their presence is their rather soft vocalisations (which are different between *H. fuertesi* and *H. amazonina*).

(See multi-species remarks in *Ognorhynchus icterotis*.)

Threats: In many parts of its potential range the threat of habitat loss and fragmentation is severe.

Actions: Highest priority should be given to supporting Alto Quindío, where the ecology of azure-winged parrot, especially with respect to feeding and breeding, should be researched, and every step taken to ensure optimum management to maximise the population there. The Los Nevados National Park (and the adjacent Navarco Nature Reserve) should be surveyed for the possible occurrence of this species. Appropriate management should follow if it is found to exist in these areas. The remnant patch of forest in which it may have been sighted in 1980 and adjacent habitat should also be investigated and protected. Institutional support for Fundación Herencia Verde will assist in maintaining their Acaime private reserve.

Red-faced parrot *Hapalopsittaca pyrrhops*

Contributors: Jeremy Flanagan, and Paul Toyne.

Conservation status: IUCN: Endangered (A1b; A2b; B1+2c; C1; C2a; D1).

CITES: Appendix II.

National protection status: Information unavailable.



Left to right: *Hapalopsittaca pyrrhops*, *H. fuertesi*, *H. amazonina*



Distribution and status: The red-faced parrot is restricted to high Andean cloudforests on the eastern slopes of the Andes of Ecuador (Morona Santiago, Azuay and Loja provinces) and in the adjacent Piura province of Peru. In this area it is rare and uncommon. Surveys in the Podocarpus National Park of Loja Province, from Cajanuma to Yagana reveal that the parrot occurs in low density and is rarely seen in flocks of more than six individuals (Rasmussen *et al.* 1996, Toyne unpublished data). This species is found in greater abundance in the north of Loja Province around the Saraguro area, where surveys located a sedentary population in the community-owned conservation area at Huashapamba (Toyne unpublished data). Selva Alegre forest in north Loja Province, located on the Saraguro-Manu road (see Toyne *et al.* 1995 for details), has a sedentary population of around 20 individuals. A maximum flock size of 29 individuals was recorded by Jacobs and Walker (1999). This small forest patch is heavily degraded by tree clearance and cattle grazing. Red-faced parrots were found to inhabit the fragmented forests around Saraguro e.g., Torr  and El Sauce, Lomo del Oro (Toyne and Flanagan 1996, 1997, Jacobs and Walker 1999). Two pairs with young were recorded at P ramos de Matanga in early 1995/6 (Krabbe *et al.* 1997). Cerro Chinguella in northern Peru, where Parker *et al.* (1982) twice recorded red-faced parrots in the 1970s, still has large tracts of undisturbed cloud forests; however, in a seven day survey in 1996, no *H. pyrrhops* were recorded (Toyne and Flanagan unpublished data).

Threats: The main threat to this species is habitat loss principally through fragmentation from human encroachment (cattle ranching and timber collection for construction and fuel). How tolerant red-faced parrots are to habitat degradation remains uncertain.

Actions: Conservation efforts must be directed to the remaining cloud forests of the Saraguro area where red-faced parrots are found in greater abundance (Toyne

1996). The feasibility of a network of connecting Andean forests should be explored (Toyne and Flanagan unpublished data, see *L. branickii*). Efforts should be made to protect the forest patch between Selva Alegre and Manu in the Chilla mountains.

It is of paramount importance that all mining activities in the Podocarpus National Park are stopped. This would secure habitat for three globally Endangered parrots: The golden-plumed parakeet *Leptosittaca branickii*, the white-breasted parakeet *Pyrrhura albipectus*, and the red-faced parrot *Hapalopsittaca pyrrhops*. In Peru, surveys are required to assess whether viable populations of the species survive, and assess what options for their conservation exist.

Golden-plumed parakeet *Leptosittaca branickii*

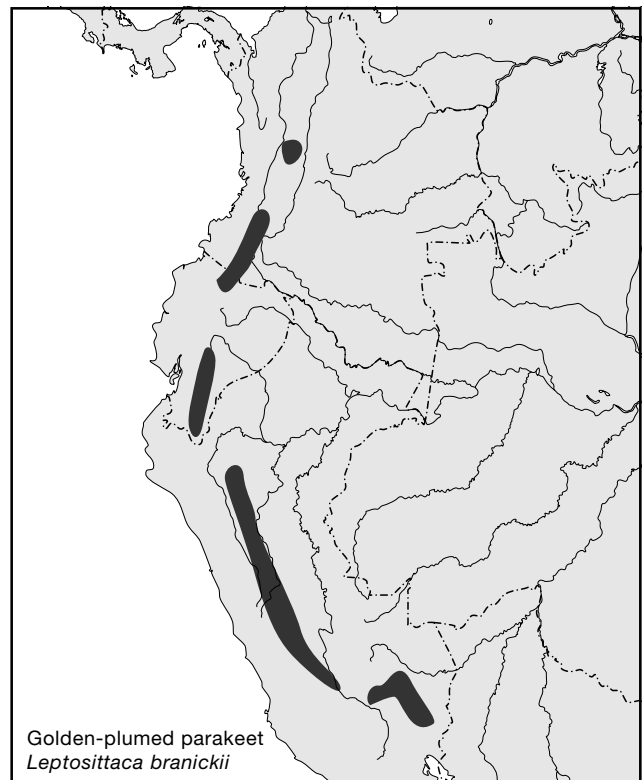
Contributors: Jeremy Flanagan, Gustavo Kattan, Paul Salaman, and Paul Toyne.

Conservation status: IUCN: Vulnerable (A1b; A2b; C1; C2a).

CITES: Appendix II.

National protection status: Information unavailable.

Distribution and status: The golden-plumed parakeet is distributed throughout the Andes from central Colombia to southern Peru. It inhabits temperate cloud forest and elfin woodland usually at 2,400–3,400m, although occasionally as low as 1,400m (Collar *et al.* 1992). Within its range, it is localised and considered nomadic (Fjeldså and Krabbe 1990, Collar *et al.* 1992), making it difficult to study, which explains why it is a poorly known species.



In Colombia, the species' movements over large areas may follow a temporal pattern, with individuals foraging the same day in areas that are kilometres apart. A large population may exist in and around the Volcán Ruiz-Tolima complex. There is a healthy population in the Central Andes of Ucumari-Los Nevados-Quindío region with groups of up to 40 individuals commonly seen. Birds seem to cross often from the west to the east slope of the central Andes. The Rio Blanco protected watershed may hold a population of up to 150 individuals within 10km of the City of Manizales.

The species feeds on *Podocarpaceae* fruits, including *Podocarpus* and *Prumnopitys*, but contrary to previous published data, *L. branickii* does not seem to be a true *Podocarpus* specialist (Flanagan and Toyne *in litt.* 1997, Kattan *in litt.* 1997). Since large *Podocarpaceae* are only found in primary forest, the species is closely associated with this habitat. It may depend upon this habitat for most of its food items, and during reproduction. However in Toche as well as in lower parts of Ucumari Reserve, the species also feeds in secondary forests.

In Ecuador it is only known from nine sites, five of which are in Loja Province. Prior to the 1990s there are few records of this species in Loja Province and consequently their distribution and status in the Province is sparsely documented.

This species has been recently observed in small flocks in the following areas: In Ecuador: Acanama (Huashapamba), Angashcola, El Quingueado, Cordillera de Allapacha, Torré, Hiñuina, Loma del Oro, and El

Sauce. In Podocarpus National Park, flocks have been seen in Cajanuma, Lagunas del Compadre, Yangana-Valladolid (including Quebrada Honda), Quebrada Rabadilla de Vaca, and San Francisco. In Colombia it has been observed in: Ucumarí Regional Park, Los Nevados National Park, the Quindío River, Rio Blanco, and the Volcán Galeras. And in Peru in: Selva Alegre and Chilla Mountains in Manu National Park.

Due to *Leptosittaca*'s mobility it is difficult to assess its status at any one site. However, it must be deemed as extremely rare and, at present, highly unpredictable.

Threats: The species is threatened by habitat fragmentation resulting in the interruption of altitudinal and seasonal migration, and lack of nesting habitat (possibly in the form of large mature trees within forests). In the Loja province of Ecuador, the main threat is habitat loss due to human encroachment (caused by cattle ranching and tree felling for construction material and fuel).

Actions: Conservation for *Leptosittaca* will require a landscape approach. This includes the conservation of a high variety of habitats with fruit-bearing trees and *Cordia cylindrostachya*, *Axinea macrophylla*, and old growth stands of *Podocarpus*. In both Colombia and Ecuador, a network of interconnected montane forests at various altitudes is needed to secure the long-term future of this and other Andean parrots. The network can include private and community-owned reserves. Efforts should focus on protecting forest patches in the Quindío region in Colombia and at Selva Alegre and Acanama-Huashapamba areas in the Chilla Mountains of Ecuador. In Peru, surveys are required to assess whether viable populations of the species survive, and what options for their conservation exists.

(See multi-species remarks in *Ognorhynchus icterotis*).

Yellow-eared conure *Ognorhynchus icterotis*

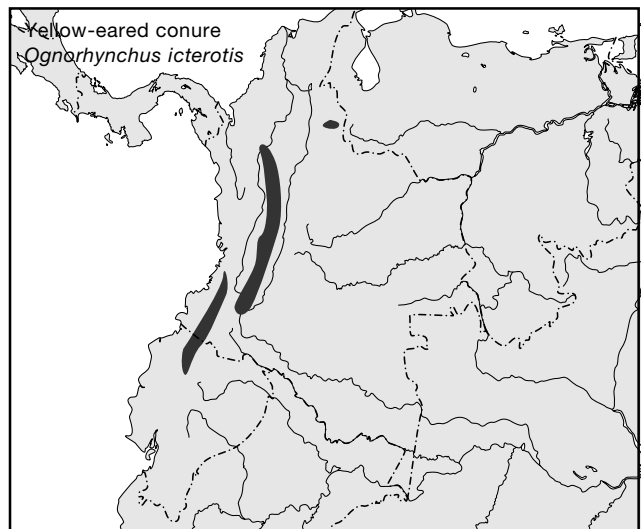
Contributors: Niels Krabbe, Luis Miguel Renjifo, Paul Salaman, Paul Toyne.

Conservation status: IUCN: Critically Endangered (A1b; C1; C2a; D1).

CITES: Appendix I.

National protection status: Information unavailable.

Distribution and status: This large parakeet, once numerous (Collar *et al.* 1992), is now on the brink of extinction as a result of hunting for food and loss of habitat. The species is only known to roost and nest in wax palms *Ceroxylon*. All recent records may refer to three flocks, each of 20–24 birds. These flocks occur in a large wax palm forest in the



Central Cordillera of Colombia; a nearly deforested area in western Ecuador; and south-west Colombia and adjacent north-west Ecuador. After vanishing recently the latter flock is considered extinct. The exact whereabouts of groups for much of the year is still unknown, rendering protective measures difficult.

While the species is strongly seasonal and highly mobile, there are several sizeable areas of apparently suitable habitat existing throughout its historical range. For example, from at least 1983 until 1989 a flock would appear at La Planada Nature Reserve, Nariño, almost every day each year in February (often staying until May). The flock increased in size, reaching a maximum of 21 birds (1985), and roughly that number thereafter. Sadly, in 1990 the flock never appeared, and has never been seen since, despite excellent safe habitat remaining and plenty of observers (Salaman 1994). This population may have moved to the area between Nariño and Carchi, but it is now thought to be extinct (Krabbe and Sornoza 1996).

An undisclosed location on the Volcán Ruiz-Tolima massif, Central Cordillera of Colombia, contains the largest surviving fragment of wax palms, estimated at over 10km² (P. Salaman *in litt.* 1997). These *Ceroxylum quindense* palms are intermixed with montane humid forest and form a mosaic habitat. This habitat also includes pasture. Most Colombian reports of this species in the past seven years originate from this one unprotected location, with the first confirmation in 1997 by L. G. Olarte and later the observation of a flock of 24 birds in October 1997 (P. Salaman *in litt.* 1997). Despite the close proximity to Los Nevados National Park and other private nature reserves, the species has not been recorded from these areas in the past decade. The species is so conspicuous, that it is unlikely to have been overlooked by the many ornithologists working in these areas. In the case of the Volcán Ruiz-Tolima massif, where there appears to be sufficient feeding and nesting habitat, it is suspected that hunting is responsible for the very low population levels. This also appears to be the case in Ecuador. Recent reports of two flocks totalling 61 birds in a remote location of the Central Cordillera of Colombia, and the discovery and monitoring of the first ever active nest in a wax palm have dramatically increased the natural history knowledge base of this species (Salaman and Lopez-Lanus, 1999).

Multi-species remarks: The Volcán Ruiz-Tolima massif, including the High Quindío region and the Toche Canyon of the Colombian Andean Central Cordillera are largely within the Los Nevados National Park and adjacent regional or private reserves. Forest cover is nearly continuous between the High Quindío (western slope) and Toche (eastern slope). Furthermore, the ridge between both slopes has pristine and inaccessible páramo. This area is probably one of the few remaining untouched areas within the range of *Bolborhynchus ferrugineifrons*. In 1989 and 1990 *B. ferrugineifrons* was observed only a few times in areas with more disturbed páramo in the High Quindío (L.M. Renjifo *in litt.* 1997). There is also a healthy population of *Leptosittaca branickii* in the High Quindío-Toche area that moves frequently between the two slopes using the same forested pass. In summary, these areas are the most important areas to preserve globally important populations of *Ognorhynchus icterotis*, *Leptosittaca branickii*, *Bolborhynchus ferrugineifrons*, and *Hapalopsittaca fuertesi* in the Colombian Andes, and certainly the only ones for which there is more detailed information. *Leptosittaca branickii*, *Bolborhynchus ferrugineifrons*, and *Hapalopsittaca fuertesi* have little altitudinal range-overlap with *Ognorhynchus icterotis*, for which protective measures must, therefore, be considered separately.

Threats: Although rapidly diminishing, there are still several sizeable areas of apparently suitable habitat throughout its historical range (Renjifo 1991, Salaman

1994, Krabbe and Sornoza 1996, P. Salaman *in litt.* 1997), suggesting that factors other than habitat destruction are responsible for its rapid decline. It has always been rare in captivity, and only a handful of individuals have ever reached western markets (Collar *et al.* 1992): two wild caught specimens were recorded in international trade between 1991 and 1995, both in 1992 (seized by the USA: CITES Annual Report database). Undoubtedly the severe fragmentation of its habitat, and perhaps in particular the destruction of traditional nesting palms, have had a large impact, but it is suspected that hunting at traditional roosts is the major cause of the species' decline. Indeed, in the valley of a traditional roost in Ecuador, nearly all families had shot the parrot for food at the roost (Krabbe and Sornoza 1996). The conservative habits of the species render it particularly vulnerable. Despite persecution of the roosts in Ecuador, the parrots continued to use the same palm, and when the palm fell, they only then moved to the neighbouring palm (Krabbe and Sornoza 1996). Lack of information concerning the whereabouts of the two remaining flocks for much of the year poses a major obstacle to its conservation. Critically, the largest fragment of wax palms in the Central Cordillera of Colombia is unprotected and highly threatened.

Actions: Without an immediate multilateral conservation strategy and immediate intervention, the species is threatened with total extinction within the next decade. Research is desperately required to locate more breeding areas, roost sites, potential migration routes, and favoured feeding sites. Studies should also identify specific threats and conservation priorities. Conservation actions will require urgent and creative land management strategies, such as strengthening the protection of all roosting and breeding sites (purchasing these areas if possible), and reverting pasturelands adjacent to wax palm to forest. Large-scale propagation of the wax palms is not recommended as a cost-effective conservation action. It is more important to concentrate conservation efforts on establishing secondary growth forest from pasturelands that lie next to the wax palms. Indeed, wax palm forests in general are currently highly fragmented, young wax palms do very well in secondary growth, and the seeds of wax palms are readily dispersed by large frugivores in the region.

The involvement of local people in managing protected areas is necessary as they pose the greatest direct threat. Whenever possible ecotourism development should be considered. However, potential political instability associated to guerrilla warfare should be considered when developing ecotourism initiatives. Community involvement should be enhanced with an active environmental education campaign (i.e., distribution of posters, talks at local schools). But the greatest threat may be avoided by simply locating and talking to local hunters.

In Ecuador, Niels Krabbe, with funding from the Zoological Society for the Preservation of Species and Populations, Fonds fur Bedrohte Papageien, and the Loro Parque Foundation, has begun a long-term conservation programme for the country's last known flock. Approximately 0.5km² of land surrounding a traditional roost in western Ecuador has been purchased and has been reforested with the parrot's favourite food plants, *Sapium* and *Croton* (both Euphorbiaceae). Three areas nearby, all used by *Ognorhynchus* and covering 1.5km² are presently being purchased, and a further 2km² may be added later in 1998. Formerly the parrot was heavily persecuted at this roost, which is now protected effectively (Krabbe and Sornoza 1996).

White-breasted parakeet *Pyrrhura albipectus*

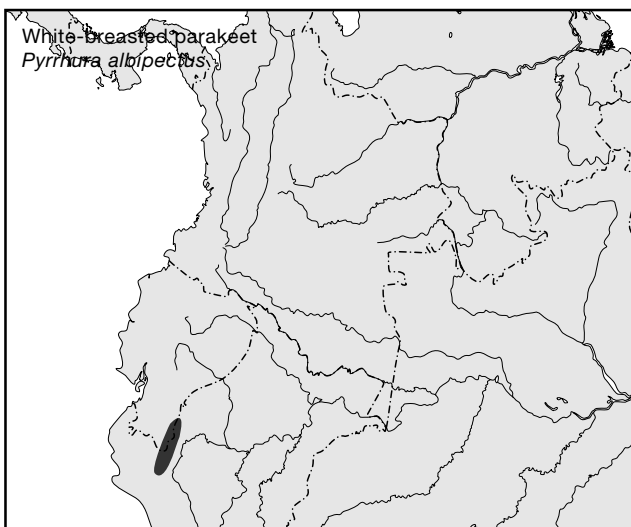
Contributors: C.S. Balchin, Jeremy Flanagan, Niels Krabbe, and Paul Toyne.

Conservation status: IUCN: Vulnerable (C2a).

CITES: Appendix II.

National protection status: Information unavailable.

Distribution and status: The white-breasted parakeet is known from three general areas of south-east Ecuador (Cordillera de Cutucú, Cordillera del Condor, and Podocarpus National Park), where it inhabits upper tropical and subtropical forest and possibly disturbed areas, between 940 and 1,800m (Robbins *et al.* 1987, Collar *et al.* 1992, Toyne *et al.* 1992, Krabbe and Sornoza 1996, Schulenberg and Awbrey 1997). Also possibly recorded in Peru. This parakeet has been recorded in both pristine and degraded habitat, as it has been observed in partially and severely deforested areas around Podocarpus National Park (Toyne *et al.* 1992).



The lower forested slopes of the Río Nangaritza valley may also prove to be ideal habitat for this parakeet (Toyne *et al.* 1992). They have been recorded here once during a short survey in 1994 (Balchin and Toyne 1998) and were encountered between 1,300 and 1,800m above the Río Mariposa, a tributary of the Río Nangaritza. However, in nearby Podocarpus National Park the parakeet is a common, permanent resident of Río Bombuscara and Romerillos (Toyne *et al.* 1992). This suggests, at least for the area of Podocarpus National Park, that they are not as severely threatened as first feared (Toyne *et al.* 1992, Toyne 1996).

Threats: Along the southern perimeter of Podocarpus National Park, encroachment by humans along the borders of the park is causing habitat loss. Occasional trapping of this species has been recorded in the areas surrounding Zamora where they are kept as pets (Toyne *et al.* 1992). Gold mining activities (e.g., mercury poisoning of rivers that provide the local water supply) in and around the park also poses threats (Toyne *et al.* 1992, Vallée 1992). Local miners left the park in 1993 but quickly returned in 1994–95 (Toyne 1994). Presently, there are approximately 90 miners in the area of San Luis, and they have formed strong ties with local politicians. Recently the Ministry of Mining (DINAMI) decreed that the miners' activities are illegal; it is now up to the new Ministry of the Environment to take steps to remove them (J. Flanagan *in litt.* 1997).

The two other areas where this species is found (Cordillera de Cutucú and Cordillera del Condor) are also threatened by deforestation, gold mining, and road building, but the current situation is not known (Collar *et al.* 1992, Toyne *et al.* 1992).

Actions: A public awareness and environmental education campaign about Podocarpus National Park and its importance has been initiated by Fundación ArcoIris. This work needs further encouragement and the relevance of the Podocarpus National Park for parrot conservation needs to be highlighted. Fortunately Podocarpus National Park has been receiving international assistance for the last few years. These efforts have led to the strengthening of local institutions (both NGOs and governmental) and a new management plan being published.

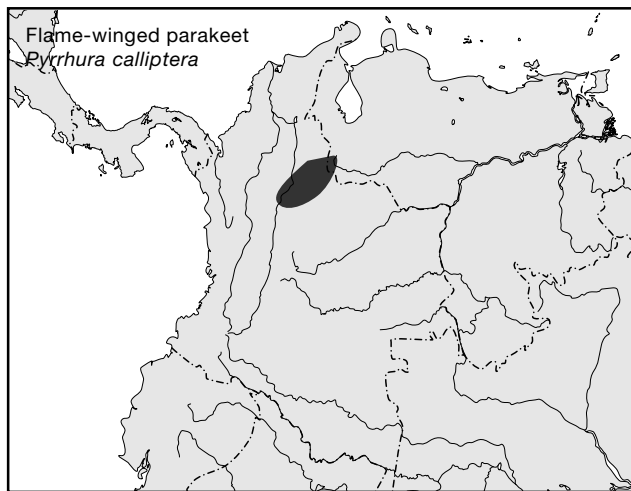
Flame-winged parakeet *Pyrrhura calliptera*

Contributor: Paul Salaman.

Conservation status: IUCN: Vulnerable (A1b; A2b; C1; C2a).

CITES: Appendix II.

National protection status: Information unavailable.



Distribution and status: Population estimates for the flame-winged parakeet range from between 5,000 and 10,000 individuals. It is confined to remnant patches of upper-premontane to montane forest and páramo 1,800 to 3,400m on the central Eastern Cordillera of Colombia. The population is suspected to be similar to *Pyrrhura viridicata* in that it is found to be not uncommon in remaining forest patches within restricted range. However, the species range is far more fragmented and human pressures much greater. Few sizeable forest fragments remain.

Threats: Forest clearance for agriculture and timber is still very active. Road/track construction in the region (although slow and limited owing to rough terrain) will undoubtedly have severe consequences in the future.

Actions: As with other species of the Colombian Andes, a field study on the species should concentrate on determining population densities in different forest types. It should include estimating current population levels according to the area of suitable remaining habitat. Knowledge of the extent of altitudinal movements and the distance travelled over open country (between forest patches) would also be of value.

Blue-throated parakeet *Pyrrhura cruentata*

(Blue-chested parakeet in Collar *et al.* 1994. Name changed here to conform to Brazilian usage.)

Contributor: Jaqueline Goerck.

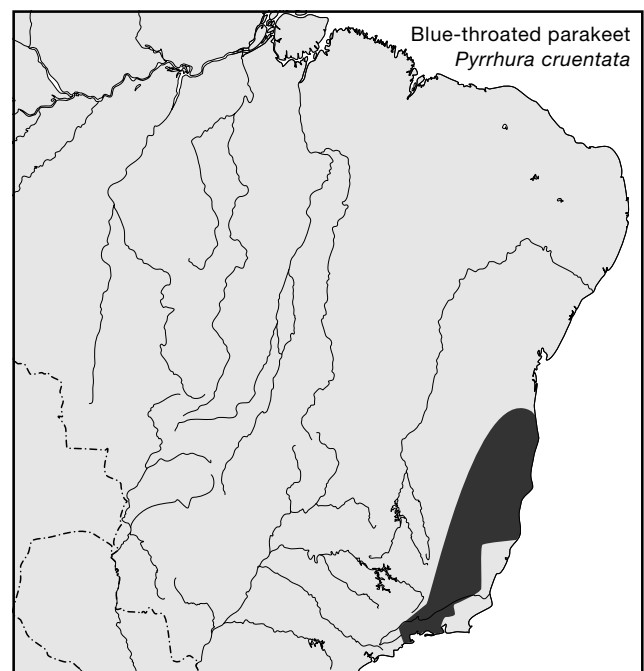
Conservation status: IUCN: Vulnerable (A1b; B1+2c; C2a).
CITES: Appendix I.
National protection status: Information unavailable.

Distribution and status: The blue-throated parakeet is found in scattered Atlantic Forest fragments in southern

Bahia, Minas Gerais, Espírito Santo, and Rio de Janeiro, Brazil. Although sometimes fairly common where it occurs, it may be unable to move between widely dispersed patches of forest, since it seems to be restricted to forested areas.

Threats: Extreme deforestation and fragmentation threatens the species throughout its range. The sparse remaining forest existing in southern Bahia is still being felled. There were four specimens recorded in international trade between 1991 and 1995, all in 1992 (pets: CITES Annual Report database).

Actions: Few actions, if any, are taking place. In fact, one of the areas where this species occurs in Espírito Santo (Córrego do Veado Biological Reserve) had more than half its original area (24km²) irreversibly burnt 12 years ago. This reserve, as many others in Brazil is threatened by



uncontrolled hunting, cattle grazing, and poor enforcement. Required conservation actions would be similar to those of *Amazona rhodocorytha*, since the range of these two species is similar.

El Oro parakeet or Orces parakeet *Pyrrhura orcesi*

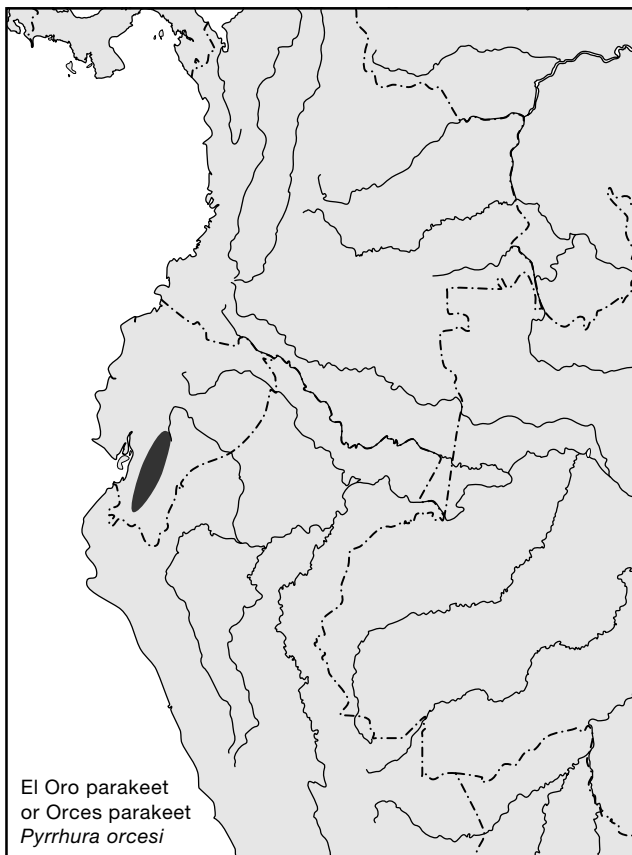
Contributor: Niels Krabbe.

Conservation status: IUCN: Vulnerable (B1+2c; C2a).
CITES: Appendix II.
National protection status: Information unavailable.

Distribution and status: The orces parakeet is restricted to very humid upper tropical forest on the west slope of the Andes in Azuay and El Oro Provinces, south-western Ecuador. In these areas it can be found at altitudes of 300 and 1,300m. Population estimates range from between 2,000 and 10,000 birds.

Threats: Continuing habitat clearance for cattle production threatens this species (Collar *et al.* 1992, Best *et al.* 1993).

Actions: Information is urgently required on its distribution, population status, and threats.



Santa Marta parakeet *Pyrrhura viridicata*

Contributors: Thomas Arndt, and Paul Salaman.

Conservation status: IUCN: Vulnerable (C1; C2b).
CITES: Appendix II.
National protection status: Information unavailable.

Distribution and status: The Santa Marta parakeet is restricted to upper-premontane to montane forest 1,800 to 2,800m on the Sierra Nevada de Santa Marta massif, Colombia. Highly vocal parties (5–20 birds) are commonly observed flying over the San Lorenzo-Cerro Kennedy trail, which has been extensively deforested. Research is required into the extent of remaining suitable habitat for the species. Estimates of population numbers in primary and non-primary forest are also needed. It is suspected that large healthy populations of the species can be found where sizeable forest fragments remain. The total population is estimated at 5,000 to 10,000 individuals.

Threats: Conifer plantations, and forest clearance for agriculture and timber threaten this species. It is a cavity-nester that requires dead limbs, although not necessarily large trunks. It is largely restricted to old secondary and primary forest. Some large and many small fragments of forest still remain on the massif, however the human pressures are very strong in the region. The extent of altitudinal movements is also unknown. Seasonal variation of numbers gained through general observations along the San Lorenzo road may help to provide such data. Until further research clarifies the species status, the species should be designated a threatened status.

Actions: Ideally, research should concentrate on the tolerance of the species to habitat change, population densities in different forest types, and estimates of current population levels.



Thick-billed parrot *Rhynchopsitta pachyrhyncha*

Contributors: Andrew Burton, Javier Cruz-Nieto, Miguel A. Cruz-Nieto, Ernesto Enkerlin-Hoeflich, Alberto Lafón-Terrazas, Dirk Lanning, Tiberio Monterrubio, Jesus Montes, Roger Otto, Jim Shiflett, Noel Snyder, and Diana Venegas.

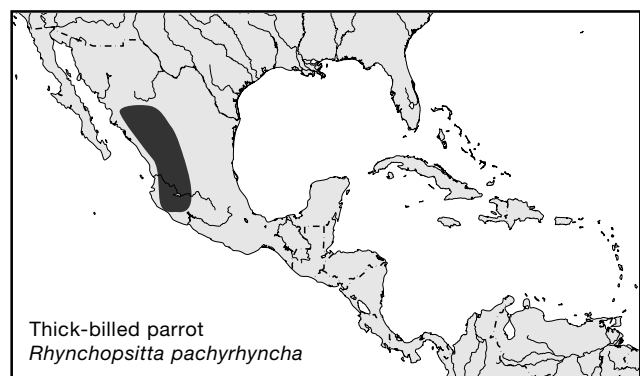
Conservation status: IUCN: Endangered (A1b; A2b; C1; C2a).

CITES: Appendix I.

National protection status: Endangered in Mexico (Peligro de extincion, NOM-ECOL-059-1994) and Endangered in the USA (US Fish and Wildlife Service).

Distribution and status: This species is restricted during breeding to pine forests in mountainous areas of northern Mexico, largely in the states of Chihuahua and Durango and, to a much lesser extent in Sonora and Sinaloa (Howell and Webb 1995; Enkerlin-Hoeflich *et al.* 1996), with some individuals reported in historic times from extreme southern Arizona in the USA. Populations have declined markedly in Mexico. Breeding pairs are now found only in undisturbed remote areas, in disturbed areas with a few remaining suitable nest sites, and in islands of forest on steep slopes and ridges that are not accessible or currently economical to log. In the non-breeding season this species roams more widely within the Sierra Madre Occidental (Enkerlin-Hoeflich *et al.* 1996). See map by Howell and Webb (1995).

The progressive decline in the population of the thick-billed parrot is apparent to all long-term residents across the range (Lanning and Shiflett 1983, Lammertink *et al.* 1996, M.A. Cruz-Nieto *in litt.* 1997). The parrot is only one of many species currently in jeopardy in the region. While the parrot still persists in suitable numbers in the best remaining forested areas, all will surely be cleared of their large trees in the near future unless conservation efforts now being started prove successful. Lammertink *et al.* (1996) have offered a rough estimate for the total wild population still in existence as 500 to 2,000 pairs. Although this estimate may be on the conservative side, no adequate basis for estimating total numbers in the wild has yet been developed. The numbers in captivity were estimated by Snyder and Wallace (1987) to possibly exceed 1,000 individuals almost all taken illegally. At least 200 birds use the general vicinity of Cebadillas de Tosanachic study site in Chihuahua. This may be the last relatively large healthy population, numbering in the low hundreds of pairs, as a fraction of the area contained 61 nests in 1997 (D. Venegas and T. Monterrubio *in litt.* 1997). There is an excellent account of this species in Collar *et al.* (1992) and a full account is found in Snyder *et al.* (1999)



Threats: Unfortunately, the thick-billed parrot suffered heavily from shooting in the USA, and was very likely extirpated north of the border as a result (Snyder *et al.* 1994). Much of the recent decline is undoubtedly due to large scale felling of the pine forests of the Sierra Madre Occidental. This has been carried out since World War II (Lanning and Shiflett 1983, Lammertink, *et al.* 1996, Cruz-Nieto 1998). The species has also been under stress from extensive trapping for the pet and avicultural trades (Snyder and Wallace 1987). The thick-billed parrot is not limited to virgin forest, and can exist in selectively logged areas provided suitable dead standing trees (snags) for nesting are available and shooting and trapping does not occur. Significant efforts to manage and conserve major remaining habitats of the species are now being pursued in Mexico (Enkerlin-Hoeflich *et al.* 1996). Thick-billed parrots are rarely kept as pets because they do not talk, although large numbers of confiscations in the US followed a surge in illegal importation of birds in 1985–1986. They are not known to raid agricultural crops, and are not shot for food.

Actions: Forest management practices need to be modified to conserve thick-billed parrot nesting habitat. Properly

located and managed reserves could protect several prime nesting areas; no such reserves currently exist, although a number of efforts are currently underway (R. Otto *in litt.* 1997, Enkerlin-Hoeflich *et al.* 1996).

A re-introduction project began in south-eastern Arizona in 1986 (reviewed in Snyder *et al.* 1994). Efforts have not yet led to a viable wild population being established. However initial experiments are encouraging and demonstrate that this may be possible. A number of birds still persist in Arizona, and experimentation has shown that at least some wild-caught birds will stay in the region of re-introduction, with reasonable levels of survival and reproduction. Experimentation has also shown that while confiscated wild-caught birds are a viable release source from a behavioural standpoint, they may harbour diseases. Captive-reared thick-bills from various zoos and aviculturists have not proved to be a viable source from both behavioural and disease standpoints. Future efforts should involve direct wild to wild transfers and the employment of extensive disease screening.

Continued efforts to achieve appropriate habitat conservation measures include; additional extensive understanding of the biology of the species, including documentation of wintering ranges of various breeding populations; the development of better means for monitoring population sizes and trends; the reactivation of a programme to re-establish extirpated populations both in Mexico and the US, using wild-caught birds from populations that are vigorous enough to serve as donors. These activities should all take place within the next five years.

Maroon-fronted parrot ***Rhynchopsitta terrisi***

Contributors: Ernesto Enkerlin, Aldegundo Garza, Jaime Gonzalez-Elizondo, Claudia Macías, José Luis Manzano-Loza, Sergio Marín, Gabriela Ortiz, Andres M. Sada, Alejandro Salinas, Noel Snyder, and Ruperto Zepien.



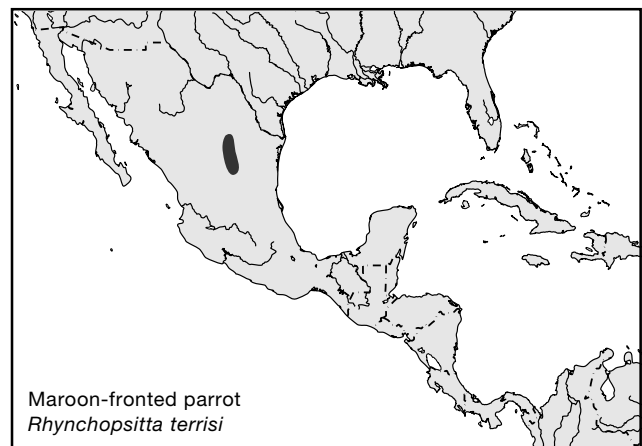
Conservation status: IUCN: Vulnerable (B1+2C; C2a).

CITES: Appendix I.

National protection status: Endangered in Mexico (Peligro de extinción, NOM-ECOL-059-1994) and Endangered in the USA (US Fish and Wildlife Service).

Distribution and status: The maroon-fronted parrot is restricted to pine forests and rock cliffs in the mountain areas of northern Mexico (specifically in Nuevo León and Coahuila states). These areas are used as nesting sites. A degree of winter activity occurs in Tamaulipas State. Breeding colonies are known only from the northernmost 25% of the range. Recent intensive studies (initiated by PROFAUNA [a conservation group based at the Universidad Autónoma Agraria Antonio Narro in Saltillo] and continued by the Monterrey Technological Institute [MTI]) have resulted in an almost complete inventory of nesting cliffs. Approximately 24 nesting areas have been documented. These consist of populations ranging from a single nesting pair to close to 100 nesting pairs each (Enkerlin-Hoeflich *et al.* 1996). Until recently the population had been estimated at between 2,000 and 4,000 birds. This figure was calculated using data obtained in the early 1970s when a flock of approximately 1,500 individuals was observed (Snyder and Lanning cited by Collar *et al.* 1992). Presumed to be declining by some observers (i.e., Gómez-Garza 1991), yet confirmed stable or at least within historic population estimates in 1994 with a simultaneous count of about 1,400 (Snyder and Enkerlin-Hoeflich 1996). A high historic count in 1996 recorded 2,213 birds and a quasi-simultaneous survey in September of the same year yielded an additional count of approximately 300 individuals at nearby nesting cliffs (J.J. Gonzalez-Elizondo *in litt.* 1997). This sets the minimum estimate at 2,500 and suggests a small but relatively stable population.

Threats: The main threats to this species are: (i) destruction of its mixed-conifer forest habitat by fire; (ii) housing development; (iii) logging; and (iv) forest clearing for agricultural purposes. The large Cumbres de Monterrey



National Park exists within the maroon-fronted parrot's range. However an increase in the frequency and intensity of forest fires is causing passive deforestation. Areas that regenerate naturally usually become oak chaparral. This habitat is of no value to the parrots in terms of food. Reforestation with native species is not occurring except in small areas by private landowners. The maroon-fronted parrot is highly dependent on free flowing water on a daily basis. The lack of springs from which to drink have sometimes forced it to drink from water troughs. During the 1994 drought at least 50 birds drowned in a single incident while attempting to drink water from a walled cement tank. Greater understanding of the ecology of the species is needed to propose a variety of measures to avert these threats (Enkerlin-Hoeflich *et al.* 1996).

Actions: In the last few years a long-term conservation programme for the species has evolved. An integrated conservation plan using the maroon-fronted parrot as the flagship species has been initiated by MTI with multiple collaborators both in Mexico and abroad. The plan includes a three level strategy to achieve conservation of habitat. This in turn provides ecological services, and scenic and recreational values to neighbouring cities of Monterrey and Saltillo. The combined population of these cities numbers approximately five million (Enkerlin-Hoeflich *et al.* 1996). The plan includes El Taray Sanctuary, the most important nesting colony. This site harbours nearly 100 breeding pairs which comprise 40% of the breeding population. This site was acquired by the Mexican Commission on Biodiversity (CONABIO) and is managed by a local NGO, the Museo de las Aves de Mexico. A 20-year strategic plan for the reserve includes financial management, conservation management, conservation research, and education and outreach components that hope to make El Taray a show-case for sustainable land use in the region. This plan may even provide a useful model for other regions. The overall effort includes an ecological planning process that would safeguard the most important nesting cliffs. A Mexican foundation (Fundación ARA) is also developing a plan for community-based protection of the second or third most important cliff nesting site known as El Condominio (or "High-rise").

Brown-backed parrotlet ***Touit melanonota***

Conservation status: IUCN: Endangered (C2a;D1).
CITES: Appendix II.
National protection status: Information unavailable.

Distribution and status: This small and inconspicuous species is very poorly known. During this century it has been recorded only in Rio de Janeiro State and three sites

in São Paulo, Brazil. It was also recorded in Bahia in the last century. It inhabits humid forest, mainly at moderate elevations (500–1,000m), but descends to lower elevations at times, perhaps seasonally (Collar *et al.* 1994).

Threats: *Touit melanonota* appears to be a victim primarily of widespread habitat loss and fragmentation, with many recent records limited to protected areas (Collar *et al.* 1992).

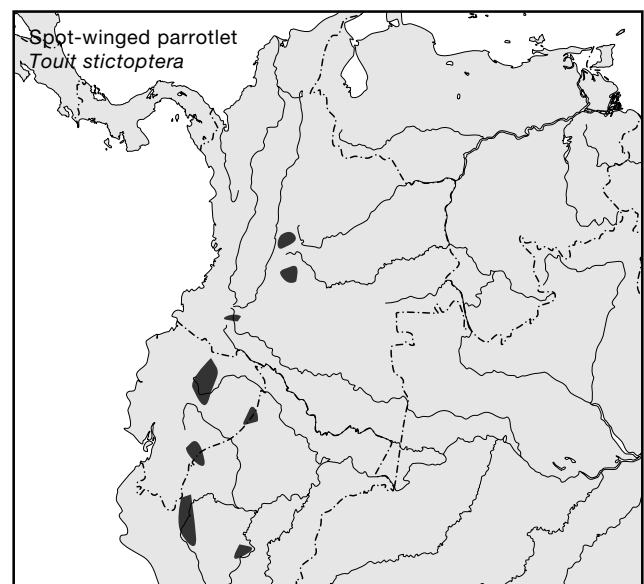
Actions: Information is urgently needed on the current distribution, population status, and threats for this species.

Spot-winged parrotlet ***Touit stictoptera***

Contributors: C.S. Balchin, Niels Krabbe, Luis Miguel Renjifo, Paul Salaman, and Paul Toyne.

Conservation status: IUCN: Vulnerable (C2a).
CITES: Appendix II.
National protection status: Information unavailable.

Distribution and status: This inconspicuous species occurs in five general areas extending through Colombia (Cundinamarca, Meta, and Cauca), Ecuador (Napo, Morona-Santiago, and Zamora-Chinchipe), and northern Peru (Cajamarca, and San Martín). It inhabits the upper tropical and lower subtropical zone, using tall humid montane forest at 500–2,300m, though mostly 1,050–1,700m. It was recently recorded in Miazhi and elsewhere in the Cordillera del Cóndor in Ecuador. No recent sightings have been made of this species despite searches in its upper tropical-premontane altitudinal zone on the east slope of the Eastern Cordillera of Colombia.



Threats: Deforestation and fragmentation threaten this species.

Actions: Information is urgently required on the distribution, population status, and threats to this species.

Golden-tailed parrotlet *Touit surda*

Conservation status: IUCN: Endangered (C2a).

CITES: Appendix II.

National protection status: Information unavailable.

Distribution and status: *Touit surda* has been recorded from four states in north-eastern Brazil – Ceará, Paraíba, Pernambuco, and Alagoas – and from four states in south-eastern Brazil – Bahia, Espírito Santo, Rio de Janeiro, and São Paulo. The majority of records have come from humid lowland forest areas up to approximately 800m in the foothills. It appears to be migratory to some degree.

Threats: This species has evidently suffered from continuing large-scale habitat destruction. Many sightings have been limited only to protected areas (Collar *et al.* 1992).

Actions: Information is urgently needed on the current distribution, population status, and threats to this species.

Blue-bellied parrot *Triclaria malachitacea*

Contributors: Glayson Ariel Bencke, Paulo Martuschelli, Marco Aurelio Pizo, and Carlos Yamashita.

Conservation status: IUCN: Vulnerable (B1+2c,d; C1, C2a). Formerly Endangered (C2a: see Collar *et al.* 1994). CITES: Appendix II.

National protection status: Protected under federal law and included on IBAMA's list of Brazilian species threatened with extinction (Bernardes *et al.* 1990).

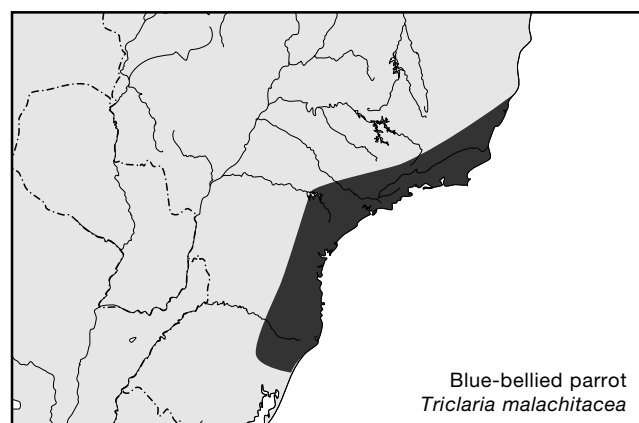
Distribution and status: The blue-bellied parrot *Triclaria malachitacea* is a threatened Psittacine endemic to the Atlantic Forest region of south-eastern Brazil. Its current status has been attributed to its natural rarity coupled with the effects of hunting and loss of habitat. Within its range, *Triclaria* still survives in Rio Grande do Sul, where it inhabits a highly fragmented landscape along the escarpment of the state (Serra Geral) and is confined to remaining patches of forest on hilltops and steep mountain slopes (Bencke 1996). The species is uncommon at Intervalles State Park, São Paulo State, and from 1989–1993 there has been no noticeable decline in this population

(Pizo *et al.* 1995). Numbers may be higher than suspected due to the fact that this is one of the most secretive parrots in the world. In central-eastern Rio Grande do Sul *Triclaria* is mostly associated with the humid broadleaf forests along the escarpment, which are now severely fragmented. It is presently restricted to the largest remnants of mature forest. However, preliminary radio-telemetry studies showed that individuals of *Triclaria* are able to disperse among habitat patches using narrow forest corridors, such as strips of second growth woodland, and also crossing small open areas (100–200m).

The total population of *Triclaria* was tentatively estimated at less than 5,000 individuals by Lambert *et al.* (1993). A recent survey (Bencke 1996) of remaining natural vegetation in central-eastern Rio Grande do Sul revealed a forest cover of 17.32%, corresponding to an area of 1,222km² (total area surveyed = 7,056km²). This calculation includes remnants greater than 0.5km² of arboreal vegetation (both primary and secondary) and low second growth. Based on the amount of habitat available its population was estimated at a maximum of approximately 10,000 individuals. This number was calculated assuming a maximum density of 10 individuals per 1km² of forest (an assumption based on field observations conducted mainly at Monte Alverne). However, it is possible that the amount of suitable habitat has been overestimated due to the inclusion of areas of second growth in the survey of remnant vegetation. Therefore, population numbers may be lower.

Unlike other parrots species in the region, *Triclaria* lives primarily in the forest interior, where it often occupies the lower strata. At Monte Alverne, most records inside the forest were of birds in the understorey canopy, between five and ten metres above the ground. *Triclaria* nests in natural cavities inside primary-forest remnants. Three nests have been found in Santa Cruz do Sul and were all quite low (between about three and five metres above ground) and thus easily accessible to nest poachers.

The main foods of *Triclaria* in the region are the seeds and pulp of several common species of native plants, especially those of families Euphorbiaceae (such as *Pachystroma longifolium*, *Actinostemon concolor*, and



Sebastiania brasiliensis) and Myrtaceae (principally *Eugenia rostrifolia* and *Campomanesia xanthocarpa*), and also cultivated maize (Galetti 1997). Some of these plant species proved to be keystone food resources, as they fruit (and are consumed) over extended periods, are available in large quantities in periods of low overall fruit diversity or constitute the main food item during the breeding season. Several reports clearly indicate that the fruits of *Euterpe edulis* are not a particularly important food resource for *Triclaria* in Rio Grande do Sul.

Threats: The main threat currently affecting the population of *Triclaria* in the centre-east of Rio Grande do Sul is the continuing process of habitat degradation and fragmentation. The illegal clearing of forests at a small scale to provide wood for curing tobacco and fuel for the winter is still very common throughout the region. As a result, primary-forest remnants are becoming increasingly smaller and more distant from each other. Additionally, this piecemeal process has been conducive to a progressive substitution of primary forests by second growth and to a consequent process of ecosystem impoverishment in the region. Attempts to evaluate the extent of deforestation in Rio Grande do Sul have been controversial, but all indicate an enormous reduction in forest areas since the time of colonisation. (Forest cover has decreased in area from 35% in 1940 to approximately 2% in 1990, G. Bencke *in litt.* 1998). The continuation of habitat fragmentation through the illegal clearing of primary forests and loss of connections between mature-forest remnants presently poses the most serious threat to the long-term survival of the blue-bellied parrot population in central-eastern Rio Grande do Sul.

Local farmers living around primary-forest remnants throughout the region occasionally take young from parrot nests to keep as pets. The magnitude of the effects of this practice on the local *Triclaria* population is currently unknown. The capture of chicks from nests is the cause of a number of nest failures every year. The forest fragments where the species nests in central-eastern state are small and easily accessible to trappers. Location and capture of *Triclaria* nestlings is further facilitated by the loud vocalisations often delivered by both adults and young near the nest and the usually low heights of nest holes. There were 20 wild caught specimens recorded in international trade between 1991 and 1995, all in 1991 (CITES Annual Report database).

Actions: The main recommended measure to achieve the protection of the species and its habitat in the region is the establishment of protected areas with some degree of connectivity. The hilltop forests near Santa Cruz do Sul and in the boundary with the township of Candelária are among the most representative of Rio Grande do Sul's remaining vegetation deserving protection by the Programa Mata Atlântica-Rio Grande do Sul (Pagel *et al.* 1992). In

spite of this, there is not a single protected area in central Rio Grande do Sul and extensive tracts of undisturbed forest no longer exist in the region. Primary-forest remnants are the only components of the landscape suitable to be set aside as reserves. These remnants are small (few are larger than 4km², but the great majority are much smaller) and often shared by several small land owners (mostly poor tobacco planters with an average property size of 0.02km²: Farias 1993).

A particularly important issue is the protection or enhancement of wildlife corridors between the protected areas (i.e., habitat islands). This may be achieved through the implementation of a local plan for sustainable management of timber (see below). Given the financial constraints on the federal and state conservation bodies, the creation of new public reserves has been recognised as a difficult approach to achieve the protection of habitats for wildlife conservation. Alternatively, the creation of public or private reserves at the municipal level is considered feasible. The process of land acquisition seems to be the most appropriate strategy to achieve the establishment of protected areas in the region because the economic situation in Santa Cruz do Sul region is believed to be favourable for such an approach. Large branch industries of important international tobacco companies established in Santa Cruz do Sul and Venâncio Aires could provide a substantial part of the funds for land purchase. The rest could be sought from national and international conservation agencies.

Another important step to reduce forest degradation would be the implementation of a plan for sustainable management of forest to cease the non-sustainable and inappropriate harvesting of wood from native forests. Brazil is currently the world's leading exporter of tobacco *in natura* and one of the main exporters of cigarettes. International importers of tobacco leaves and manufactured products originating from the Santa Cruz do Sul region should be made aware that the tobacco is planted over areas where a globally threatened species of parrot occurs, and that this activity has resulted in the fragmentation of natural habitats and led to a decline of several wildlife species. Such an "overseas" awareness campaign would certainly be more effective if conducted by external conservation agencies rather than by local groups.

Brazil's tobacco planters association (Afubra) from Santa Cruz do Sul, in conjunction with tobacco companies, started several campaigns aimed at introducing in the region alternative sources of timber to replace the wood from native forests in the curing of tobacco. However, all these actions failed, apparently because of the lack of continuity and inadequate implementation. In view of the ineffectiveness of the previous campaigns, and also because of some fines imposed to farmers during occasional law enforcement activities in the region, the Afubra has recently adopted a different approach. It is now leading a campaign to change the state legislation governing the use of native

forests (Código Florestal Estadual). If approved, the proposed amendment to the law will allow (upon licensing) the exploitation of second growth forests, regardless of their successional stage and location, to use the wood as fuel in the curing of tobacco. However, this proposal is obviously not based on technical criteria and may have catastrophic consequences in areas where secondary forests predominate. The situation is rapidly worsening, particularly in the region around Santa Cruz do Sul. Here the wood used in the curing of tobacco is extracted principally from native forests.

Souza Cruz, one of the largest tobacco companies in the region, has recently announced the installation of a new industrial plant at Santa Cruz do Sul which will significantly increase the company's capacity for processing tobacco leaves. This measure will require an estimated additional 13,700 tobacco planters in the region to satisfy the plant's demand for tobacco, which in turn will result in a corresponding increase of agricultural areas to maintain these farmers and in consumption of wood for curing the leaves. Moreover, tobacco industries have recently been given special incentives by the Rio Grande do Sul's government to install new plants or to increase their investments in the state.

Environmental education and public awareness will remain a high priority. *Triclaria* is an unknown bird for the great majority of the local population. Only rural inhabitants living in farms around primary forest remnants are familiar with the species. Consequently, public awareness and environmental education should be carried out in properties around the largest primary-forest remnants in the region and in elementary schools of communities near these properties. Awareness of urban populations in the region requires a different approach. This target group should be made aware of the situation of forests and wildlife in the interior of the townships, especially the effects of habitat fragmentation. Several species of bird are known to have already vanished from the whole region, and many others are locally threatened, primarily as a result of habitat fragmentation (Bencke 1996). Newspaper articles, lectures, and television interviews should complement the urban public awareness campaign.

Accounts for species proposed for consideration for inclusion on the Red List

Yellow-naped parrot *Amazona auropalliata*

Contributors: Ernesto Enkerlin-Hoeflich, Celia Valverde, and David A. Wiedenfeld.

Conservation status: IUCN: To be considered. Vulnerable A2d.

CITES: Appendix II.

National protection status: Information unavailable.

Distribution and status: The yellow-naped parrot is patchily distributed along the Pacific (southern) coast of Central America from Chiapas, Mexico to north-western Costa Rica, and on the Caribbean slope from central Honduras to central Nicaragua. No formal, or even anecdotal, data are available for Mexico, although it is presumed to be critical in the Mexican part of the range. There are no reports in Mexico of large flocks as in other *Amazona* or *Aratinga* species. Present in at least the low hundreds in southern Guatemala in very disturbed cane and cattle areas. Thurber *et al.* (1987) also reported diminished numbers in El Salvador. In Honduras, the species exists in very low numbers on the Pacific Slope (Wiedenfeld 1993). It takes refuge for roosting and nesting in the mangroves around the Gulf of Fonseca; this may also be true for the remaining birds in El Salvador. On the Caribbean slope of Honduras, the species is restricted to the areas of Colón and Olancho. The Caribbean subspecies *Amazona auropalliata parvipes* is still fairly numerous, with an estimated population of approximately 140,000 individuals in 1992 (Wiedenfeld 1993). On the Caribbean slope, the parrot is restricted to relatively undisturbed habitats, including both broad-leaved forest and pine savanna, but shuns cultivated areas and second-growth (Wiedenfeld 1993). The species may possibly be still extant in the Bay Islands, off the Caribbean coast of Honduras, but reports of birds there may represent escaped captive birds.

In Nicaragua, the yellow-naped parrot numbers approximately 180,000 individuals (Wiedenfeld 1995). As in Honduras, it occurs on both the Pacific and Caribbean slopes, but not in the southern Central Highlands. Its population density is nearly twice as high on the Caribbean as the Pacific slope (Wiedenfeld 1995). Stiles (1985) reported some reductions in yellow-naped parrot populations in Costa Rica, which he attributed to cage bird trapping. He also mentioned that the species had been extirpated from some areas.

Threats: Because of its facility in learning to "talk", this amazon is a preferred pet by Central Americans. As a result, there is great pressure on its populations for internal trade as pets. The threat of capture for internal trade is believed to be much greater than the threat of capture for external trade (both legal and illegal combined). Especially on the Pacific slope of Central America, where yellow-naped parrot populations are already low and human populations are high, the harvest for internal trade may have a very significant effect on the amazon's populations. In Honduras, those who sell amazons usually demand about US\$25 in the field in the Mosquitia, and about US\$60 in Tegucigalpa (Wiedenfeld 1993). The daily minimum wage in Honduras is about US\$2. Heavy

laundering of this species to the USA from Central America through Mexico makes it impossible to judge levels of harvest within Mexico. The average number of yellow-naped parrots exported during 1989–1994 was 733 birds per year (Wiedenfeld 1995). Because of the high value of each amazon and because of the large numbers exported, the yellow-naped parrot accounts for a high percentage of the economic value of the birds in trade. Other export figures are provided by the CITES Annual Report database which recorded 4,018 wild caught specimens in international trade between 1991 and 1995, with an annual maximum of 930 in 1995. The export quota from Nicaragua for 1997 and 1998 was set at 800 ranched birds (CITES Notification to the Parties No. 980, 1997; CITES Notification to the Parties No. 1988/07).

Habitat loss is an especially serious threat on the Pacific slope, where human populations are highest and a large amount of habitat has already been destroyed. The mangroves around the Gulf of Fonseca, which serve as a roosting and nesting refuge for the Honduran and El Salvadorian populations of the amazon are presently being cleared for conversion to shrimp farming ponds. To obtain young from the nest, many harvesters fell the nest trees. This has two detrimental effects on the amazons: it kills some of the young when the tree falls, and it reduces the availability of nest sites. On most of the Pacific slope of Central America and in some parts of the Honduran Mosquitia, destruction of nest sites in the process of harvesting may be so severe as to reduce the proportion of the adult population which can breed each year. A multi-year project in southern Guatemala revealed extremely high levels of poaching, little predation from natural predators, and an apparently stable adult population.

Actions: Plans for the conservation of this amazon should be developed soon and implemented quickly, before the situation becomes critical. The yellow-naped parrot is a long-lived species, and most of the birds harvested are taken as young from the nest. Therefore, even if all young are harvested each year, the adult population may show only slight declines for many years. As the adults reach senescence and begin to die from normal old-age mortality, the population could crash in a very short time. It is imperative that a study be completed to determine the extent of the harvest for internal pet market consumption, which remains largely unquantified. A formal programme for monitoring the amazon's population numbers also should be put in place.

In addition, immediate efforts should be made to reduce demand for the amazon in the pet trade, and therefore to reduce the harvest. These should probably include encouragement of captive-breeding programs using birds already in captivity and educational programs in both the importing and exporting countries, so that people will understand the effect of the harvest on this species.

Cuban amazon ***Amazona leucocephala***

Contributors: Vicente Berovides, Patricia Bradley, Frederick Burton, Xiomara Gálvez, Rosemarie Gnam, and James Wiley.

Conservation status: IUCN: To be considered. Vulnerable B1 in Cuba and Endangered B3b in Bahama Islands and Cayman Islands.

CITES: Appendix I.

National protection status: Information unavailable.

Distribution and status: This species is native to Cuba, the Bahama Islands, and Cayman Islands. It strictly inhabits forests at all elevations. Populations have dramatically declined through most of its range. There are five races of parrots that comprise the *leucocephala* complex, including two Cuban forms *Amazona l. leucocephala* and *A. l. palmarum*, the Bahama amazon *A. l. bahamensis*, the Grand Cayman amazon *A. l. caymanensis*, and the Cayman Brac amazon *A. l. hesternus* (Peters 1928).

Cuban populations ***Amazona leucocephala leucocephala*** **and *A. l. palmarum***

Distribution and status: The Cuban amazon was formerly widespread and common throughout Cuba and Isla de la Juventud (Isle of Pines). The species is locally found in all



of the provinces, except that of La Habana. It is common in some areas, e.g., Ciénaga de Zapata in the Sierra de Najasa (Camagüey), and in some mountainous zones (Sierra Maestra) in Granma and Santiago de Cuba provinces (González *et al.* 1993, Gálvez 1996b). The parrot was formerly abundant throughout Isla de la Juventud, but the population underwent considerable declines, notably in the 1960s. More recently, several populations have increased in numbers.

Threats: Although the Cuban amazon is protected from capture and shooting by national and international law, it is still marketed in Eastern European countries. In 1988, US Fish and Wildlife Service agents seized 49 Cuban amazons en-route to the United States. A lively trade in parrots as local pets continues. Nevertheless, the most serious threat to the parrot is habitat destruction for agriculture, cattle, and firewood, and natural disasters such as hurricanes that limit the number of dead trees for nesting for both *A. leucocephala* and *Aratinga euops* (de las Posas and González 1984).

Actions: The parrot continued to decline in range and numbers throughout Cuba until the late 1970s, when government measures were taken to control the export of parrots for pets. That control resulted in notable increases in several parrot populations in the 1980s. Also, the recovery of some populations has been the result of intensive protection and habitat restoration by the Empresa Nacional para la Conservación de la Flora y la Fauna, for example, in continuing efforts since 1979, this government agency established dead palms with nesting cavities in the Los Indios Ecological Reserve in Isla de la Juventud. The population increased from 196 parrots in 1976 to a total of 1,100 parrots for the northern part of the Isla de la Juventud in 1996.

Both *A. l. leucocephala* and *A. l. palmarum* have been in captivity in Cuba and elsewhere (Tavistock 1916; Noegel 1977, 1978; González *et al.* 1993). Although the important Ciénaga de Zapata and other habitats critical to *A. leucocephala* and *Aratinga euops*' survival have been made reserves, additional large conservation areas are needed in sites where the species persists. The Empresa Nacional para la Conservación de la Flora y la Fauna, in co-operation with the Zoológico Nacional de Cuba, and the Biblioteca Nacional de José Martí, has undertaken a vigorous education programme, including annual conservation festivals involving local communities since 1995, with events to date at the Isla de la Juventud and Ciego de Ávila.

Bahama populations

Amazona leucocephala bahamensis

Distribution and status: The Bahama amazon was once plentiful and probably present on all major islands of the

Bahama Archipelago, although records exist only for Abaco, New Providence, San Salvador, Long, Crooked, Acklin's, Great Inagua, and Long Cay. By the 1940s, it was found solely on Abaco, Acklin's, and Great Inagua. The population on Acklin's was made extinct shortly thereafter. The southern third of Abaco (1,681 km²) is considered the parrot's primary stronghold on that island (Attrill 1980, Gnam 1990). Amazons occur island-wide on Great Inagua (1,544 km²), but are patchy in distribution. The parrots formerly visited nearby Little Inagua, and may continue to do so today. The Abaco population nests in holes in the limestone ground, rather than traditional tree cavities as used by the Inagua population. The population on Abaco was estimated at 450–800 birds in 1976 (Snyder *et al.* 1982). In 1989, the Abaco population was estimated at 830–1082 birds (Gnam and Burchsted 1991). A population survey there in 1995 yielded 1,100–1,200 parrots.

Threats: Populations of *A. l. bahamensis* are thought to be relatively stable (possibly increasing on Abaco), but vulnerable to exotic predators, poaching, possible habitat loss, and hurricanes. With its small population size, restricted distribution, and the threats facing it, this population cannot be considered secure.

Actions: A successful public awareness campaign (Clarke 1993), and a parrot reserve has been established on Abaco. An urgent study to determine current population size and distribution is needed on Great Inagua. A comprehensive long-range management plan based on sound knowledge of parrot biology is needed for Abaco Island. Comprehensive fire policies and feral cat control in the nesting areas on Abaco would be of benefit. Also, it seems timely and prudent to re-establish *A. l. bahamensis* on other islands. A re-introduction on Acklin's Island or northern Abaco Island now appears particularly feasible in view of the parrot's recent extinction, stability of the habitat in these areas, and the present respect by Bahamians of bird protection laws. The great strength of re-introduction is its power to rally public support for conservation. The Bahama race of the Cuban amazon has been bred in captivity (e.g., Fitzgerald and Larson 1989), although translocation of birds from the healthy Abaco population is probably the most feasible strategy for re-establishing populations on other islands.

Cayman Islands populations

Amazona leucocephala caymanensis* and *A. l. hesterna

Distribution and status: Two forms of *Amazona leucocephala* parrots inhabit the Cayman Islands, *A. l. hesterna* from the Cayman Brac, and *A. l. caymanensis* from the Cayman Island. Both races inhabit coastal and inland forests and are of concern because of their small populations and the

small area of available habitat. The Cayman Brac amazon occupies the smallest range of any *Amazona* in the Caribbean. It once occurred on both Cayman Brac and Little Cayman. Cayman Brac birds were said to fly to Little Cayman (7km) to feed, but it was likely that the smaller island had its own breeding population. At present, the parrot is found only in Cayman Brac, where it frequents the dry woodland of the plateau and nearby agricultural holdings along the coast, where the parrots often feed. In 1985, Bradley (1986) estimated a population consisting of approximately 26 adult individuals (including 12 breeding pairs) and 11–15 juvenile individuals. In addition, she estimated that more than 200 parrots were in captivity (four times more than in the wild population) on the island, although Noegel (1976) located only eight captive *A. l. hesterna* on Cayman Brac a decade earlier. Most recently, Wiley *et al.* (1991) estimated a total population of 300–430 parrots. Subsequent population surveys in 1994 and 1997 have resulted in similar population estimates (Baxter 1997).

The Grand Cayman parrot *A. l. caymanensis* ranges throughout Grand Cayman, except for central George Town, the eastern fringe of North Sound, the interior of the Central Mangrove Swamp, Booby Cay in North Sound, and the reclaimed land from Rum Point to Water Point. Within its limited range, *A. l. caymanensis* has been generally described as common. The adult population was estimated in 1985 to be 935 (range = 674–1,239) individuals (Bradley 1986). More recent population surveys have placed that estimate at about 2,000 birds (Baxter 1997). In 1985, the captive population of parrots on Grand Cayman was approximately 500 birds.

Threats: Among the most serious threats that affect parrot reproductive success are: predation by rats, barn owl *Tyto alba*, smooth-billed ani *Crotophaga ani*, greater Antillean grackle *Quiscalus niger*, and feral cats; disease; starvation of young after a hurricane or period of drought; flooded cavities; felling of parrot nesting trees by humans; and human harvest of chicks for pets (Wiley *et al.* 1991, Wiley and Wunderle 1993). Amazons continue to be destroyed as pests, and wounded adult parrots that survive shooting are taken for captivity. Recently, escaped *A. l. caymanensis* pets have been observed free-flying in Cayman Brac and, in at least one case, a mixed pair consisting of *caymanensis* and *hesterna* individuals was observed attempting to breed. Since the initial investigations in the early 1990s, breeding effort by the Cayman Brac amazon populations appears to have substantially declined. Although suitable nesting cavities are few, sites used in earlier years have not been occupied in recent years. However, the most serious threat is the accelerated land development for tourism.

Actions: Major steps have recently been taken by the Cayman Islands government to ensure the survival of the

species. Some bird sanctuaries have been established, but inclusion of larger tracts of habitat are essential to the populations' survival. The parrot was removed from the Cayman Islands game list in 1990. In 1990, the National Trust for the Cayman Islands, in co-operation with the RARE Centre for Tropical Conservation, began an intensive public education programme for the native parrots modelled on the programs successfully used in the Lesser Antilles. There were 115 specimens of the whole species recorded in international trade between 1991 and 1995, with an annual maximum of 42 in 1992 (CITES Annual Report database).

For both races, the conservation education programme should be continued, since it has shown excellent results and is the foundation of other conservation measures (Scharr *et al.* 1992). In 1991, The Nature Conservancy transferred its holding on the Bluff of Cayman Brac to The National Trust. This provided an important first step in protecting adequate habitat for the parrot. However, the creation of a large, or series of smaller, yet effective, parrot reserves on Cayman Brac is needed. Major terrestrial reserves on Grand Cayman include the Salina Reserve (2.53km²), Mastic Reserve (1.55km²), and Central Mangrove Wetland (about 6.48km²). Additional habitat protection is vital to ensuring the survival of the parrot on that island. Further measures should include the regulation and restriction of construction of new roads through the important habitat of the Bluff. The removal of feral cats from parrot nesting and foraging areas is of high priority. Despite the removal of 250 feral cats from Cayman Brac by the Department of Agriculture in 1991, cat populations remain extremely high and pose a potential threat to the survival of the parrot. Given the small population size, regular population surveys are necessary.

Additional research is needed on availability and quality of nesting habitat, as well as reproductive effort and success of the Cayman Brac amazon population. A well-managed captive propagation programme seems appropriate in view of the small population size and restricted range of the Cayman Brac amazon. Individuals for the captive flock should not be taken from the wild, but from extant captives of definite *hesterna* lineage. A captive population will serve both in providing a reserve of birds in the event of a devastating natural disaster to the wild population and as a source of progeny for management of the Cayman Brac population. Re-introductions may be vital in bolstering numbers, and to increase genetic diversity and geographic distribution. The re-establishment of *A. l. hesterna* on Little Cayman appears particularly feasible in view of the parrot's recent eradication. However, recent habitat surveys on Little Cayman have revealed the need for intensive habitat management (e.g., provision of nesting sites) before the parrot can be re-established there. Efforts, including those of a local (Grand Cayman) aviculturist, to breed both races in captivity have been successful.

Scarlet macaw

Ara macao cyanoptera

(Northern Central American populations)

Contributors: Ernesto Enkerlin-Hoeflich, James Gilardi, Christopher Vaughan, and David Wiedenfeld.

Conservation status: IUCN: To be considered. Endangered A1a, b, d.

CITES: Appendix I (transferred from Appendix II in 1985. Liechtenstein, Surinam and Switzerland have reservations on this listing).

National protection status: Information unavailable.

Distribution and status: The scarlet macaw occurs from southern Mexico in Oaxaca southward through Central America and throughout northern South America east of the Andes south as far as Bolivia and southern Brazil. Its northern Central American populations south to central Nicaragua have been recently described as a separate subspecies, *Ara macao cyanoptera* (Wiedenfeld 1994). The remaining populations from Nicaragua southward (including South American populations) comprise the nominate subspecies, *Ara macao macao* and are not considered globally threatened (although some isolated populations may be at risk, such as its northernmost populations in Panama and in the Carrara Biological Reserve in Costa Rica).

Northern Central American populations

Ara macao cyanoptera

Distribution and status: Fewer than 100 birds are believed to survive in Mexico, and most of these are found in the



Marques de Comillas area of the Lacandon forest. See map in Howell and Webb (1995). A small population also persists in north-west Guatemala in the Laguna de Tigre region, although chicks from all known nests are poached (Santiago Billy *in litt.* 1997). At least one population also remains in Belize where a flock of up to 100 individuals visits the Red Bank village intermittently. The scarlet macaw apparently no longer occurs on the pacific slope in El Salvador or Honduras. In Nicaragua, there remains a small population at Volcán Cosigüina. On the Caribbean slope in Honduras, the species remains in low numbers. The majority of individuals occur in the north-eastern part of the country, primarily in Departamento Olancho. Wiedenfeld (1994) estimated the total population of scarlet macaws in Honduras at 1,000–1,500 individuals. As in Honduras, the Nicaraguan population of scarlet macaws is restricted to the Caribbean coast. Numbers in Nicaragua are probably somewhat higher than in Honduras, probably in the range of 1,500–2,500 birds (Wiedenfeld 1995).

Threats: Virtually extirpated from middle America by a combination of capture for the pet trade and habitat loss (Iñigo-Elias 1991), the former being by far the most important factor (Iñigo-Elias *in litt.* 1997). Although the macaw is a CITES Appendix I species, some birds are still apparently taken for illegal international trade. However, the macaw is a popular pet species in its range countries, and the majority of birds harvested for pets probably remain within those countries. There were 314 specimens of the whole species recorded in international trade between 1991 and 1995, with an annual maximum of 171 in 1994 (CITES Annual Report database). Surinam, under its reservation, imposed an export quota of 100 specimens for 1998, although other Parties without reservations are not allowed to import the species (CITES Notification to the Parties No. 1998/07).

Within the next 10 years, all middle American populations will probably disappear except for those in highly protected (i.e., guarded) areas. In Belize a recent sighting of over 60 birds puts this population as a special conservation concern (Saqui *in litt.* 1997). Conservation efforts are being considered for harvest of the species and captive breeding in Mexico despite the numerous risks involved in both courses of action. These efforts are, in the opinion of the authors, misguided.

In Carrara Biological Reserve, Costa Rica, most nests of this species are poached, despite attempts to guard them, although apparently juveniles do occur in the population each year. Nests in more remote areas with lower human populations on the Caribbean slope of Central America may experience lower poaching pressure. Surprisingly, chicks are at least as valuable in their range countries as they are in North America or Europe, suggesting that reduction of international trade would not stop the demand for chicks.

Actions: Biological research is currently being conducted on scarlet macaw populations in Mexico, Guatemala, and Belize. Outreach programs are being implemented in Belize to educate schools and local communities about scarlet macaw ecology and conservation. Similar education programs need to be extended to other threatened macaw populations.

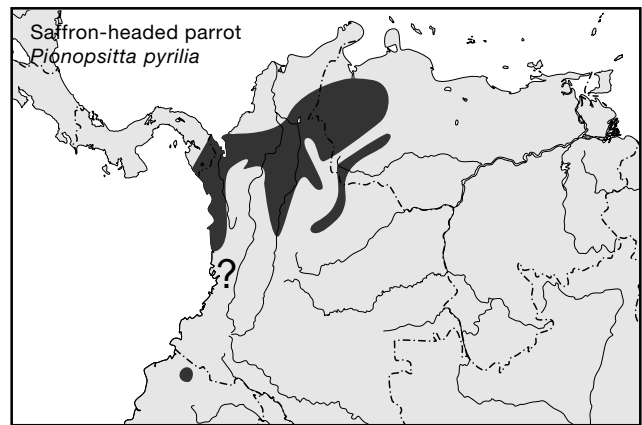
The development of community-based ecotourism may provide an opportunity for local people to extract economic benefit from the tourist appeal of scarlet macaws. In the Marques de Comillas community in southern Mexico and in Red Bank village in Belize, scarlet macaw-based ecotourism projects are currently underway. Similar ecotourism focusing on macaws has been proposed for Costa Rica (Marineros and Vaughan 1995). However, the success of community-based ecotourism depends on effective organisation, training, infrastructure, services, and promotion, and should involve all members of the community (Norris *et al.* 1998).

In Costa Rica, there has been substantial controversy over the management of the Carrara population. An international conference was held in 1995 and recommendations were made to move forward with a combination of ecological studies, nest site protection, and the rescuing of chicks from “unprotectable” nests.

Populations in Nicaragua and Honduras still require attention. The dispersed nature of the remaining scarlet macaw populations in Central America, many of which are located close to national borders, raises the need for a regional approach to conservation which co-ordinates national efforts, and addresses the socio-economic problems of poaching and habitat destruction.

Saffron-headed parrot ***Pionopsitta pyrrhia***

Contributors: Franklin Rojas, Jon Paul Rodriguez, Chris Sharpe, Gary Stiles, and Paul Salaman.



Conservation status: IUCN: To be considered. Vulnerable C1.
CITES: Appendix II.

National protection status: Information unavailable.

Distribution and status: A very uncommon parrot of the low humid and high cloudforest of Venezuela, Colombia, and possibly Ecuador. In Venezuela it is rarely seen, even though good habitat is considered sufficient. In Colombia, it may be common at one site, but only seasonally. There are only two other recent records from the country. There is one isolated record in Cotacachi Cayapas National Park in NW Ecuador, and possibly represent roaming birds from nearby Colombia. The species is certainly rare and the estimated population is 10,000, and highly nomadic (Juniper and Parr 1998).

Threats: Significant portions of nearly pristine habitat remain in Venezuela, where national parks in the Andes cover more than 1000km² of suitable habitat. In Colombia, it has been recorded as being trapped for trade (at least nationally), and its habitat is rapidly being lost within its range.

Actions: Further studies on its biology, distribution, population size, and regional movements are needed.

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Appendix 1

Contact details

Further information may be obtained from the contacts listed below.

Organisations

Association for Parrot Conservation,
c/o Ernesto Enkerlin, President.
Centro de Calidad Ambiental ITESM,
Sucursal de Correos J, C.P.64849
Monterrey N.L., Mexico.

BirdLife International, Wellbrook
Court, Girton Road, Cambridge CB3
0NA, UK
(BirdLife International-Indonesia
Programme, P.O. Box 310/Boo, Bogor
16003, Indonesia).

BIRDS Australia Parrot Association,
Australian Bird Research Centre, 415
Riversdale Road, Hawthorn East,
Victoria 3123, Australia.

Fundación Armonia, Alameda Junin
48 Esq Florida, Casilla 3081, Santa
Cruz, Bolivia.

Research Centre for African Parrot
Conservation, Zoology and
Entomology Department, Private Bag,
X01, Scottsville, 3201, Natal, South
Africa.

World Parrot Trust, Glanmor House,
Hayle, Cornwall TR27 4HB, UK.

Individuals

Des Allen,
1158 NoGaYaCho, Machida Shi,
Tokyo 195-0053 Japan.

Steven R. Beissinger,
Division of Ecosystem Sciences,
Department of Environmental
Science, Policy and Management,
Hillgard Hall #3110, University of
California, Berkeley, CA 94720-3110,
USA.

Glaysen Bencke,
Rua Augusto Spengler 500/401. BL1,
Santa Cruz do Sul RS, CEP 96815-
020, Brazil.

Vicente Berovides,
Empresa Nacional Para la Protección
de la Flora y la Fauna, Programa
especies en peligro, Av. 42 No. 514 esq
7a Miramar, La Habana, Cuba.

Colin Bibby,
BirdLife International, Wellbrook
Court, Girton Road, Cambridge CB3
0NA, UK.

John Blyth,
Department of Conservation and
Land Management, P.O. Box 51,
Waneroo, WA 6065, Australia.

Tom Brooks,
Department of Ecology and
Evolutionary Biology, M313 Walters
Life Science Building, University of
Tennessee, Knoxville, TN37996-0810,
USA.

Enrique Bucher,
Centro de Zoología Aplicada, Casilla
de Correos 122, Cordoba 5000,
Argentina.

Allan Burbidge,
Department of Conservation and
Land Management, P.O. Box 51,
Waneroo, WA 6065, Australia.

Paul Butler,
RARE Center for Tropical
Conservation PO Box GM755,
Gablewoods Saint Lucia 809-4520864.

Nigel Collar,
BirdLife International, Wellbrook
Court, Girton Road, Cambridge CB3
0NA, UK.

Charles Daugherty,
School of Biological Sciences, Victoria
University, P.O. Box 600, Wellington,
New Zealand.

Leo Douglas,
Gosse Bird Club (Birdlife Jamaica), 93
Old Hope Roas, Kingston Jamaica
West Indies.

Colleen Downs,
Research Centre for African Parrot
Conservation, Zoology and
Entomology Department, Private Bag,
X01, Scottsville, 3201, Natal, South
Africa.

Eduardo E. Iñigo Elias, Conservation
Director, Mexico Program Office,
World Wildlife Fund, Av. Mexico 51;
Col. Hipodromo, D.F. 06100, Mexico.
Present Address: Fundación ARA,
Aptdo. Postal 2275, Sucursal
Monterrey, Nuevo León. C.P. 64988
Mexico.

Graeme Elliot,
Department of Conservation, Private
Bag 5, Nelson, New Zealand.

Ernesto Enkerlin-Hoeflich,
Centro de Calidad Ambiental ITESM,
Sucursal de Correos J, C.P.64849
Monterrey N.L., Mexico.

Leasie Felderhof,
Queensland department of
Environment, P.O. Box 2066, Cairns,
Queensland, Australia.

Jeremy Flanagan,
Fundación Ecológica ArcoIris, Casilla
11-01-860, calles Bernardo Valdiviezo
03-26 y Jose Felix Valdiviezo, Loja,
Ecuador. Present address: ProAves
Peru, PO Box 07, Piura, Peru.

Joseph Forshaw,
P.O. Box 84, Wauchipe, New South
Wales, 2446, Australia.

Mauro Galetti,
Departamento de Botanica, UNESP,
C.P. 199, 13506-900 Rio Claro, São
Paulo, Brazil.

Xiomara Galvez,
Empresa Nacional Para la Protección
de la Flora y la Fauna, Programa
especies en peligro, Av. 42 No. 514
esq 7ma Miramar, La Habana, Cuba.

Stephen Garnett,
Department of Environment and
Heritage, P.O. Box 2066, Cairns 4870,
Australia.

James Gilardi,
Wildlife Preservation Trust
International, 2320 Amapola Drive,
Davis, CA 95616, USA.

Mariano Gimenez Dixon,
Programme Officer, Species Survival
Programme, IUCN–The World
Conservation Union, Rue Mauverney
28, CH-1196, Gland, Switzerland.

Alejandro Grajal,
Latin America and Caribbean
Program, National Audubon Society,
444 Brickell Av. Suite 850, Miami FL
33131-2405, USA.

Rosemarie Gnam,
Office of Management Authority, US
Fish Wildlife Service, 4401 N Fairfax
Drive, Arlington VA 22203, USA.

Terry Greene,
Science and Research Division,
Department of Conservation,
PO. Box, 10420, Wellington,
New Zealand.

Neiva Guedes,
Projeto ArarAzul, Rua Geraldo
Jacques M. Lette 79, Conl Ma Apo
Pedrossian, CEP 79044-480 Campo
Grande/MS, Brazil.

Mark Holdsworth,
Parks and Wildlife Service, GPO Box
44A Hobart Tasmania 7001 Australia.

Eric Horstmann,
Fundacion Probosque, Km. 15 Via La
Costa, Aptdo. Postal 09-01-04243,
Guayaquil, Ecuador.

Paul Jepson,
BirdLife International-Indonesia
Programme, P.O. Box 310/Boo, Bogor
16003, Indonesia (current address:
School of Geography, Oxford OX1
3TB, UK).

Gustavo Kattan,
Aptdo. Aéreo 25527, Carrera 80 N° 5-
220 apto 407 U-3, Cali, Colombia.

Susan Koenig,
School of Forestry and Environmental
Studies, Prospect Street, Yale
University, New Haven, Ct. 06511,
USA. Present address: Windsor
Research Station, Sherwood Content,
Trelawny, Jamaica, W.I.

Niels Krabbe,
Casilla 17-21-791, Quito, Ecuador

Frank Lambert,
BirdLife International-Indonesia
Programme, P.O. Box 310/Boo, Bogor
16003, Indonesia.

Wendy Lee,
Sevenoaks, Runaway Bay, Jamaica,
West Indies.

Catherine Levy,
Gosse Bird Club (Birdlife Jamaica),
93 Old Hope Roas, Kingston Jamaica
West Indies.

Pedro Lima,
CETREL, S/A Via Atlantica Km9,
Polo Petroquimico, CP 011-428810-
000, Camaçari, Bahia, Brazil.

James Lowen,
30 Suez Road, Cambridge CB1 3QB,
UK.

Stuart Marsden,
Department of Biological Sciences,
John Dalton Building, Chester Street,
Manchester M1 5GD, UK.

Jaime Martinez,
Projeto Charão, Rua Presidente
Vargas 190, Caixa Postal 37, CEP
99500-000 Carazinho RS, Brazil.

Peter Mawson,
Wildlife Branch, Department of
Conservation and Land Management,
P.O. Box 104, Como, WA 6152,
Australia.

Phil McGowan,
c/o World Parrot Trust, Glanmor
House, Hayle, Cornwall TR27 4HY,
UK.

Peter Menkhorst,
Department of Natural Resources and
Environment, 4/250 Victoria Parade,
East Melbourne, Victoria 3002,
Australia.

Carolyn Miller,
P.O. Box 37, Belize City, Belize.

Teresa Mulliken,
TRAFFIC International, 219c
Huntingdon Road, Cambridge CB3
0DL, UK.

Charles Munn,
Aptdo 18-09-30, Lima 18, Peru.

Richard Noske,
School of Biological and
Environmental Sciences, Science
Faculty, Northern Territory University,
Darwin, NT 0909, Australia.

Fábio Olmos,
Rua Antonio F. Gandra 182, São
Vicente; SP, 11390-250, Brazil.

Michael J. Parr,
American Bird Conservancy, 1250 24th
Street, NW, Suite 400, Washington,
DC 20037, USA.

Lynn Pedler,
P.O. Box 41, Parndana SA 5220,
Australia.

Mike Perrin,
Research Centre for African Parrot
Conservation, Zoology and
Entomology Department, Private Bag,
X01, Scottsville, 3201, Natal, South
Africa.

Elin Pitter,
Mette Bohn Christiansen, Zoological
Museum, University of Copenhagen,
Universitetsparken 15, DK 2100
Copenhagen, Denmark.

Marco Aurelio Pizo,
Dept de Zoologia. IB/Unicamp, Caixa
Postal 6109, 13083-971 Campinas SP
Brazil.

Pam Rasmussen,
NHB 335 MRC 114, Smithsonian
Institution, Washington, D.C. 20560,
USA.

Luis Miguel Renjifo,
University of Missouri-St. Louis,
Department of Biology, Natural Bridge
Road, St. Louis, Missouri 63121, USA.
Present address: Instituto Von Humboldt,
AA 8693, Bogota, Colombia.

Michael Reynolds,
World Parrot Trust, Glanmor House,
Hayle, Cornwall TR27 4HY, UK.

Adriana Rodriguez-Ferraro, Provita,
Aptdo. 47552, Caracas, 1041-A,
Venezuela.

Franklin Rojas-Suarez,
Provita, Aptdo. 47552, Caracas,
1041-A, Venezuela.

Alison Rosser,
Trade Specialist Group, Species
Survival Programme, IUCN–The World
Conservation Union, 219c Huntingdon
Road, Cambridge CB3 0DL, UK.

Paul G. W. Salaman,
Edward Grey Institute of Field
Ornithology, Department of Zoology,
University of Oxford, South Parks
Road, Oxford OX1 3PS, UK.

Virginia Sanz,
Provita, Aptdo. 47552, Caracas, 1041-
A, Venezuela.

Denis Saunders,
CSIRO Wildlife and Ecology, PO Box
84, Lyneham ACT 2602, Australia.

Pedro Scherer Neto,
Museu de Historia Natural, Seção de
Aves, Rua Benedito Conceição 407,
Curitiba PR Brazil 82810-080.

Richard Selman,
6 Aquila Drive, Heddon-on-the-Wall,
Newcastle-upon-Tyne NE15 0BS, U.K.

Noel Snyder,
Wildlife Preservation Trust, P.O. Box
426, Portal, AZ 85632, USA.

Craig Symes,
Research Centre for African Parrot
Conservation, Zoology and
Entomology Department, Private Bag,
X01, Scottsville, 3201, Natal, South
Africa.

Jon Riley,
1 The Croft, North Sunderland,
Seahouses, Northumberland NE68
7XA, UK.

Paul Stevenson,
Australian Parks National and Wildlife
Service, Norfolk Island, Australia

E. Paul Toyne,
WWF-UK, Panda House, Weyside
Park, Cattershill Lane, Godalming,
Surrey GU7 1XR, U.K.

Christopher Vaughan,
Programa Regional de Vida Silvestre,
Aptdo. 1350-3000, Escuela de Ciencias
Ambientales, Universidad Nacional,
Mexico.

Louise Warburton,
Research Centre for African Parrot
Conservation, Zoology and
Entomology Department, Private Bag,
X01, Scottsville, 3201, Natal, South
Africa.

David Waugh,
Fundacion Loro Parque, Bencomo
No1, 38400 Puerto de la Cruz,
Tenerife, Spain. Present address:
Royal Zoological Society of Scotland,
Edinburgh EH12 6TS, Scotland U.K.

David A. Wiedenfeld,
George M. Sutton Avian Research
Center, PO Box 2007, Bartlesville OK
740056, 918-336-7778, USA.

James Wiley,
USD. Interior, US Geological Survey,
Grambling State Univ., PO Box.841,
Grambling, LA 71245, USA.

Roger Wilkinson,
Chester Zoo, Upton-by-Chester,
Cheshire CH2 1LH, UK.

Kerry-Jayne Wilson,
Entomology and Animal Ecology
Department, Lincoln University,
Canterbury, New Zealand.

Roland Wirth,
Franz-Senn-Str. 14, 81377 Muenchen,
Germany.

Tim Wright,
Program in Comparative and
Evolutionary Biology of Hearing,
Department of Zoology, University of
Maryland, College Park, MD 20742,
USA.

Joseph M. Wunderle,
International Institute of Tropical
Forestry, US Forest Service, Box 490,
Palmer Puerto Rico 00721.

Carlos Yamashita,
Rua Voluntarios da Patria 3714 apto
52, São Paulo SP-CEP 02402-400,
Brazil.

Appendix 2

IUCN Red List Categories

Prepared by the IUCN Species Survival Commission
As approved by the 40th Meeting of the IUCN Council, Gland, Switzerland
30 November 1994

I) Introduction

1. The threatened species categories now used in Red Data Books and Red Lists have been in place, with some modification, for almost 30 years. Since their introduction these categories have become widely recognised internationally, and they are now used in a whole range of publications and listings, produced by IUCN as well as by numerous governmental and non-governmental organisations. The Red Data Book categories provide an easily and widely understood method for highlighting those species under higher extinction risk, so as to focus attention on conservation measures designed to protect them.

2. The need to revise the categories has been recognised for some time. In 1984, the SSC held a symposium, 'The Road to Extinction' (Fitter and Fitter 1987), which examined the issues in some detail, and at which a number of options were considered for the revised system. However, no single proposal resulted. The current phase of development began in 1989 with a request from the SSC Steering Committee to develop a new approach that would provide the conservation community with useful information for action planning.

In this document, proposals for new definitions for Red List categories are presented. The general aim of the new system is to provide an explicit, objective framework for the classification of species according to their extinction risk.

The revision has several specific aims:

- to provide a system that can be applied consistently by different people;
- to improve the objectivity by providing those using the criteria with clear guidance on how to evaluate different factors which affect risk of extinction;
- to provide a system which will facilitate comparisons across widely different taxa;
- to give people using threatened species lists a better understanding of how individual species were classified.

3. The proposals presented in this document result from a continuing process of drafting, consultation and validation. It was clear that the production of a large number of draft proposals led to some confusion, especially as each draft has been used for classifying some set of species for conservation purposes. To clarify matters, and to open the way for modifications as and when they became necessary, a system for version numbering was applied as follows:

Version 1.0: Mace & Lande (1991)

The first paper discussing a new basis for the categories, and presenting numerical criteria especially relevant for large vertebrates.

Version 2.0: Mace *et al.* (1992)

A major revision of Version 1.0, including numerical criteria appropriate to all organisms and introducing the non-threatened categories.

Version 2.1: IUCN (1993)

Following an extensive consultation process within SSC, a number of changes were made to the details of the criteria, and fuller explanation of basic principles was included. A more explicit structure clarified the significance of the non-threatened categories.

Version 2.2: Mace & Stuart (1994)

Following further comments received and additional validation exercises, some minor changes to the criteria were made. In addition, the Susceptible category present in Versions 2.0 and 2.1 was subsumed into the Vulnerable category. A precautionary application of the system was emphasised.

Final Version

This final document, which incorporates changes as a result of comments from IUCN members, was adopted by the IUCN Council in December 1994.

All future taxon lists including categorisations should be based on this version, and not the previous ones.

4. In the rest of this document the proposed system is outlined in several sections. The Preamble presents some basic information about the context and structure of the proposal, and the procedures that are to be followed in applying the definitions to species. This is followed by a section giving definitions of terms used. Finally the definitions are presented, followed by the quantitative criteria used for classification within the threatened categories. It is important for the effective functioning of the new system that all sections are read and understood, and the guidelines followed.

References:

- Fitter, R., and M. Fitter, ed. (1987) *The Road to Extinction*. Gland, Switzerland: IUCN.
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II) Preamble

The following points present important information on the use and interpretation of the categories (= Critically Endangered, Endangered, etc.), criteria (= A to E), and sub-criteria (= a,b etc., i,ii etc.):

1. Taxonomic level and scope of the categorisation process

The criteria can be applied to any taxonomic unit at or below the species level. The term 'taxon' in the following notes, definitions and criteria is used for convenience, and may represent species or lower taxonomic levels, including forms that are not yet formally described. There is a sufficient range among the different criteria to enable the appropriate listing of taxa from the complete taxonomic spectrum, with the exception of micro-organisms. The criteria may also be applied within any specified geographical or political area although in such cases special notice should be taken of point 11 below. In presenting the results of applying the criteria, the taxonomic unit and area under consideration should be made explicit. The categorisation process should only be applied to wild populations inside their natural range, and to populations resulting from benign introductions (defined in the draft IUCN Guidelines for Re-introductions as "... an attempt to establish a species, for the purpose of conservation, outside its recorded distribution, but within an appropriate habitat and eco-geographical area").

2. Nature of the categories

All taxa listed as Critically Endangered qualify for Vulnerable and Endangered, and all listed as Endangered qualify for Vulnerable. Together these categories are described as 'threatened'. The threatened species categories form a part of the overall scheme. It will be possible to place all taxa into one of the categories (see Figure 1).

3. Role of the different criteria

For listing as Critically Endangered, Endangered or Vulnerable there is a range of quantitative criteria; meeting any one of these criteria qualifies a taxon for listing at that level of threat. Each species should be evaluated against all the criteria. The different criteria (A–E) are derived from a wide review aimed at detecting risk factors across the broad range of organisms and the diverse life histories they exhibit. Even though some criteria will be inappropriate for certain taxa (some taxa will

never qualify under these however close to extinction they come), there should be criteria appropriate for assessing threat levels for any taxon (other than micro-organisms). The relevant factor is whether any one criterion is met, not whether all are appropriate or all are met. Because it will never be clear which criteria are appropriate for a particular species in advance, each species should be evaluated against all the criteria, and any criterion met should be listed.

4. Derivation of quantitative criteria

The quantitative values presented in the various criteria associated with threatened categories were developed through wide consultation and they are set at what are generally judged to be appropriate levels, even if no formal justification for these values exists. The levels for different criteria within categories were set independently but against a common standard. Some broad consistency between them was sought. However, a given taxon should not be expected to meet all criteria (A–E) in a category; meeting any one criterion is sufficient for listing.

5. Implications of listing

Listing in the categories of Not Evaluated and Data Deficient indicates that no assessment of extinction risk has been made, though for different reasons. Until such time as an assessment is made, species listed in these categories should not be treated as if they were non-threatened, and it may be appropriate (especially for Data Deficient forms) to give them the same degree of protection as threatened taxa, at least until their status can be evaluated.

Extinction is assumed here to be a chance process. Thus, a listing in a higher extinction risk category implies a higher expectation of extinction, and over the time-frames specified more taxa listed in a higher category are expected to go extinct than in a lower one (without effective conservation action). However, the persistence of some taxa in high risk categories does not necessarily mean their initial assessment was inaccurate.

6. Data quality and the importance of inference and projection

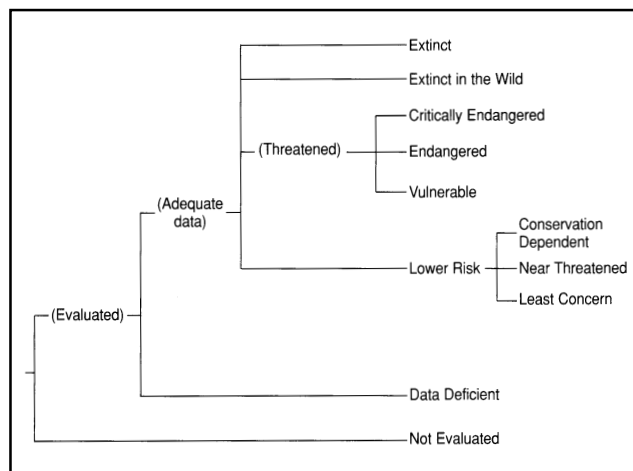
The criteria are clearly quantitative in nature. However, the absence of high quality data should not deter attempts at applying the criteria, as methods involving estimation, inference and projection are emphasised to be acceptable throughout. Inference and projection may be based on extrapolation of current or potential threats into the future (including their rate of change), or of factors related to population abundance or distribution (including dependence on other taxa), so long as these can reasonably be supported. Suspected or inferred patterns in either the recent past, present or near future can be based on any of a series of related factors, and these factors should be specified.

Taxa at risk from threats posed by future events of low probability but with severe consequences (catastrophes) should be identified by the criteria (e.g. small distributions, few locations). Some threats need to be identified particularly early, and appropriate actions taken, because their effects are irreversible, or nearly so (pathogens, invasive organisms, hybridization).

7. Uncertainty

The criteria should be applied on the basis of the available evidence on taxon numbers, trend and distribution, making due allowance for statistical and other uncertainties. Given that data are rarely available for the whole range or population of a taxon, it may often be appropriate to use the information

Figure 1: Structure of the Categories



that is available to make intelligent inferences about the overall status of the taxon in question. In cases where a wide variation in estimates is found, it is legitimate to apply the precautionary principle and use the estimate (providing it is credible) that leads to listing in the category of highest risk.

Where data are insufficient to assign a category (including Lower Risk), the category of 'Data Deficient' may be assigned. However, it is important to recognise that this category indicates that data are inadequate to determine the degree of threat faced by a taxon, not necessarily that the taxon is poorly known. In cases where there are evident threats to a taxon through, for example, deterioration of its only known habitat, it is important to attempt threatened listing, even though there may be little direct information on the biological status of the taxon itself. The category 'Data Deficient' is not a threatened category, although it indicates a need to obtain more information on a taxon to determine the appropriate listing.

8. Conservation actions in the listing process

The criteria for the threatened categories are to be applied to a taxon whatever the level of conservation action affecting it. In cases where it is only conservation action that prevents the taxon from meeting the threatened criteria, the designation of 'Conservation Dependent' is appropriate. It is important to emphasise here that a taxon requires conservation action even if it is not listed as threatened.

9. Documentation

All taxon lists including categorisation resulting from these criteria should state the criteria and sub-criteria that were met. No listing can be accepted as valid unless at least one criterion is given. If more than one criterion or sub-criterion was met, then each should be listed. However, failure to mention a criterion should not necessarily imply that it was not met. Therefore, if a re-evaluation indicates that the documented criterion is no longer met, this should not result in automatic down-listing. Instead, the taxon should be re-evaluated with respect to all criteria to indicate its status. The factors responsible for triggering the criteria, especially where inference and projection are used, should at least be logged by the evaluator, even if they cannot be included in published lists.

10. Threats and priorities

The category of threat is not necessarily sufficient to determine priorities for conservation action. The category of threat simply provides an assessment of the likelihood of extinction under current circumstances, whereas a system for assessing priorities for action will include numerous other factors concerning conservation action such as costs, logistics, chances of success, and even perhaps the taxonomic distinctiveness of the subject.

11. Use at regional level

The criteria are most appropriately applied to whole taxa at a global scale, rather than to those units defined by regional or national boundaries. Regionally or nationally based threat categories, which are aimed at including taxa that are threatened at regional or national levels (but not necessarily throughout their global ranges), are best used with two key pieces of information: the global status category for the taxon, and the proportion of the global population or range that occurs within the region or nation. However, if applied at regional or national level it must be recognised that a global category of threat may not be the same as a regional or national category for a particular taxon. For example, taxa classified as Vulnerable on the basis of their global declines in numbers or range might

be Lower Risk within a particular region where their populations are stable. Conversely, taxa classified as Lower Risk globally might be Critically Endangered within a particular region where numbers are very small or declining, perhaps only because they are at the margins of their global range. IUCN is still in the process of developing guidelines for the use of national red list categories.

12. Re-evaluation

Evaluation of taxa against the criteria should be carried out at appropriate intervals. This is especially important for taxa listed under Near Threatened, or Conservation Dependent, and for threatened species whose status is known or suspected to be deteriorating.

13. Transfer between categories

There are rules to govern the movement of taxa between categories. These are as follows: (A) A taxon may be moved from a category of higher threat to a category of lower threat if none of the criteria of the higher category has been met for five years or more. (B) If the original classification is found to have been erroneous, the taxon may be transferred to the appropriate category or removed from the threatened categories altogether, without delay (but see Section 9). (C) Transfer from categories of lower to higher risk should be made without delay.

14. Problems of scale

Classification based on the sizes of geographic ranges or the patterns of habitat occupancy is complicated by problems of spatial scale. The finer the scale at which the distributions or habitats of taxa are mapped, the smaller the area will be that they are found to occupy. Mapping at finer scales reveals more areas in which the taxon is unrecorded. It is impossible to provide any strict but general rules for mapping taxa or habitats; the most appropriate scale will depend on the taxa in question, and the origin and comprehensiveness of the distributional data. However, the thresholds for some criteria (e.g. Critically Endangered) necessitate mapping at a fine scale.

III) Definitions

1. Population

Population is defined as the total number of individuals of the taxon. For functional reasons, primarily owing to differences between life-forms, population numbers are expressed as numbers of mature individuals only. In the case of taxa obligately dependent on other taxa for all or part of their life cycles, biologically appropriate values for the host taxon should be used.

2. Subpopulations

Subpopulations are defined as geographically or otherwise distinct groups in the population between which there is little exchange (typically one successful migrant individual or gamete per year or less).

3. Mature individuals

The number of mature individuals is defined as the number of individuals known, estimated or inferred to be capable of reproduction. When estimating this quantity the following points should be borne in mind:

- Where the population is characterised by natural fluctuations the minimum number should be used.

- This measure is intended to count individuals capable of reproduction and should therefore exclude individuals that are environmentally, behaviourally or otherwise reproductively suppressed in the wild.
- In the case of populations with biased adult or breeding sex ratios it is appropriate to use lower estimates for the number of mature individuals which take this into account (e.g. the estimated effective population size).
- Reproducing units within a clone should be counted as individuals, except where such units are unable to survive alone (e.g. corals).
- In the case of taxa that naturally lose all or a subset of mature individuals at some point in their life cycle, the estimate should be made at the appropriate time, when mature individuals are available for breeding.

4. Generation

Generation may be measured as the average age of parents in the population. This is greater than the age at first breeding, except in taxa where individuals breed only once.

5. Continuing decline

A continuing decline is a recent, current or projected future decline whose causes are not known or not adequately controlled and so is liable to continue unless remedial measures are taken. Natural fluctuations will not normally count as a continuing decline, but an observed decline should not be considered to be part of a natural fluctuation unless there is evidence for this.

6. Reduction

A reduction (criterion A) is a decline in the number of mature individuals of at least the amount (%) stated over the time period (years) specified, although the decline need not still be continuing. A reduction should not be interpreted as part of a natural fluctuation unless there is good evidence for this. Downward trends that are part of natural fluctuations will not normally count as a reduction.

7. Extreme fluctuations

Extreme fluctuations occur in a number of taxa where population size or distribution area varies widely, rapidly and frequently, typically with a variation greater than one order of magnitude (i.e. a tenfold increase or decrease).

8. Severely fragmented

Severely fragmented refers to the situation where increased extinction risks to the taxon result from the fact that most individuals within a taxon are found in small and relatively isolated subpopulations. These small subpopulations may go extinct, with a reduced probability of recolonisation.

9. Extent of occurrence

Extent of occurrence is defined as the area contained within the shortest continuous imaginary boundary which can be drawn to encompass all the known, inferred or projected sites of present occurrence of a taxon, excluding cases of vagrancy. This measure may exclude discontinuities or disjunctions within the overall distributions of taxa (e.g. large areas of obviously unsuitable habitat) (but see 'area of occupancy'). Extent of occurrence can often be measured by a minimum convex polygon (the smallest polygon in which no internal angle exceeds 180 degrees and which contains all the sites of occurrence).

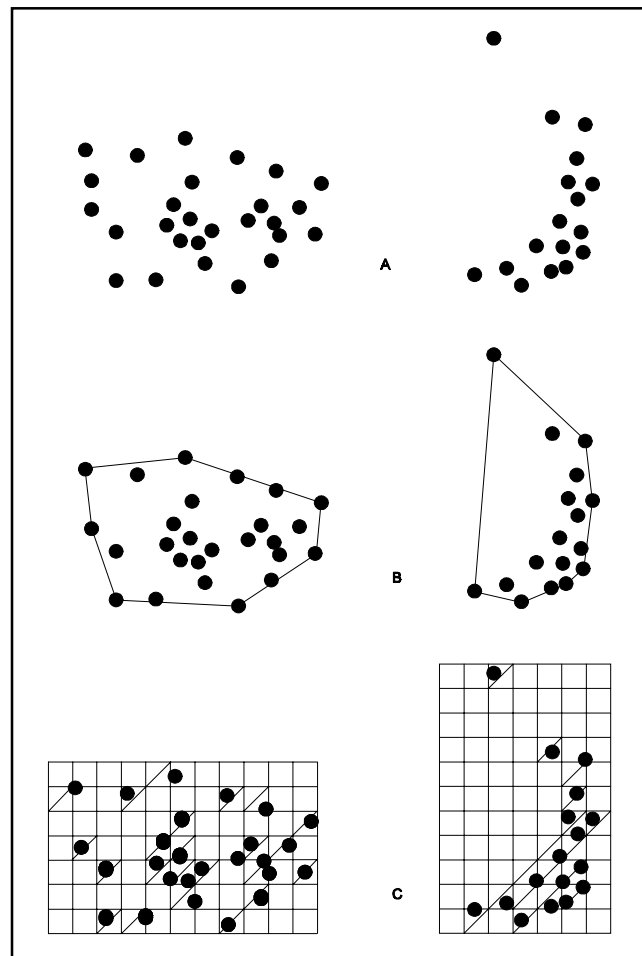


Figure 2: Two examples of the distinction between extent of occurrence and area of occupancy. (a) is the spatial distribution of known, inferred or projected sites of occurrence. (b) shows one possible boundary to the extent of occurrence, which is the measured area within this boundary. (c) shows one measure of area of occupancy which can be measured by the sum of the occupied grid squares.

10. Area of occupancy

Area of occupancy is defined as the area within its 'extent of occurrence' (see definition) which is occupied by a taxon, excluding cases of vagrancy. The measure reflects the fact that a taxon will not usually occur throughout the area of its extent of occurrence, which may, for example, contain unsuitable habitats. The area of occupancy is the smallest area essential at any stage to the survival of existing populations of a taxon (e.g. colonial nesting sites, feeding sites for migratory taxa). The size of the area of occupancy will be a function of the scale at which it is measured, and should be at a scale appropriate to relevant biological aspects of the taxon. The criteria include values in km², and thus to avoid errors in classification, the area of occupancy should be measured on grid squares (or equivalents) which are sufficiently small (see Figure 2).

11. Location

Location defines a geographically or ecologically distinct area in which a single event (e.g. pollution) will soon affect all individuals of the taxon present. A location usually, but not always, contains all or part of a subpopulation of the taxon, and is typically a small proportion of the taxon's total distribution.

12. Quantitative analysis

A quantitative analysis is defined here as the technique of population viability analysis (PVA), or any other quantitative form of analysis, which estimates the extinction probability of a taxon or population based on the known life history and specified management or non-management options. In presenting the results of quantitative analyses the structural equations and the data should be explicit.

IV) The Categories ¹

EXTINCT (EX)

A taxon is Extinct when there is no reasonable doubt that the last individual has died.

EXTINCT IN THE WILD (EW)

A taxon is Extinct in the wild when it is known only to survive in cultivation, in captivity or as a naturalised population (or populations) well outside the past range. A taxon is presumed extinct in the wild when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.

CRITICALLY ENDANGERED (CR)

A taxon is Critically Endangered when it is facing an extremely high risk of extinction in the wild in the immediate future, as defined by any of the criteria (A to E) on pages 175–176.

ENDANGERED (EN)

A taxon is Endangered when it is not Critically Endangered but is facing a very high risk of extinction in the wild in the near future, as defined by any of the criteria (A to E) on page 176.

VULNERABLE (VU)

A taxon is Vulnerable when it is not Critically Endangered or Endangered but is facing a high risk of extinction in the wild in the medium-term future, as defined by any of the criteria (A to D) on pages 176 and 177.

LOWER RISK (LR)

A taxon is Lower Risk when it has been evaluated, does not satisfy the criteria for any of the categories Critically Endangered, Endangered or Vulnerable. Taxa included in the Lower Risk category can be separated into three subcategories:

1. **Conservation Dependent (cd).** Taxa which are the focus of a continuing taxon-specific or habitat-specific conservation programme targeted towards the taxon in question, the cessation of which would result in the taxon qualifying for one of the threatened categories above within a period of five years.
2. **Near Threatened (nt).** Taxa which do not qualify for Conservation Dependent, but which are close to qualifying for Vulnerable.
3. **Least Concern (lc).** Taxa which do not qualify for Conservation Dependent or Near Threatened.

DATA DEFICIENT (DD)

A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its

risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution is lacking. Data Deficient is therefore not a category of threat or Lower Risk. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate. It is important to make positive use of whatever data are available. In many cases great care should be exercised in choosing between DD and threatened status. If the range of a taxon is suspected to be relatively circumscribed, if a considerable period of time has elapsed since the last record of the taxon, threatened status may well be justified.

NOT EVALUATED (NE)

A taxon is Not Evaluated when it has not yet been assessed against the criteria.

V) The Criteria for Critically Endangered, Endangered and Vulnerable

CRITICALLY ENDANGERED (CR)

A taxon is Critically Endangered when it is facing an extremely high risk of extinction in the wild in the immediate future, as defined by any of the following criteria (A to E):

A) Population reduction in the form of either of the following:

- 1) An observed, estimated, inferred or suspected reduction of at least 80% over the last 10 years or three generations, whichever is the longer, based on (and specifying) any of the following:
 - a) direct observation
 - b) an index of abundance appropriate for the taxon
 - c) a decline in area of occupancy, extent of occurrence and/or quality of habitat
 - d) actual or potential levels of exploitation
 - e) the effects of introduced taxa, hybridisation, pathogens, pollutants, competitors or parasites.

- 2) A reduction of at least 80%, projected or suspected to be met within the next 10 years or three generations, whichever is the longer, based on (and specifying) any of (b), (c), (d) or (e) above.

B) Extent of occurrence estimated to be less than 100km² or area of occupancy estimated to be less than 10km², and estimates indicating any two of the following:

- 1) Severely fragmented or known to exist at only a single location.
- 2) Continuing decline, observed, inferred or projected, in any of the following:
 - a) extent of occurrence
 - b) area of occupancy
 - c) area, extent and/or quality of habitat
 - d) number of locations or subpopulations
 - e) number of mature individuals.

3) Extreme fluctuations in any of the following:

- a) extent of occurrence
- b) area of occupancy
- c) number of locations or subpopulations
- d) number of mature individuals.

C) Population estimated to number less than 250 mature individuals and either:

- 1) An estimated continuing decline of at least 25% within three years or one generation, whichever is longer or
- 2) A continuing decline, observed, projected, or inferred, in numbers of mature individuals and population structure in the form of either:
 - a) severely fragmented (i.e. no subpopulation estimated to contain more than 50 mature individuals)
 - b) all individuals are in a single subpopulation.

D) Population estimated to number less than 50 mature individuals.

E) Quantitative analysis showing the probability of extinction in the wild is at least 50% within 10 years or three generations, whichever is the longer.

ENDANGERED (EN)

A taxon is Endangered when it is not Critically Endangered but is facing a very high risk of extinction in the wild in the near future, as defined by any of the following criteria (A to E):

A) Population reduction in the form of either of the following:

- 1) An observed, estimated, inferred or suspected reduction of at least 50% over the last 10 years or three generations, whichever is the longer, based on (and specifying) any of the following:
 - a) direct observation
 - b) an index of abundance appropriate for the taxon
 - c) a decline in area of occupancy, extent of occurrence and/or quality of habitat
 - d) actual or potential levels of exploitation
 - e) the effects of introduced taxa, hybridisation, pathogens, pollutants, competitors or parasites.
- 2) A reduction of at least 50%, projected or suspected to be met within the next 10 years or three generations, whichever is the longer, based on (and specifying) any of (b), (c), (d), or (e) above.

B) Extent of occurrence estimated to be less than 5000km² or area of occupancy estimated to be less than 500km², and estimates indicating any two of the following:

- 1) Severely fragmented or known to exist at no more than five locations.
- 2) Continuing decline, inferred, observed or projected, in any of the following:
 - a) extent of occurrence
 - b) area of occupancy
 - c) area, extent and/or quality of habitat
 - d) number of locations or subpopulations
 - e) number of mature individuals.
- 3) Extreme fluctuations in any of the following:
 - a) extent of occurrence
 - b) area of occupancy
 - c) number of locations or subpopulations
 - d) number of mature individuals.

C) Population estimated to number less than 2500 mature individuals and either:

- 1) An estimated continuing decline of at least 20% within five years or two generations, whichever is longer, or
- 2) A continuing decline, observed, projected, or inferred, in numbers of mature individuals and population structure in the form of either:
 - a) severely fragmented (i.e. no subpopulation estimated to contain more than 250 mature individuals)
 - b) all individuals are in a single subpopulation.

D) Population estimated to number less than 250 mature individuals.

E) Quantitative analysis showing the probability of extinction in the wild is at least 20% within 20 years or five generations, whichever is the longer.

VULNERABLE (VU)

A taxon is Vulnerable when it is not Critically Endangered or Endangered but is facing a high risk of extinction in the wild in the medium-term future, as defined by any of the following criteria (A to E):

A) Population reduction in the form of either of the following:

- 1) An observed, estimated, inferred or suspected reduction of at least 20% over the last 10 years or three generations, whichever is the longer, based on (and specifying) any of the following:
 - a) direct observation
 - b) an index of abundance appropriate for the taxon
 - c) a decline in area of occupancy, extent of occurrence and/or quality of habitat
 - d) actual or potential levels of exploitation
 - e) the effects of introduced taxa, hybridisation, pathogens, pollutants, competitors or parasites.
- 2) A reduction of at least 20%, projected or suspected to be met within the next ten years or three generations, whichever is the longer, based on (and specifying) any of (b), (c), (d) or (e) above.

B) Extent of occurrence estimated to be less than 20,000km² or area of occupancy estimated to be less than 2000km², and estimates indicating any two of the following:

- 1) Severely fragmented or known to exist at no more than ten locations.
- 2) Continuing decline, inferred, observed or projected, in any of the following:
 - a) extent of occurrence
 - b) area of occupancy
 - c) area, extent and/or quality of habitat
 - d) number of locations or subpopulations
 - e) number of mature individuals
- 3) Extreme fluctuations in any of the following:
 - a) extent of occurrence
 - b) area of occupancy
 - c) number of locations or subpopulations
 - d) number of mature individuals

- C) Population estimated to number less than 10,000 mature individuals and either:
- 1) An estimated continuing decline of at least 10% within 10 years or three generations, whichever is longer, or
 - 2) A continuing decline, observed, projected, or inferred, in numbers of mature individuals and population structure in the form of either:
 - a) severely fragmented (i.e. no subpopulation estimated to contain more than 1000 mature individuals)
 - b) all individuals are in a single subpopulation
- D) Population very small or restricted in the form of either of the following:
- 1) Population estimated to number less than 1000 mature individuals.
 - 2) Population is characterised by an acute restriction in its area of occupancy (typically less than 100km²) or in the number of locations (typically less than five). Such a taxon would thus be prone to the effects of human activities (or stochastic events whose impact is increased by human activities) within a very short period of time in an unforeseeable future, and is thus capable of becoming Critically Endangered or even Extinct in a very short period.
- E) Quantitative analysis showing the probability of extinction in the wild is at least 10% within 100 years.
- Note: copies of the IUCN Red List Categories booklet, are available on request from IUCN (address on back cover of this Action Plan)*
- ¹ Note: As in previous IUCN categories, the abbreviation of each category (in parenthesis) follows the English denominations when translated into other languages.

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IUCN Species Survival Commission
Rue Mauverney 28, CH-1196 Gland, Switzerland.
Tel: + +41 22 999 01 53, Fax: + +41 22 999 00 15
E-mail: lwh@hq.iucn.org

IUCN Publications Services Unit,
219c Huntingdon Road, Cambridge, CB3 0DL, UK.
Tel: + +44 1223 277894, Fax: + +44 1223 277175
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