Working group	*Co-chair*	*CS Presenter*	*Keynote Speaker*	*Expert*	*Rapporteaur*	*Attendance*
Birds						
Phillip Mcgowan	☑	☑	☐	☐	☐	YES
Rod Hay	☑	☑	☐	☐	☐	YES
Adrián Reuter	☐	☐	☐	☐	☑	YES
Fatima Venegas	☐	☐	☐	☑	☐	YES
Frederic J. Launay	☐	☑	☐	☐	☐	NO
Janine Clemens	☐	☑	☐	☐	☐	NO
Martin Lezama	☐	☑	☐	☐	☐	YES
Stuart Marsden	☐	☑	☐	☐	☐	YES
Siti Prijono	☐	☑	☐	☐	☐	YES
Sonja Meintjes	☐	☐	☐	☐	☐	NO

Total Participants : 10

Case Studies
The group considered the following individual case-studies: *Cacatua sulphurea* from Indonesia, *Cacatua galerita* and *Platycercus eximius* from New Zealand, *Psittacus erithacus* in Nigeria, *Amazona auropaliata* in Nicaragua and *Falco cherrug* in the United Arab Emirates. Additional reports on the Conservation and Sustainable Use of Parrots in Mexico, Collecting Data in Support NDFs for Parrots, and Population Assessment of Raptors in Guinea also provided key information and examples for the working group. The group acknowledged the large range of situations encompassed by birds in trade, including rare species with wide ranges, patchily distributed or colonial species, widely ranging or migratory species, species introduced outside their native range, island endemic taxa, etc.

Risk Analysis
The group first developed a decision tree to categorize the origins of specimens proposed for trade. The group also developed, as a preliminary step towards making an NDF for birds, a standardised framework for assessing the following risk categories: vulnerability of the population; general threats to population; potential impact of proposed harvest; and management of harvest. Testing the framework on sulphur-crested cockatoo in New Zealand, saker falcon, Java sparrow, crestless fireback pheasant, African grey parrot and yellow-naped amazon reinforced the value of this approach.

Assessment Tools
The case studies illustrated the need for access to practical methods of population and harvest assessment for a large range of species, countries and situations, and developed tables for assessing which method might be appropriate in each case. Techniques for population survey and monitoring were assessed in categories of complexity according to the study aim, field data required, situational suitability, availability of resources and expertise, possible field methods, strengths and weaknesses, example species and key references. Similarly, harvest assessment methodologies were assessed according to scope, data required, methods, stage of trade being assessed, strengths and weaknesses, other benefits and the impact of illegal trade.

Decision framework
Within an overall framework of considering origin of specimens, gathering information, assessing risk and analysing the information, a decision tree was developed to help in actually making an NDF. This allowed consideration of whether enough information is available and if so, whether the requested harvest is within sustainable limits, consideration of other factors affecting the population and conditions that might be placed on the trade to render it acceptable.

Recommendations
Recommendations focused on:
Examination of past Significant Trade Reviews to identify technical issues and potential difficulties;
Access to advice and data on relevant biological information, e.g life history;
The development of technical advice on particular approaches and methods for population assessment and measuring the effects of harvest and trade;
Encouraging bilateral support in these matters;
Recognising that addressing many of these issues may have significant other benefits to the species concerned and their ecosystems.

Participants

- Rosemarie Gnam
- Rod Hay
- Martín Lezama-López
- Stuart Marsden
- Phil McGowan
- Siti Nuramaliati Prijono
- Ron Orenstein
- Adrian Reuter
- Fatima Vanegas

Thanks to Vin Fleming and Fred Launay for case studies

Birds on Appendix II

There are 1268 species, six subspecies and one population of birds listed on Appendix II. These contain a wide variety of life histories, significant variation in ecology and diverse data gathering contexts. For example, considering life-history, there are short-lived species and long-lived species that attain reproductive maturity after several years and a wide variety of reproductive strategies; considering ecology there are species that occur at naturally low densities, species that congregate, species that are patchily distributed, species that are very difficult to detect, and species that migrate and some of these characteristics may vary from season to season; and considering data gathering contexts, there are species that occur in habitats that are easy to survey and those that are very difficult to gather data in; and some species inhabit areas that are remote whilst others are in places that are easily accessible.

All of these factors affect the ability to gather data that can be useful in making Non-Detriment Findings. In order to explore these issues in more detail, several case studies were discussed:

- African grey parrot *Psittacus erithacus*
- *Cacatua galerita* and *Platycercus eximius* in New Zealand
- *Cacatua sulphurea* in Indonesia
- *Falco cherrug* in United Arab Emirates
- *Amazona auropaliata* in Nicaragua
- Assessing the status of raptors in Guinea
- Sustainable harvesting of birds in Mexico
- Collecting data in support of Non-Detriment Findings for parrots
- Considerations specific to songbirds

Challenges

Several common challenges emerged from these case studies and consideration of other bird taxa. These were explored both in the context of the need make a

Non-Detriment Finding in response to a specific application and also in the context of a longer term process to enhance a Scientific Authority's ability to make Non-Detriment Findings in the future. The case study that covered raptors in Guinea showed the potential value of the latter. The challenges include:

- The difficulty of locating existing data and having access to them;
- Gathering new data that are reliable and relevant is very difficult;
- Resources required for obtaining data ("cost of obtaining data");
- There is often a perceived lack of expertise available; and
- Having the confidence to interpret available data and making a Non-Detriment Finding. Some Scientific Authorities may find this daunting.

Therefore, there is a real need to make available guidance that shows how effort (and other resources) can be used to best effect. It was noted that making some Non-Detriment Findings can be very straightforward and a way of identifying these would be helpful. In contrast, other cases may be very complex and highlighting the difficulty inherent in making these Non-Detriment Findings (and how they can be tackled) would also be valuable.

These two extremes demonstrate the importance of striking the correct balance in guidance notes between providing prescriptive detail that might be helpful in complex cases and proposing broad steps that would be more generally applicable and would facilitate quick progress in straightforward cases.

Guiding principles

Some principles are common to all analyses of biodiversity data; they should underpin all Non-Detriment Finding processes. Three that were identified were:

1. Be precautionary
2. Be realistic about limitations of data
3. Feedback – learn lessons to improve process

The overall process

Given the large number of bird species contained on Appendix II and the diversity of life-histories, ecology and prospects for obtaining data, a simple scheme was constructed for working through the Non-Detriment Finding process. The purpose of this framework was to indicate stages where the complexity of each case could be assessed.

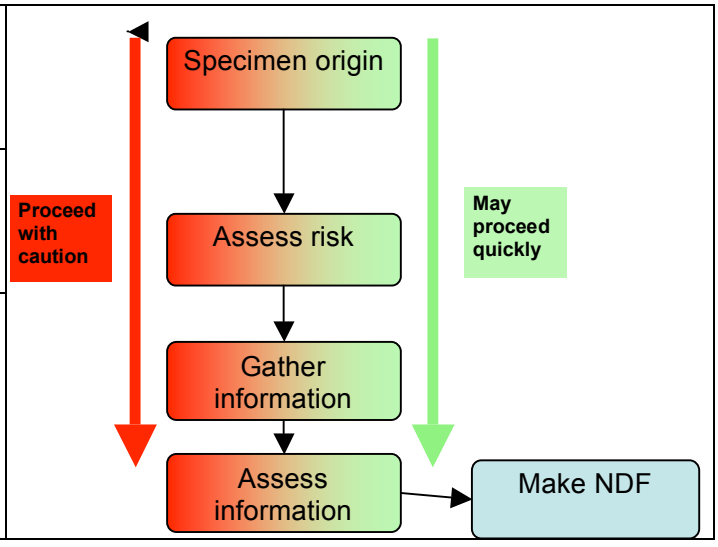
This step identifies cases concerning captive-bred specimens and those from introduced populations of low conservation value. These cases may often be fast-tracked.	
This step assesses the risk that the proposed harvest holds for the population, given the vulnerability of the population and various proposed harvest characteristics.	
These steps considers the challenge of obtaining and analysing relevant data, whether in the short-term (i.e. already gathered) or in the longer-term (i.e. new fieldwork) for regularly traded species	

Table 1: The process of making a Non-Detriment Finding. In the flowchart, the red to the left of each box denotes cases that are more difficult, whereas the green to the right indicates cases

that are more straightforward. Overall, this shows that some cases will be challenging because of where the specimens are from, the high risk of the proposed harvest and challenges in obtaining and analysing data.

Origin of specimens

The case studies and subsequent discussion indicated that there were some cases where Non-Detriment Findings could be quite straightforward. These are cases were the export is not likely to have an impact on the wild population in its native geographical distribution. They arise because of the long history of aviculture and captive breeding of birds and the large number of introduced species that have become established outside their native range. It should be stressed that some cases concerning both captive bred and introduced specimens will have consequences for the wild population in its native range, but this step allows for rapid identification of Non-Detriment Findings that are straightforward.

Risk Assessment

Most cases where a Non-Detriment Finding is being considered for birds have the potential to have an impact on the wild population. A risk assessment is a way to determine quickly where effort is best directed so that the conservation status of Appendix II species in not harmed by exports. This step assesses how big the risk is that the impact will be damaging to the wild population. Based on the outcome, a Scientific Authority can identify cases that should be subject to a relatively high level of attention and where a precautionary approach is especially required.

The following four criteria were considered important to take into account at this stage:

1. Vulnerability of the population;
2. General threats to population;
3. Potential impact of proposed harvest; and
4. Management of harvest.

The basic elements of the risk assessment system are:

1. Within each criterion there are specific factors that should be considered;
2. A simple scoring system, with one indicating a low risk of impact and five representing a high risk. Each of the four principal criteria was, therefore, given a score between one and five.
3. The four principal criteria may be weighted according to their overall contribution to risk of impact.

It must be stressed that whilst the general approach is considered robust, there is a need for refinement and testing of the detailed working of the risk assessment to ensure it achieves its full potential. This should include further consideration of the factors listed within each criterion to ensure that those selected are applicable to a wide variety of cases and identify the main factors to be considered. (It may be worth using terms and definitions from the IUCN Red List [and other global standards] where appropriate to avoid confusion.) It also includes further work on the weightings, scores and formulae used to calculate the overall risk assessment score.

The risk assessment can be created in a spreadsheet for easy use and an example is given in Appendix 2, with examples.

Gathering and assessing information

It is obvious that Non-Detriment Findings require data. Whilst in an ideal world there would be shortage of data, in the real world data are in short supply. The quality and quantity of data that are available influence the conclusions that can be drawn from them and an understanding of the limitations of different datasets may be helpful when making Non-Detriment Findings. This is because some datasets allow only the most basic interpretations to be drawn from them, whereas others may allow sophisticated analyses of varying levels of harvest and their impact on a wild population.

The conclusions of the risk analysis should guide the way that data are assembled and analysed. For bird species that are currently traded regularly it is possible to take a longer-term view about data requirements so that efforts can be made to gather new data in carefully planned and systematic ways. If new data are being gathered, the following should be borne in mind:

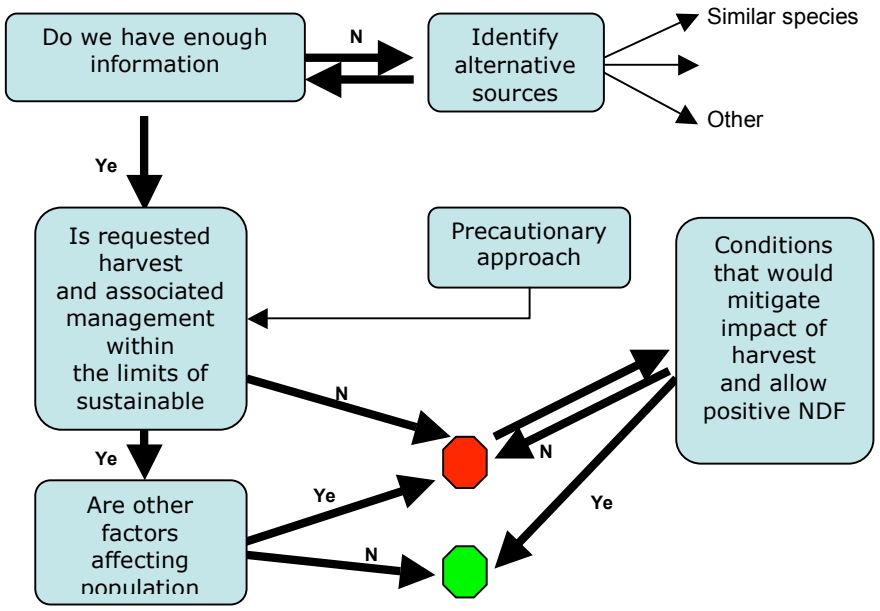
1. Different Non-Detriment Findings have different data requirements;
2. Type of data gathered determines what conclusions can be drawn;
3. Data gathering possibilities vary from situation to situation; and
4. Well-designed data gathering can greatly enhance Non-Detriment Finding process over time.

Because the availability of data is a key limiting factor in the making of Non-Detriment Findings in a wide variety of regularly traded bird species, this is an area that would benefit from detailed guidance. In order to help this process, approaches to bird survey and monitoring methods were identified and their applicability and usefulness in various situations considered. These are presented in Appendix 3 i).

The same issues (requirements, limitations and opportunities) hold true for the assessment of harvest of birds from wild populations. Therefore, approaches to providing appropriate data on harvest are provided in Appendix ii).

Making the Non-Detriment Finding

The flow diagram below depicts a decision-making process that has particular application to birds, though its elements would generally be consistent across most taxonomic groups.



The first step is an assessment of the adequacy of the information provided in support of the application. If it is not adequate, and the shortcomings are not readily redeemable by the applicant, consideration may be given to other sources of information such as readily available information from similar species, or consultation with relevant experts. This may enable the application to proceed to the next step, though, for some high risk species, a high degree of uncertainty may be sufficient grounds for a detriment finding.

The next step, which is the heart of the Non-Detriment Finding process, addresses the fundamental question of whether the harvest and export is within the limits of sustainability for the population and species concerned, in the context of any associated management programmes that may be undertaken. For some species, this may be straightforward, and a recommendation can be made. However, for the majority, other factors such as habitat loss, climate change, invasive species or additional sources of direct mortality such as illegal trade will have to be considered. Some factors may have a positive influence on the decision. For example, export of captive-bred specimens from closed-loop breeding facilities may reduce pressure on wild populations.

Once all of these factors have been assessed then a finding might be made one way or another. It must be stressed that a precautionary approach is desirable for most cases. One way of meeting such an approach is to set a sustainable harvest at the lower confidence interval of the estimated sustainable offtake. There are some situations where the analysis may be able to result in an Non-Detriment Finding if conditions (e.g. reduced quantity exported, or other mitigations of the impact of harvest) are attached to the permit.

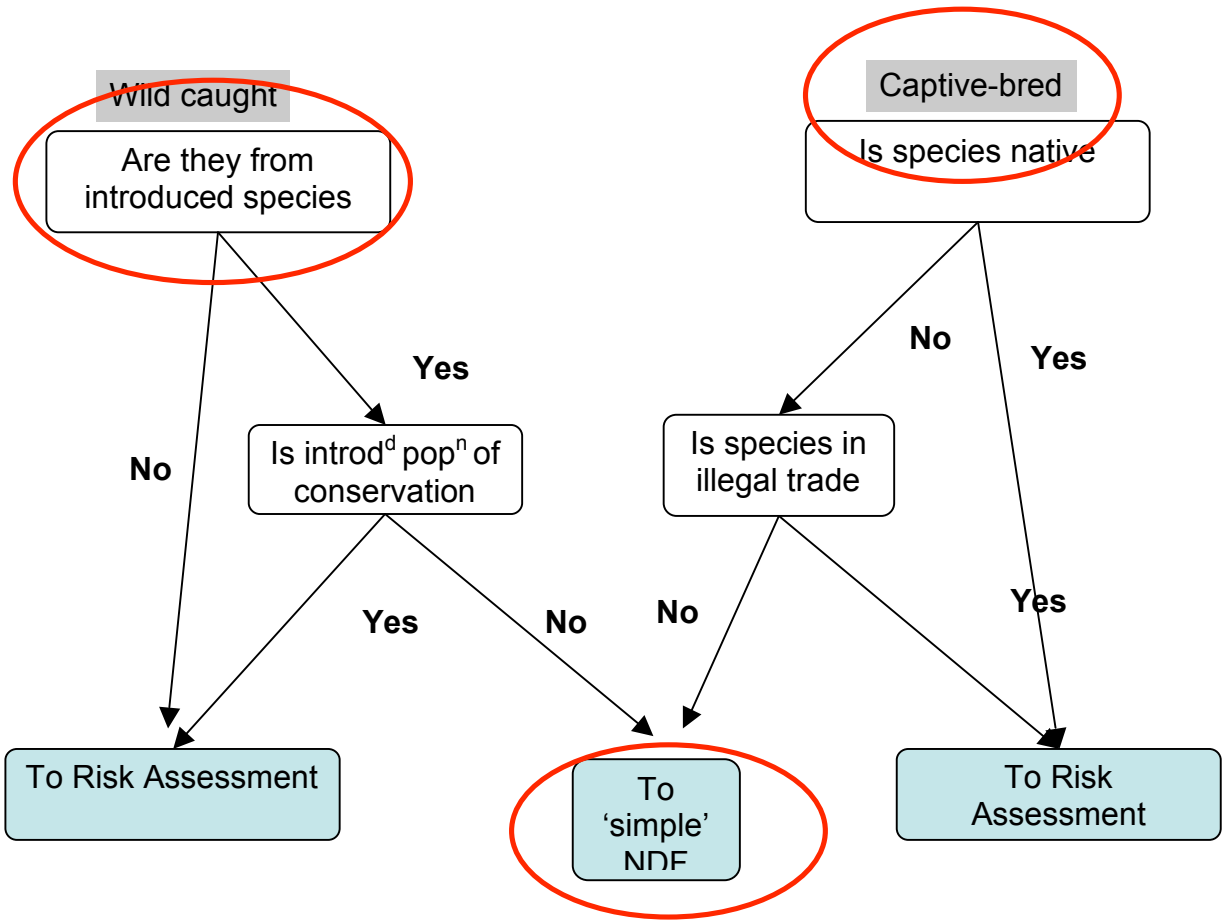
Of key importance, so that knowledge may be cumulative and decisions transparent, is documentation of the decision. The example from the US Scientific Authority provided in Appendix 5 illustrates a simple and standardised format.

Recommendations

1. **Non-Detriment Finding issues:** Examine past Significant Trade Reviews to identify technical issues
2. **Data requirements:** Technical advice from Scientific Committees and other bodies on data requirements for species subject to Significant Trade Review
3. **Data availability:** Provide a database (some publicly available sources already exist) of relevant biological information, e.g life history
4. **Data/expertise sharing:** Encourage sharing of these resources between range States, within regions etc
5. **Data gathering/analysis:** Technical advice from Scientific Committees and other bodies on use of approaches/methods
6. **Encourage bilateral support:** The UK-Guinea raptor assessment provided relevant information
7. **Added value:** Recognise that addressing many of these issues may have significant other benefits

Presentation and packaging of these ideas and guidance will be crucial.

Appendix 1: Origin of specimens



Appendix 2

Risk assessment template and rapid assessments of case study species and selected other cases. It must be stressed that whilst the general approach is considered robust, there is a need for refinement and testing of the detail. Please see text in main report.

Low =1, High = 5	Cacatua galerita	Psittacus erithacus	Lophura eryhtrop	Falco cherrug	Padda	Amazona	MIN	MAX
1. Vulnerability of the population	1	3	3	3	5	3.5	1	5
Weighting = 3 Distribution - geographic range								
Abundance								
Reproductive capacity								
Ability to repopulate								
Habitat breadth								
Pop. Trend								
Complexity of life history								
Other								
2. General threats upon pop	1	5	3	3	5	4	1	5
Weighting = 1.5 Illegal trade								
Invasives, diseases								
Loss and degradation of habitat								
Domestic offtake								
Prop of range that is protected								
Conservation problems in other range States?								
Other threats								
3. Potential impact of proposed harvest	1	3	1	3	2	4	1	5
Weighting = 2 Quantity or proportion of population								
Life stage targeted								
Harvest method								
Will it stimulate further trade?								
Harvest area								
Importance of species in ecosystem								
Endemicity								
Other								

4. Management of harvest (1=good)		2	5	2	3	1	3	1	5
Weighting = 1	Reliability of monitoring								
	Local community support								
	Effectiveness of regulation and management								
	Other								

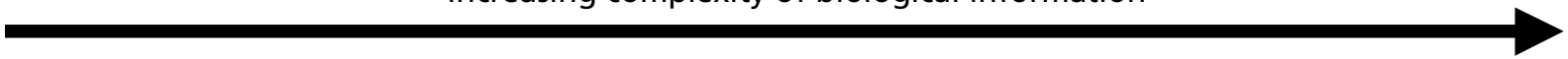
Weighted risk assessment scores

Low	**0 - 2.5**	1.1	3.7	2.3	3.0	3.7	3.7
Medium	**2.6 - 3.5**	Low	High	Low	Medium	High	High
High	**3.6 - 5.0**						

Appendix 3

i) Gathering information on bird populations and applicability making Non-Detriment Findings for birds

Increasing complexity of biological information

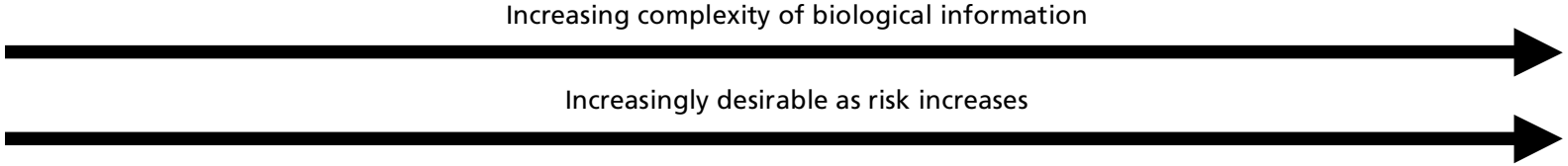


Increasingly desirable as risk increases

APPROACH	**Occupancy and other basic methods**	**Abundance indices and approximate density estimates**	**Reliable population size estimates**	**Harvest models**
AIM/ QUESTION	Have occupancy rates or the range of the species contracted or become patchy due to excessive harvest?	Has the approximate abundance of the species changed at a site/sites due to excessive harvest?	How does the annual harvest of a species relate, as a percentage its overall wild population?	Are current/proposed levels of harvest sustainable based on known population dynamics and productivity?
FIELD DATA REQUIRED	Presence/absence of species at selected sites across range	Encounter rates or approximate population sizes at individual sites	Reliable estimates of actual population density and size across whole range/state	Detailed and reliable information on productivity and other population parameters – usually from selected sites
SUITABLE IN SITUATIONS	Species occurring at low density across huge ranges, in difficult locations	Species occurring at low density, which are difficult to survey, where expertise or resources are lacking	Species with relatively small ranges, occurring at reasonable densities, where quality fieldwork is possible	Relatively well-known species, where resources are available, stable locations
RESOURCES AND EXPERTSE	Possibly low although dependent on range size. Analysis usually simple but could be complex	Generally low level of resources and expertise needed.	Generally high level of effort and expertise needed	High level of effort needed. Modelling requires expertise but dependent on model used.
POSSIBLE FIELD TECHNIQUES	Ad hoc information, atlas-types data, birdwatchers' records, data from interviews with local communities, driving transects	Transect walks, Unbounded point counts, mist-net data, watches from vantage points, questionnaires,	Distance sampling using VCPM or VWTM. Occasionally, actual counts, controlled roost counts or total nest counts (very rare	Dependent on model used – in Potential Biological Removal model, detailed information on population size, proportion

		Roost counts, flyover counts	/localised species)	of population breeding, sex ratio, number of successful nests, fledgling production etc.
WEAKNESSES	Gives very sketchy idea of harvest impact. Other influences on population likely to be present. Tells us little about numerical decline. Serious data quality issues	Does not tell us about actual numerical decline. Open to bias due across observer and major detectability issues	Easy to make mistakes in data collection and analysis. Areas covered by survey small. Important assumptions may mean unsuitable for some species	Area covered small and hence problem of representativeness. Data may be imprecise. Model assumptions may be inappropriate.
STRENGTHS	Maybe the only possible technique. Looks across much of range. Involves stakeholders. New analysis tools available	Easy to perform and more area can b covered. Can be adaptable to individual sites/methods can be mixed.	Allows issues of detectability to be addressed. Actual population figures can feed into IUCN Red List classifications. Proper measures of error incorporated.	The most detailed and only direct test of sustainability of harvest. Data useful for other purposes. Surrogate information can be used in absence of species-specific data.
EXAMPLE SPECIES	Raptors, African grey parrot, rare species with large ranges	Saker falcon, Galliformes, cryptic species, patchily distributed/aggregative species.	Many: except extremely rare or highly clumped species. Not aerial species, raptors, waterbirds etc. Appropriate for many Parrots	Limited by resources. Cacatua, Amazona, raptors and a range of species. Data can be surrogate for some parameters.
KEY REFERENCES	Bibby et al. (1998; 2001), Danielson et al. (2005)	Bibby et al. (2001), Cougill & Marsden (2004)	Buckland et al. (2000) Marsden (1999) Buckland et al. (2008)	Beissinger & Bucher 1992), Bodmer (2004), Robinson & Redford (1991)

ii) Gathering information on harvesting of birds and applicability making Non-Detriment Findings for birds



APPROACH	**Data from UNEP-WCMC Trade Database**	**Market/trade visits**	**Consultation with harvesters and brokers**	**Working with local communities**	**Direct monitoring of trade**

SCOPE	Usually countrywide for export	In some cases regional, can be local, island- or countrywide	Generally local, specific to a defined site or handful of sites. Data collection slow so scope is local	Generally local, specific to defined site. Data relatively quick to collect so can be multi-community study	Generally local, but can include monitoring to fill existing country-wide quota
DATA/METRIC GATHERED	Usually Annual export or import	Numbers of birds entering/leaving market	Numbers of birds collected by individual harvesters over time. Locations of harvest	Numbers and origins of harvested individuals from area by a community	Direct total count of harvested individuals
METHODS	Trade data gathered by scientific authorities	Markets are visited periodically and throughput of specimens estimated	Interviews/information from harvesters and/or brokers. Visits to harvesting areas is important validation	Semi-structured interviews with community leaders and other key figures	On site count of harvest
STAGE OF TRADE	End point – post mortality at all previous stages	Mid-point. Pre-arrival mortality difficult to assess. Can yield data on in situ mortality	Start point to early stages. Mortality and other issues at capture point & early stages of trade can be quantified.	Start point. Mortality and other issues at capture point can be quantified.	Start point. Mortality and other issues at capture point can be quantified.
STRENGTHS	Long time series allowing trends to be examined. Metrics tend to be standardised across countries	Gives local patterns of 'visible' trade. Allows other data to be collected. Can be multi-species. Can be visible conservation presence	Can give reliable estimate of capture rates, methods of capture, effort, locations. Can link data directly with ecological conditions. If more than one stage of trade is studies, numbers can be cross-checked across stages and areas.	Can give reliable estimate of capture rates, methods of capture, effort, locations. Numbers harvested by individual communities can be can be validated through multiple interviews or visiting other communities.	Most accurate assessment of offtake. Most reliable for assessing mortality and management
WEAKNESSES	Coarse-scale disallowing local trends to be identified. Many anomalies/inconsistencies. Difficult to	Requires careful approach to maintain accuracy of information. Seasonal patterns of trade need to be accounted for.	Requires suitable conditions to gain reliable information. Open to bias due to individuality of trappers. Translation, and cultural issues. Relationships can break down. Harvest from a	Requires much caution in building trust – some organisations probably disallowed from collecting data – governments,	May be a very sensitive issue. May require considerable effort

	interpret	Difficult to put data into regional or national context – requires some assumptions. Surveys can be ruined by enforcement actions	defined area can be difficult to estimate unless all catchers are studied and the area can be defined accurately	foreigners. Difficult to assess reliability of data in some cases. Unless survey is complete and multiple communities surveyed it is difficult to estimate an absolute harvest from a geographical area.	

OTHER BENEFITS	Creates international cooperation and information/knowledge sharing	Price analysis may yield useful idea of ease of capture or market issues	Can be integrated with other ecological data to give information on nesting requirements, habitat associations, age structure, productivity etc	Can yield holistic data on livelihoods and aspirations. Can be used to develop partnerships with local communities. Gives information that can help to develop local harvest systems with enhanced benefits to local communities Can help to maximise the returns from the trade to the community	Can yield data on compliance with management procedures, mortality at various phases.
ILLEGAL TRADE	Does not represent well	Can yield data in some cases but this can be unreliable	Can yield useful data dependent on approach.	Can yield useful data dependent on approach	Can yield useful data dependent on approach

U.S. Fish and Wildlife Service
Division of Scientific Authority
Convention on International Trade in Endangered Species of Wild Fauna and Flora
Record of Advice on Export Permit Application

Application number: Date DSA:

Applicant: Name
City, State

Specimens and species:

Recipient: Name
City, State

Type of permit: Appendix II export

ADVICE
After examining the above permit application, we find that the proposed export is likely to be for purposes that are **not detrimental** to the species.

Basis for advice:

1. The applicant requests authorization to export description of specimens.

2. According to Resolution Conf. 12.11 (Rev. CoP13) (Standard nomenclature), species that are listed in the Appendices of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) should have a valid CITES-recognized name, as reported in CITES-approved checklists. Nomenclature for the species included in this application follows [*Checklist of CITES species and Annotated CITES Appendices and reservations* (Inskipp and Gillett 2005), *UNEP-WCMC Species Database: CITES-Listed Species* (UNEP-WCMC 2006), other]. Where appropriate, taxonomic names used in the application have been corrected to conform with CITES taxonomic references as follows: [if changes are too numerous to list here, refer to an Annex with the changes].

3. [Description of origin of specimens.] According to the documentation provided by the applicant, the specimen(s) intended for export was/were harvested by the applicant in (City, County, State)] on [date(s)]; was/were purchased from [name of person(s)/establishment (City, State)] on (date), who harvested the specimen(s) in [(City, County, State)] on [date(s)]. Copies of receipts of purchase / collector's permit / landowner permission / applicable licenses included application.

4. [Brief summary of conservation status of species in the wild and explanation of why this *export* will not be detrimental.]

5. [Qualifications of applicant to harvest/maintain the specimen(s).]

References Cited:

Inskipp, T., and H. J. Gillet. 2003. Checklist of CITES Species. CITES Secretariat, Geneva, Switzerland, and UNEP-WCMC, Cambridge, United Kingdom.

UNEP-WCMC. 2006. UNEP-WCMC Species Database: CITES-Listed Species. <http://www.cites.org/eng/resources/species.html>. [Accessed Insert Date].

BIOLOGIST:_____ CONCUR:_____

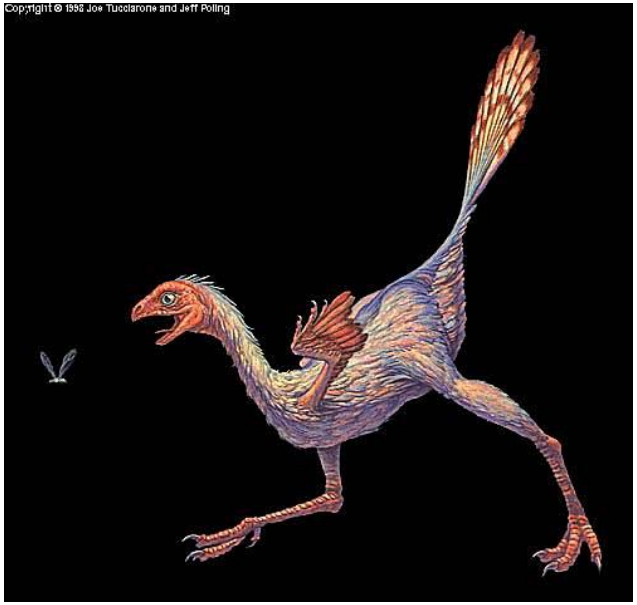
.

DMA BIOLOGIST:_____

To be filed in: _____

DSA:[Your name]:[date finding was drafted]:[name of file]

Working Group 6: birds



Participants

- Rosemarie Gnam
- Rod Hay
- Martín Lezama-López
- Stuart Marsden
- Phil McGowan
- Siti Nuramaliati Prijono
- Ron Orenstein
- Adrian Reuter
- Fatima Vanegas

Thanks to Vin Fleming and Fred Launay for case studies

Birds on Appendix II

1268 species + 6 subspecies + 1 population







Challenges

- Gathering new data and locating existing data
- Resources (“cost of obtaining data”)
- Expertise available
- Confidence - making NDFs can be daunting

Can guidance suggest how effort (and other resources) be used to best effect?

Case studies

- African grey parrot *Psittacus erithacus*
- *Cacatua galerita* and *Platycercus eximius* in New Zealand
- *Cacatua sulphurea* in Indonesia
- *Falco cherrug* in United Arab Emirates
- *Amazona auropaliata* in Nicaragua

- Assessing the status of raptors in Guinea
- Sustainable harvesting of birds in Mexico
- Collecting data in support of NDFs for parrots

- Considerations specific to songbirds

Underlying issues

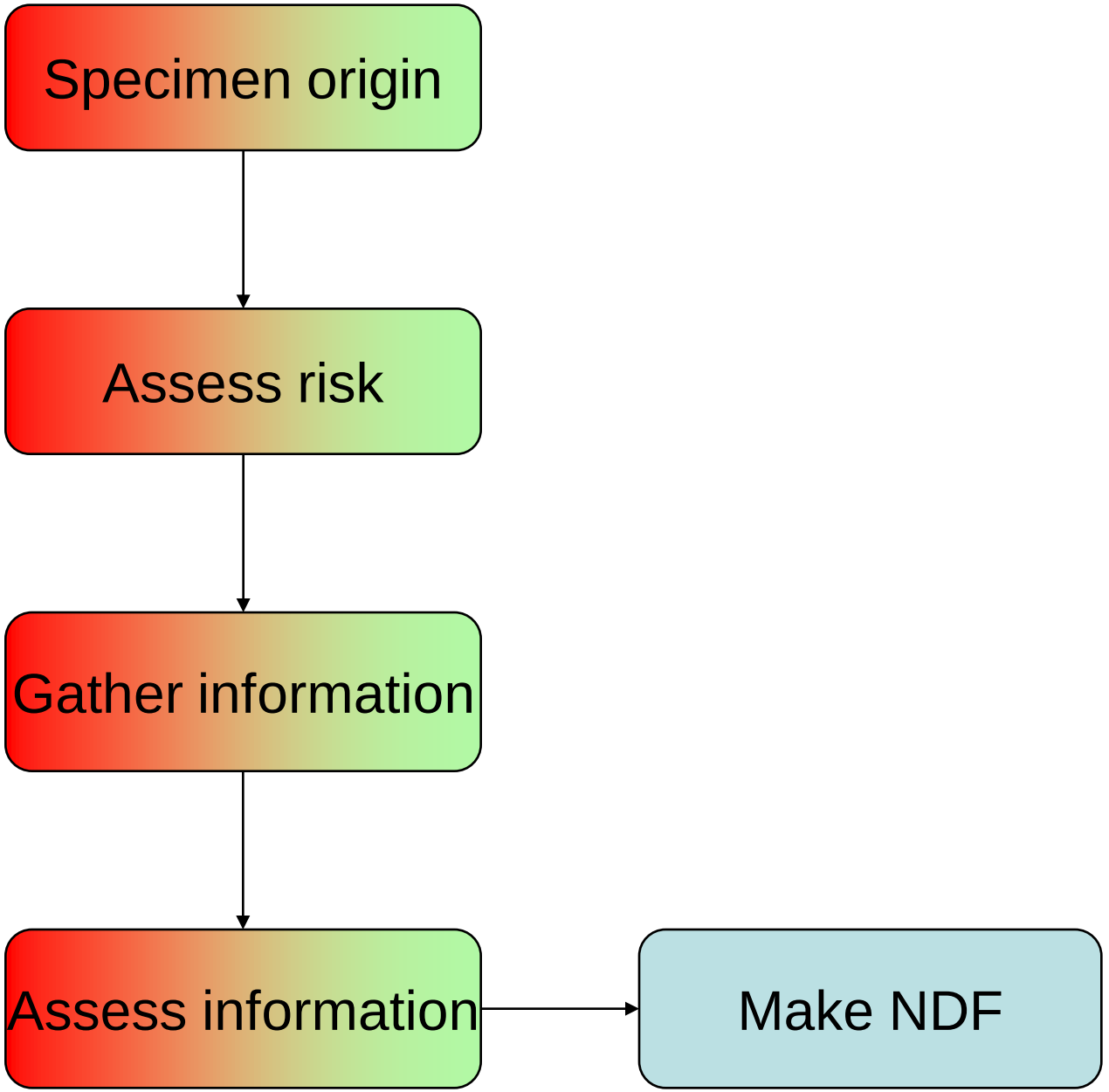
- Some NDFs a real challenge, some not
- Building confidence
- Limited resources

- Therefore, help to indicate where resources might be best directed
- Balance right between prescriptive detail and supportive practicality

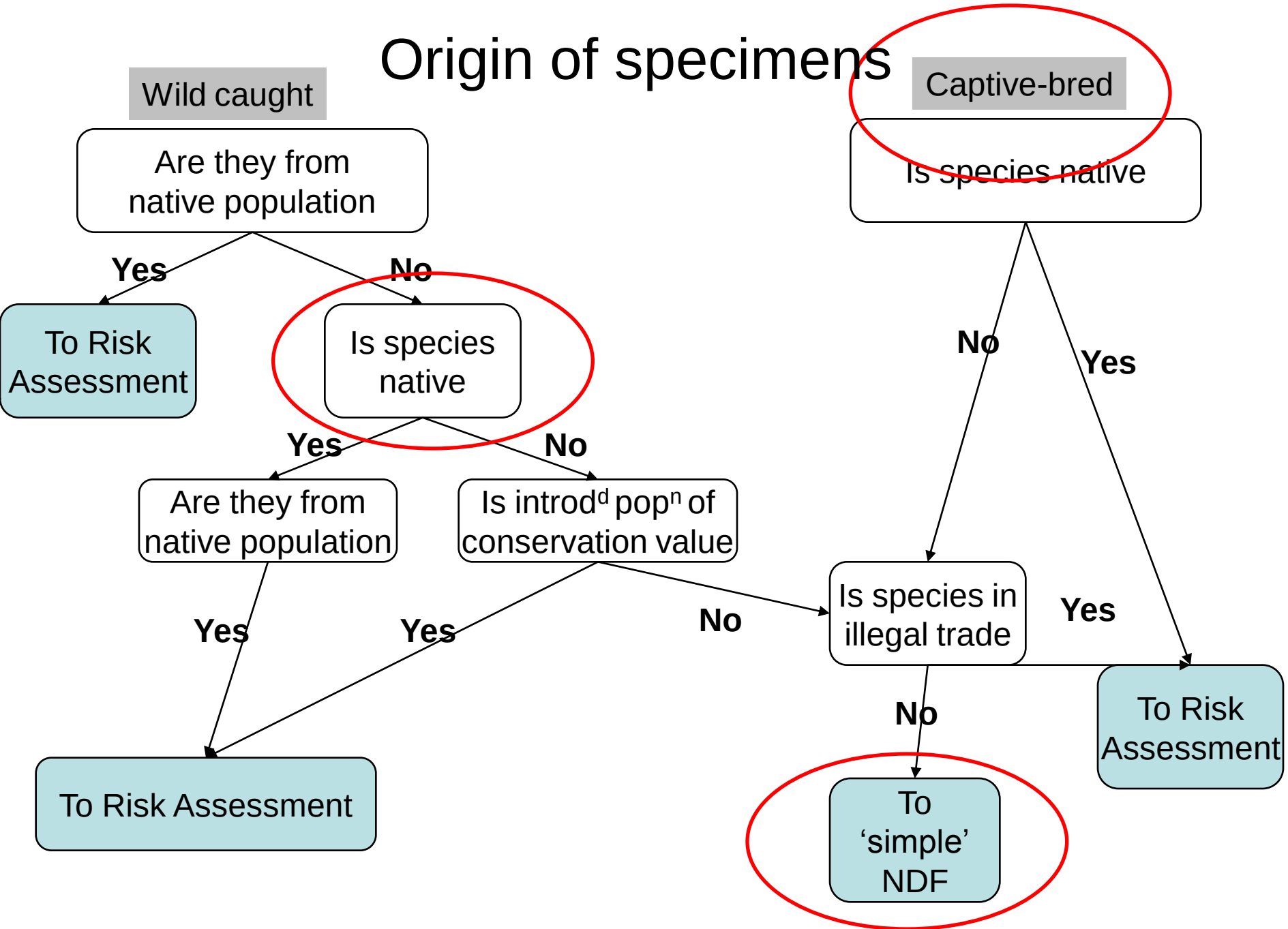
Guiding principles

- Be precautionary
- Be realistic about limitations of data
- Feedback – learn lessons to improve process

The overall process



Origin of specimens



Risk Assessment

Way to quickly assess where effort is best directed.

1. Vulnerability of the population
2. General threats to population
3. Potential impact of proposed harvest
4. Management of harvest

Risk assessment

1.Vulnerability of the population	Distribution - geographic range Abundance Reproductive potential Ability to repopulate Habitat breadth Pop. trend Complexity of life history Other
2. General threats to population	Illegal trade Invasives, disease Loss and degradation of habitats Domestic offtake Prop of range that is protected Conservation problems in other range States Other threats

Risk assessment

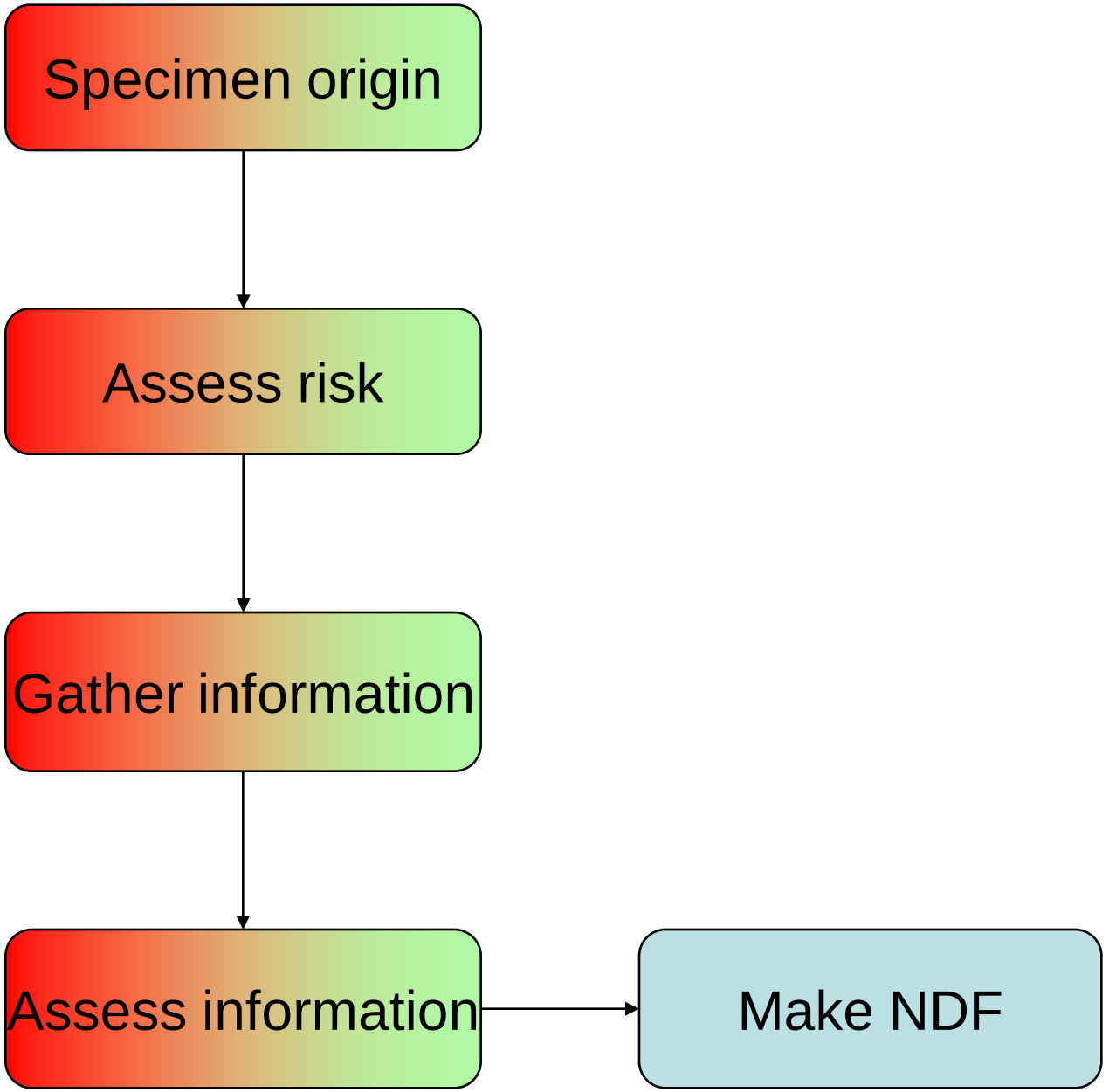
3. Potential impact of proposed harvest	Quantity or proportion of po Life stage targeted Harvest method Will it stimulate further trade Harvest are Importance of species in ecosystem Endemicity Other
4. Management of harvest	Reliability of monitoring Local community support Effectiveness of regulation and management Other

May be worth using terms and definitions from IUCN Red List (and other global standards) where appropriate

Risk Assessment examples

Introduced *Cacatua galerita* in NZ Sulphur-crested cockatoo	Low
Psittacus erithacus (Nigeria) African grey parrot	High
Lophura erythrophthalma Crestless fireback pheasant	Low
Falco cherrug Saker falcon	Medium
Amazona auropilliata in Nicaragua Yellow-naped amazon parrot	High
Padda oryzivora Java Sparrow	High

The overall process

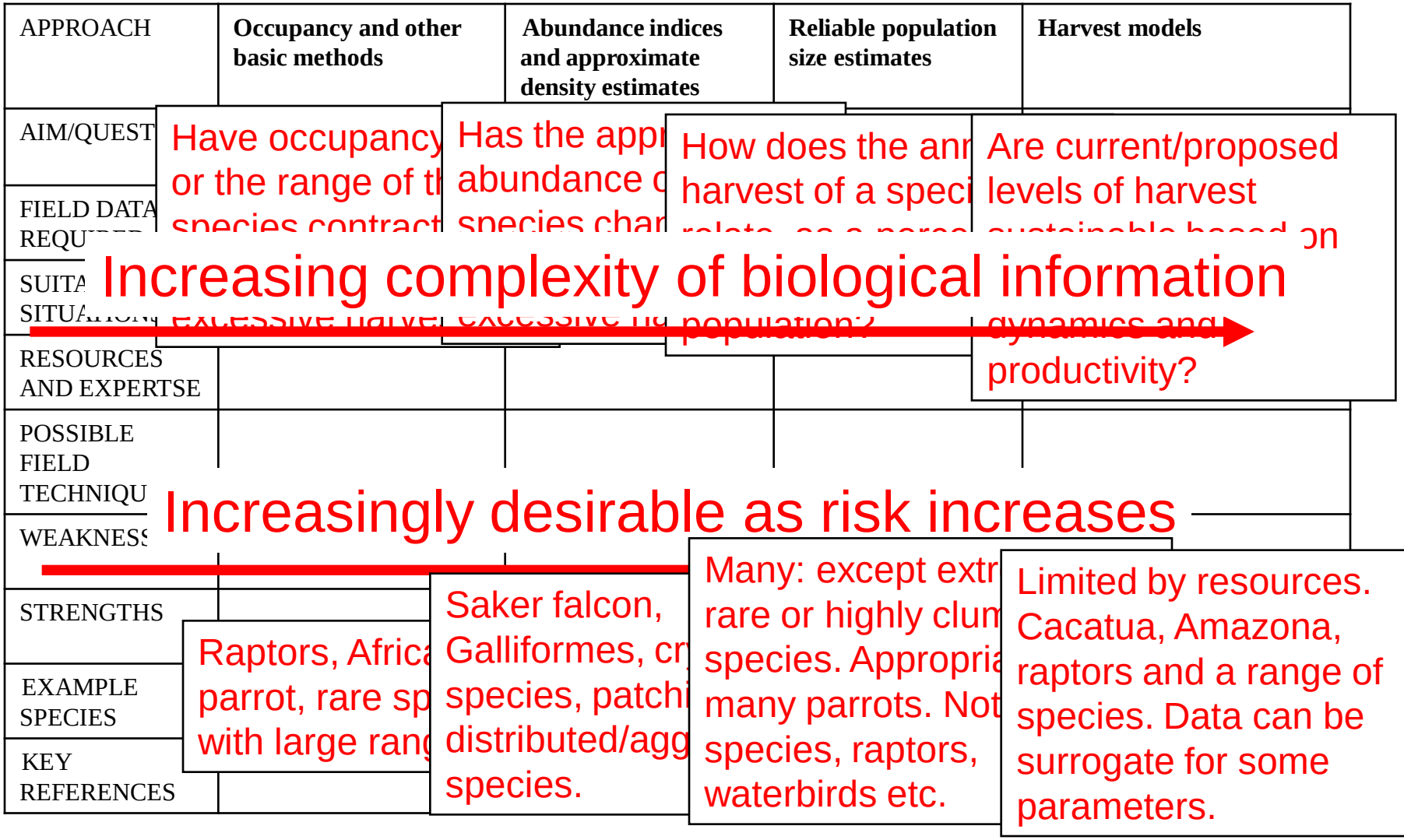


Data issues and considerations

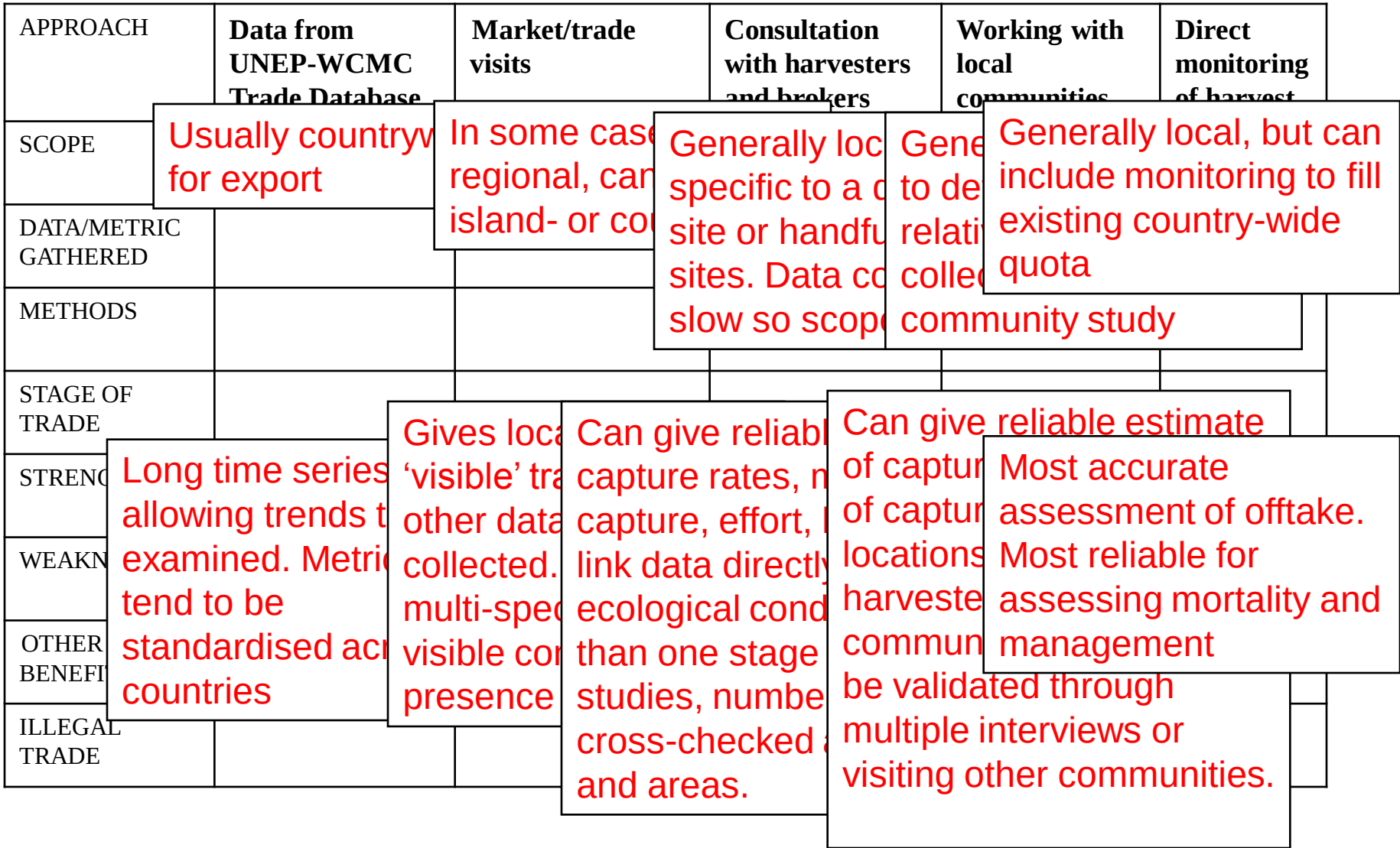
- NDFs require data
- Different NDFs have different data requirements
- Type of data available determines what conclusions can be drawn
- Data gathering possibilities vary from situation to situation
- Well-designed data gathering can greatly enhance NDF process over time

- So, an assessment of data gathering possibilities and limitations may be helpful

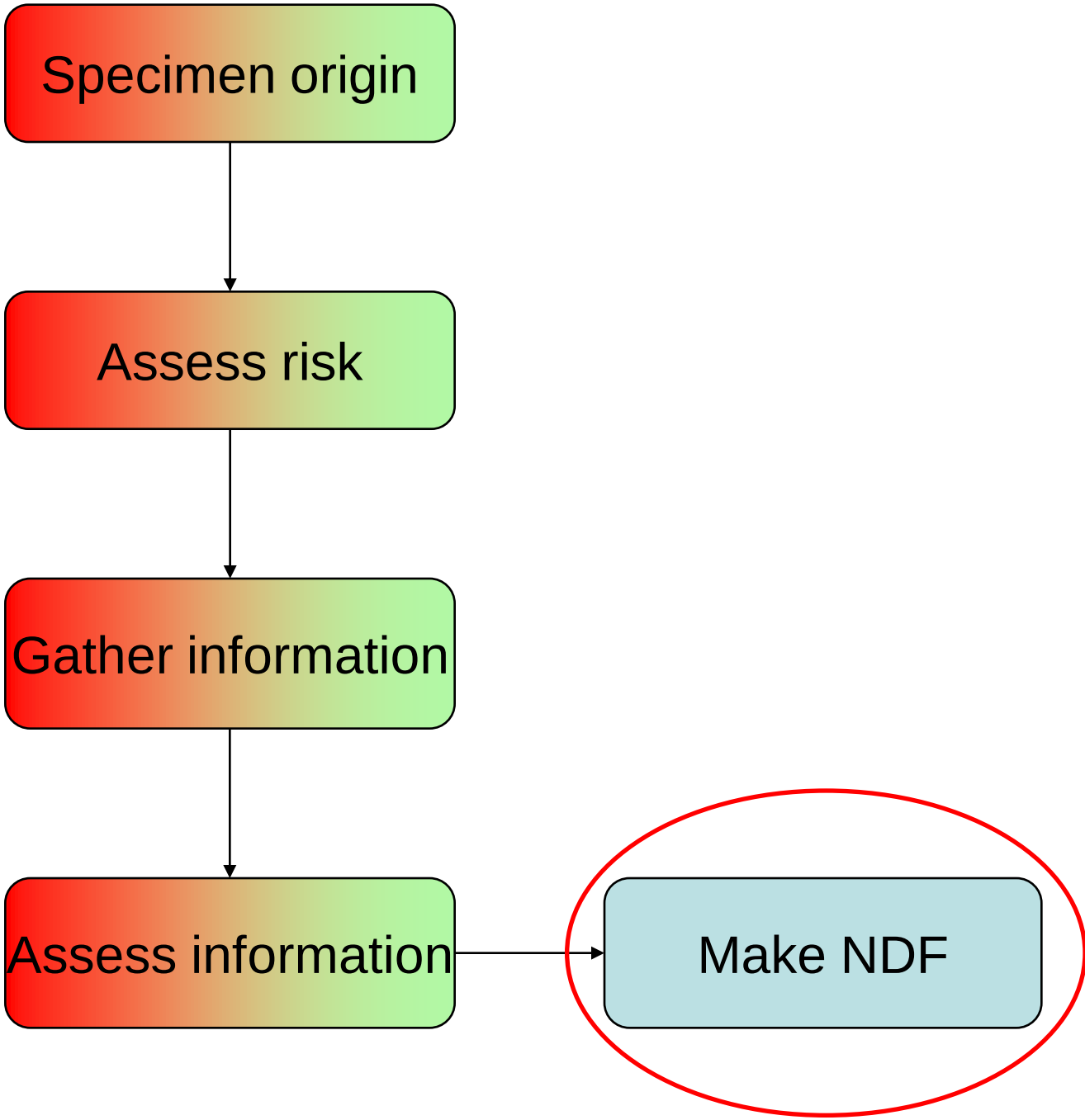
Survey and monitoring methods

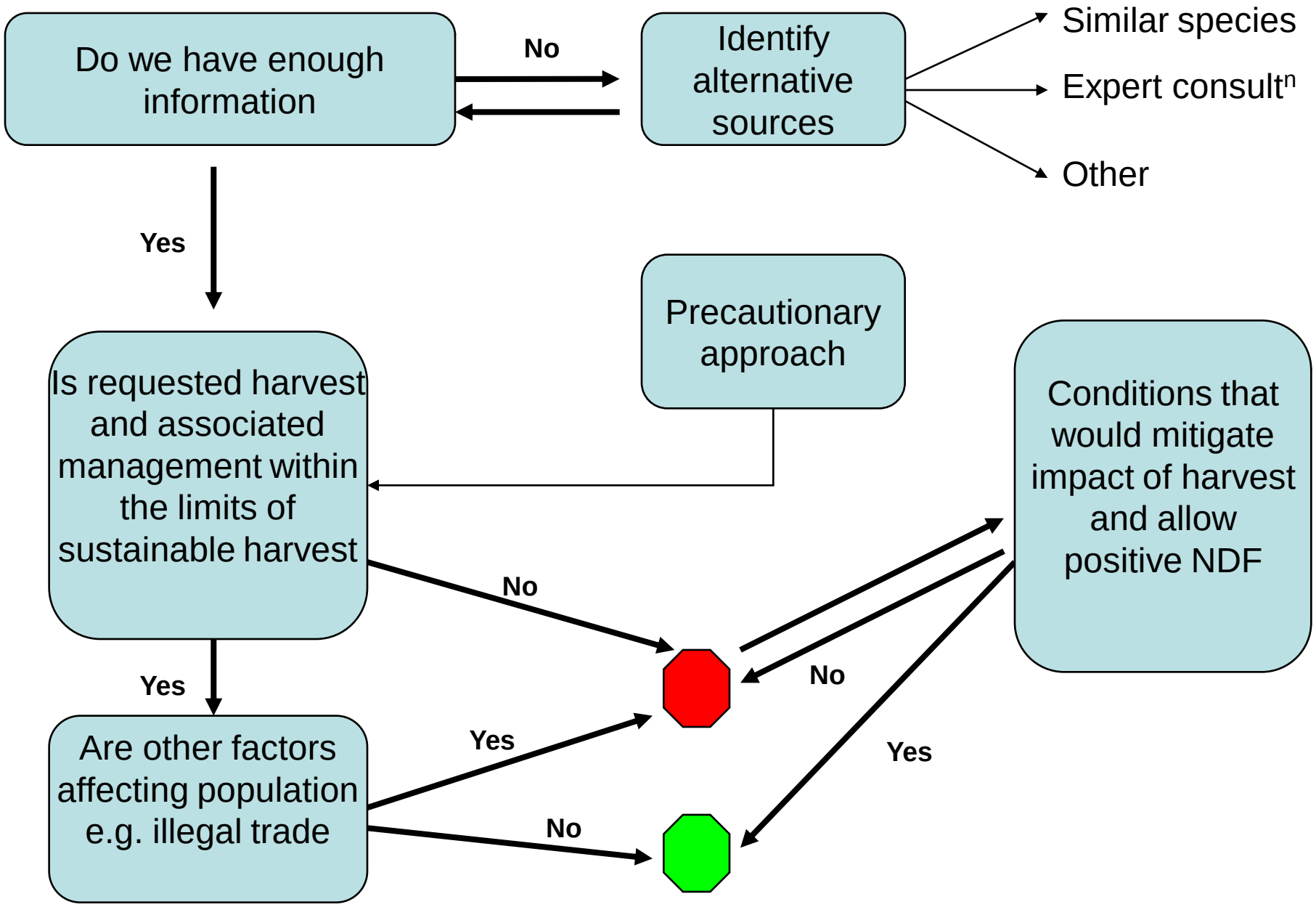


Harvest assessment methods



The overall process




Do we have enough information
No
Identify alternative sources
Similar species
Expert consultn
Other
Yes
Precautionary approach
Is requested harvest and associated management within the limits of sustainable harvest
Conditions that would mitigate impact of harvest and allow positive NDF
No
No
Yes
Yes
Are other factors affecting population e.g. illegal trade
Yes
No

Recommendations

- **NDF issues:** Examine past Significant Trade Reviews to identify technical issues
- **Data requirements:** Technical advice from Scientific Committees and other bodies on data requirements for species subject to Significant Trade Review
- **Data availability:** Provide a database (some publicly available sources already exist) of relevant biological information, e.g life history
- **Data/expertise sharing:** Encourage sharing of these resources between range States, within regions etc
- **Data gathering/analysis:** Technical advice from Scientific Committees and other bodies on use of approaches/methods
- **Encourage bilateral support:** The UK-Guinea raptor assessment provided relevant information
- **Added value:** Recognise that addressing many of these issues may have significant other benefits

Presentation and packaging of these ideas and guidance will be crucial

NDF WORKSHOP CASE STUDIES
WG 6 – Birds
CASE STUDY 1
Psittacus erithacus
Country – **GUINEA**
Original language – English

AFRICAN GREY PARROT *PSITTACUS ERITHACUS* CASE STUDY

AUTHORS:
Phillip Mcgowan

I. Background information on the taxa

1. BIOLOGICAL DATA

1.1. Scientific and common names
African grey parrot *Psittacus erithacus*

1.2. Distribution
The species occurs from Guinea-Bissau in West Africa though the forests of West and Central Africa to western Kenya and south to northern Angola and Democratic Republic of Congo. Within this broad extent of occurrence of more than 3,000,000 sq km (BirdLife International 2008) it is found in Angola, Benin, Burundi, Cameroon, Central African Republic, The Democratic Republic of the Congo, Congo, Côte dIvoire, Equatorial Guinea, Gabon, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Mali, Nigeria, Rwanda, Sâo Tomé e Principe, Sierra Leone, Tanzania, Togo, Uganda.

1.3. Biological characteristics:

1.3.1. *General biological and life history characteristics of the species*

1.3.2. *Habitat types*
The species' preferred habitat is moist lowland forest, although it is found up to 2,200 m altitude in the east of its range. An association within this range for *Elaeis* palm fruit has been noted. At least in West

Africa, the species makes seasonal movements out of the driest parts of its range in the dry season. Although typically inhabiting dense forest, birds are commonly observed in or at forest edges, clearings, gallery forest, mangroves, wooded savannah, cultivated areas, and even gardens (Juniper and Parr, 1998). However, habitat alteration often reduces nest-site availability but allows sizeable populations of large frugivores to persist owing to increased food availability in secondary forest and anthropogenic habitats. Such long-lived birds may remain common for some period after populations are no longer self-sustaining. In captivity, birds have a mean lifespan of around 45 years, and first breed at about five years of age. Clutches comprise three to five eggs and wild productivity is around 0.4 chicks/nest (Fotso, 1998b).

Gatter (1997) estimated two breeding pairs/ km^2 in logged forest north of Zwedru, Liberia. McGowan (2001) provided similar estimates of nest densities in Nigeria of 0.5-2.1/km^2, believing the higher end to be more accurate. This would indicate 4.2 breeding birds/km^2 plus non-breeding birds (the remaining 70-85% of the population, as estimated by Fotso (1998b), giving estimates of 4.9-6.0 birds/km^2. These estimates are substantially higher than those of 0.3-0.5 birds/km^2 in good habitat in Guinea (Dändliker, 1992a) and 0.9-2.2 birds/km^2 (in evergreen forests) or 0.15-0.45 birds/km^2 (in semideciduous forests) in Ghana (Dändliker, 1992b). Using these density estimates, the overall population in West Africa (including *P. e. timneh*) was estimated at 160,000 to 360,000 birds; Central African populations are much larger (Dändliker, 1992a).

1.3.3. *Role of the species in its ecosystem*

There is no specific information on this.

1.4. Population:

1.4.1. *Global Population size*

Using the density estimates given in 1.3.2 above, the overall *P. e. timneh* population was estimated at 120,100-259,000 birds, and the West African population of *P. e. erithacus* at 40,000-100,000 birds (BirdLife International 2008; , although Central African populations of this subspecies are much larger (Dändliker 1992a). Using a global land cover classification (JRC 2000), a digitised map of the species' range from Benson et al. (1988), and estimates of density of 0.15-0.45 birds/km2 in semi-deciduous forest (including deciduous forest) and 0.3-6.0 birds/km2 in evergreen forest (including swamp forest and mangrove), supplemented by recent (post-1995) published national estimates where available, an initial coarse assessment of the global population of this species is 0.68-13 million individuals.

1.4.2. *Current global population trends*

___increasing _X_decreasing ___ stable ____unknown

BirdLife International (2008) report that there have been population declines have been noted in Burundi, Cameroon, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Nigeria, Rwanda, São Tomé and Príncipe, Sierra Leone, Togo, Uganda and parts of Congo and the Democratic Republic of the Congo (see AC22 Doc 10.2 Annex 1). In all of these declines, trapping for the wild bird trade has been implicated, with habitat loss also having significant impacts throughout West and East Africa. Data suggest that c. 21 % of the wild population is being harvested annually, and in addition forest loss during 1990-2000 was estimated to be particularly high in Côte d'Ivoire (31%), Sierra Leone (29%), Nigeria (26%), and Liberia (20%).

1.5. Conservation status:

1.5.1. *Global conservation status (according to IUCN Red List)*

___Critically endangered _X_Near Threatened
___Endangered ___Least concern
___Vulnerable ___Data deficient

1.5.2. *National conservation status for the case study country*

Range State	**National Protection status**
Angola	Totally protected
Benin	No information
Burundi	No information
Cameroon	Not protected. Capture requires permits under 1994 Wildlife and Fisheries Act
Central African Republic	No information
Congo	Not protected. Capture and possession requires 'permis de detention'
Côte d'Ivoire	Hunting and trapping not permitted in classified forest and protected areas
Democratic Republic of Congo	Hunting is regulated. Capture only allowed under permit in specified sites, by specified trappers
Equatorial Guinea	No information
Gabon	Trapping requires a permit
Guinea	Hunting is illegal, but live-trapping is not
Guinea-Bissau	Nationally protected. Moratorium on trapping
Kenya	Totally protected
Liberia	No information
Mali	No information
Nigeria	Totally protected
Rwanda	Exports are banned
Sierra Leone	Harvest for export governed by permit. No permits issued for domestic use
Togo	No information
Uganda	Totally protected

1.5.3. *Main threats within the case study country*

___No Threats
_X_Habitat Loss/Degradation (human induced)
___Invasive alien species (directly affecting the species)
_X_Harvesting [hunting/gathering]
___Accidental mortality (e.g. Bycatch)
___Persecution (e.g. Pest control)
___Pollution (affecting habitat and/or species)
___Other_____
___Unknown

2. SPECIES MANAGEMENT WITHIN THE COUNTRY FOR WHICH CASE STUDY IS BEING PRESENTED

2.1. Management measures

Across the species' distribution there is little evidence of active management, although in some range States there is legislation in place to protect the species from over-exploitation.

2.2. Monitoring system

2.2.1. *Methods used to monitor harvest*

In most countries systems for monitoring harvest are not described. Importantly, it has been concluded that in some key countries quotas are either regularly exceeded (e.g. Cameroon, Congo), quotas may exceed sustainable harvest (e.g. Guinea) or the basis for setting quotas is not at all clear (see AC22 Doc 10.2 Annex 1). Furthermore, the widespread illegal harvest of African grey parrots means that, by its very nature, an unknown number of birds are being removed from the wild population and so there is no method for assessing the overall number of individuals (or proportion of the population) removed.

2.2.2. *Confidence in the use of monitoring*

Issues related to this are covered under II below.

2.3. Legal framework and law enforcement

The species is listed in Appendix II of CITES. As indicated in Section 1.5.2, national protection varies considerably throughout its distribution.

AC 22 Doc 10.2 states: "P. erithacus was included in CITES Appendix II in 1981, and has been the subject of two previous significant trade reviews. The first, which took place prior to the establishment of a formalized review process, determined that trade in the species was a

"possible problem" (Inskipp et al. 1988). The second was completed in 1992 under Phase I of the process established via Resolution Conf. 8.9, and concluded that the Impact of current levels of trade and/or the conservation status of the species was insufficiently known (Inskipp and Corrigan, 1992). Based on the information provided, at their seventh meeting, the CITES Animals Committee formulated recommendations for five Parties. These were subsequently communicated by the Secretariat to the Parties concerned (Cameroon, Ghana, Guinea, Liberia and Togo) in June 1992 (AC.8.10, AC.8.10.5)." BirdLife (2008) goes on to say that "The Animals Committee of CITES has recommended up to a two-year ban from January 2007 on exports of African Grey Parrots Psittacus erithacus from four West African countries (Cote d'Ivoire, Liberia, Sierra Leone and Guinea), where the distinctive (sub)species timneh is found, and in Cameroon, where the more widespread (sub)species erithacus occurs. For a further two countries - Congo and the Democratic Republic of Congo - the Committee has recommended that quotas should be halved to 4,000 and 5,000 birds respectively. The species occurs in a number of protected areas."

3. UTILIZATION AND TRADE FOR RANGE STATE FOR WHICH CASE STUDY IS BEING PRESENTED.

3.1. **Type of use** (origin) **and destinations** (purposes)

The African grey parrot is an extremely popular pet in many parts of the world. Historically this has typically been Europe and the United States (where many websites are devoted to information on the welfare and keeping of these and other parrot species), but it is also becoming increasingly popular in the Middle East. The popularity arises from their status as 'companion animals' whereby they are usually kept inside houses. The main reason for the desire that many people have to own an African grey parrot is its remarkable ability to copy human words, although other aspects of its behaviour are also seen as attractive. Furthermore, as a long-lived species, many people develop extremely strong attachments to individual grey parrots over many years.

Virtually all international trade is for this pet market and is from wild specimens. Young birds still in the nest are the most sought after as the younger the birds are the more likely it is that they will mimic human words and this is a very desirable characteristic for many people.

Table 1. AC22 Doc 10.2 Annex 1 provides the following summary of exports from range States between 1993 and 2004 with an indication of the degree of concern and comments on impacts on wild populations.

Range States selected for review

Range State	Exports* (1994-2003)	Urgent, possible or least concern	Comments
Angola	191	Least concern	Low levels of exports reported
Benin	13	Least concern	Low levels of exports reported
Burundi	0	Least concern	No reported exports
Cameroon	156,855	Urgent concern	Little recent population information, however indications of localised declines and range contraction; export quotas (which have regularly been exceeded) may be high relative to sustainable offtake; suspected illegal trade a concern
Central African Republic	228	Least concern	Low levels of exports reported
Congo	31,946	Possible concern	Exports increasing in recent years; quotas regularly exceeded; little recent population information, scientific basis for quotas and non-detrimental nature of exports not clear
Côte d'Ivoire	**18,903	Urgent concern	Exports increasing in recent years; quotas regularly exceeded; little recent population information but habitat disappearing; scientific basis for quotas and non-detrimental nature of exports not clear; suspected illegal trade a concern.
Democratic Republic of Congo	118,780	Possible concern	Little recent population information; scientific basis for quotas and non-detrimental nature of exports not clear; suspected illegal trade a concern
Equatorial Guinea	770	Possible concern	Recent increase in exports; scientific basis for quotas and non-detrimental nature of exports not clear
Gabon	382	Least concern	Low levels of exports reported
Guinea	6,465	Urgent concern	Population believed to have declined significantly with concern that permitted exports may not be within sustainable levels; suspected illegal trade a concern
Guinea-Bissau	69	Least concern	Low levels of exports reported
Kenya	503	Least concern	Negligible international trade reported recently; earlier trade based on import records so could reflect reporting error
Liberia	11,045	Urgent concern	Species regarded as depleted, export levels likely not to be sustainable; suspected illegal trade a concern
Mali	66	Least concern	Low levels of exports reported
Nigeria	539	Least concern	Authorized international trade at low levels; high national demand; illegal exports, and possibly imports, believed to be substantial and require attention.
Rwanda	0	Least concern	No exports reported
Sierra Leone	10,911	Urgent concern	Preliminary calculations suggest current exports are unsustainable
Togo	116	Least concern	No viable population; low level of exports reported likely to have originated elsewhere; the origin of any further exports requires confirmation
Uganda	41	Least concern	Low levels of exports reported

* Excluding re-exports
**Figures for *P. erithacus* and *P. e. timneh*

Table 2. Exports (including re-exports) of Psittacus erithacus from range States 2000-2007. Figures for 2006 and 2007 (in shaded columns) are considered incomplete as yet. Data have been extracted from the CITES Trade Database maintained at UNEP-WCMC.

Country	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**Totals** (up to **2005)**	**Totals** up to **(2007)**
Angola	0	11	10	9	7	4	0	2	41	43
Benin	4	0	6	0	3	1	2	0	14	16
Burundi	1	2	6	13	1	0	0	0	23	23
Cameroon	17532	14969	16405	11113	17465	17053	4300	0	94537	98837
CAR	21	15	10	7	3	2900	850	2	2956	3808
Congo	2103	8272	8205	9243	7092	8773	606	0	43688	44294
Côte d'Ivoire	38	913	958	4789	3911	2607	1401	0	13216	14617
DRC	14292	10662	5867	15326	18997	15986	10787	751	81130	92668
Eq. Guinea	5	3	8	736	487	272	0	0	1511	1511
Gabon	47	82	33	45	60	54	10	10	321	341
Ghana	2	0	1	6	0	3	0	1	12	13
Guinea	19	8	103	552	1310	2428	3495	0	4420	7915
Guinea-Bissau	1	1	4	2	0	0	0	2	8	10
Kenya	48	23	10	2	7	4	3	0	94	97
Liberia	0	0	0	0	575	1422	0	0	1997	1997
Nigeria	5	6	13	1	4	400	0	0	429	429
Sao Tome and Principe	40	18	0	0	0	0	0	0	58	58
Sierra Leone	0	0	0	0	0	650	0	0	650	650
Togo	3	13	6	7	11	4	0	0	44	44
Uganda	7	24	39	5	6	11	2	0	92	94
Totals	**34168**	**35022**	**31684**	**41856**	**49939**	**52572**	**21456**	**768**	**245241**	**267465**

3.2. Harvest:

3.2.1. *Harvesting regime*

Post-capture, pre-export mortality estimates for the species in Cameroon, Democratic Republic of Congo, Ghana, Guinea and Nigeria average 30-40% (overall between 15 and 66%) (Dändliker, 1992a,b; Fotso, 1998b; McGowan, 2001; Ngenyi, 2002). In Nigeria, birds are harvested during the nesting season when nestlings are removed from the nest. As there is increasing competition between trappers, nestlings are being taken at younger ages each year. This means that survival is increasing uncertain. McGowan (2001) concluded that for every 100 birds trapped, 43 would be dead before leaving the trapper and of the surviving 57, 34-40 would reach a market such as Calabar. That is a mortality rate of 60-66% by the time the birds reach a major domestic town or city.

3.2.2. *Harvest management/ control* (quotas, seasons, permits, etc.)

The Animals Committee of CITES has recommended up to a two-year ban from January 2007 on exports of African Grey Parrots *Psittacus eri-*

thacus from four West African countries (Cote d'Ivoire, Liberia, Sierra Leone and Guinea), where the distinctive (sub)species timneh is found, and in Cameroon, where the more widespread (sub)species *erithacus* occurs. For a further two countries – Congo and the Democratic Republic of Congo – the Committee has recommended that quotas should be halved to 4,000 and 5,000 birds respectively. The species occurs in a number of protected areas.

3.3. Legal and illegal trade levels

See Table 1 and Table 2. It is difficult to quantify the extent of illegal trade any further.

II. Non-detriment finding procedure (NDFs)

As the Significant Trade Review (AC22 Doc 10.2 Annex 1) indicates there is a significant lack of information from across the species' range on the process by which quotas are set and NDFs made. Therefore, the issues are discussed in general terms here.

The criteria for setting the export quotas is not clear (see AC22 Doc 10.2 Annex 1) and the haphazard way that these quotas are established and in some cases exceeded, suggest little rigour in the NDF procedure across throughout the species' range.

The over-riding challenge in making non-detriment findings for the African grey parrot throughout its range is the difficulty of assessing the impact that removal of individuals will have on wild populations. This is because assessing the status of the population is difficult (making reliable population estimates is a significant challenge) and pre-export mortality appears to be variable, but is typically high. If certain age groups are also harvested (e.g. chicks), the impact of reduced or possibly no recruitment into the adult population also has to be considered.

When combined with the uncertain basis on which export quotas are established (and sometimes exceeded) and the extent of illegal harvest, it is clearly very difficult to conclude whether or not offtake is detrimental to a wild population. This effectively means that any administrative process for determining non-detriment will be confounded by poor knowledge and limited ability to implement what legislation exists.

The Nigerian MA answered 'No' to the following question in their biennial report (2003-04) to the CITES Secretariat (see http://www.cites.org/common/resources/reports/pab/03-04Nigeria.pdf) in August

2006: "Are harvest and/or export quotas as a management tool in the procedure for issuance of permits?"

RECOMMENDATIONS: HOW COULD AN NDF BE DONE

Determining that any harvest has no detrimental impact on a wild population requires the following:

- the population maintains its geographic distribution;
- numbers of breeding adults remain stable; and
- there are sufficient young birds being recruited into the adult population.

Therefore, it is considered that the following data are required:

- the area over which the population is distributed and the habitats that are used within this area;
- a quantitative assessment of the population size of mature adults; and
- fieldwork must demonstrate that a good proportion of young birds are successfully fledging from nests. It would be desirable to determine what constitutes a 'good proportion' based on what is know about the species' biology and what lessons can be drawn from the population biology of other parrot species.

This last item may be critical. Without a convincing demonstration that there are young birds fledging successfully it is not possible to be confident that a population will be maintained. Note that where adults are trapped (as well as, or instead of, young birds being removed from the nest), proof that young birds are fledging is not enough on its own to safeguard wild populations."

AFRICAN GREY PARROT *PSITTACUS ERITHACUS* CASE STUDY

AUTHOR:
Phillip Mcgowan

The African grey parrot occurs in 23 African countries and is exported from many of them in large numbers. Trade in the species has been of concern on several occasions and has been subject to three Significant Trade Reviews with the most recent being presented at the 22nd meeting of the Animals Committee in 2006. Concern over the trade has also resulted in other actions in various range States: species surveys being conducted; Notifications to the Parties concerning trade have been issued; and moratoriums have been imposed. To add to this concern, there is illegal trade that also has the impact of reducing wild population numbers. All of these factors make this species a fascinating case study for the Non-Detriment Finding process.

The most recent Significant Trade Review (AC 22 Doc 10.2 Annex 1) highlighted the challenges of making Non-Detriment Findings by indicating the extent to which the basis upon which quotas and NDFs were made was uncertain. Therefore, this case study will concentrate on illustrating the technical challenges that should be overcome before an appropriate administrative process can be proposed. These challenges arise from the difficulty of estimating population numbers, then assessing what impact offtake at various levels will have, and setting all of this against a background where illegal trapping will also have an (unknown) impact on wild populations. Furthermore, pre-export mortality of 15-60% (average 30-40) has been reported from five countries.

Determining that any harvest has no detrimental impact on a wild population of grey parrots requires the following:

- the population maintains its geographic distribution;
- numbers of breeding adults remain stable; and
- there are sufficient young birds being recruited into the adult population.

NDF WORKSHOP CASE STUDIES
WG 6 – Birds
CASE STUDY 2
Amazona auropalliata
Country – **NICARAGUA**
Original language – Spanish

PROPOSAL FOR MAKING AN NDF BASED ON A PSITTACIDAE RECOVERY PROGRAM FOR NICARAGUA: THE *AMAZONA AUROPALLIATA* CASE

AUTHOR:
Martín Lezama-López
Expert in Ecology and Wildlife Management Managua, Nicaragua.

I. Background information on the taxa

1. BIOLOGICAL DATA

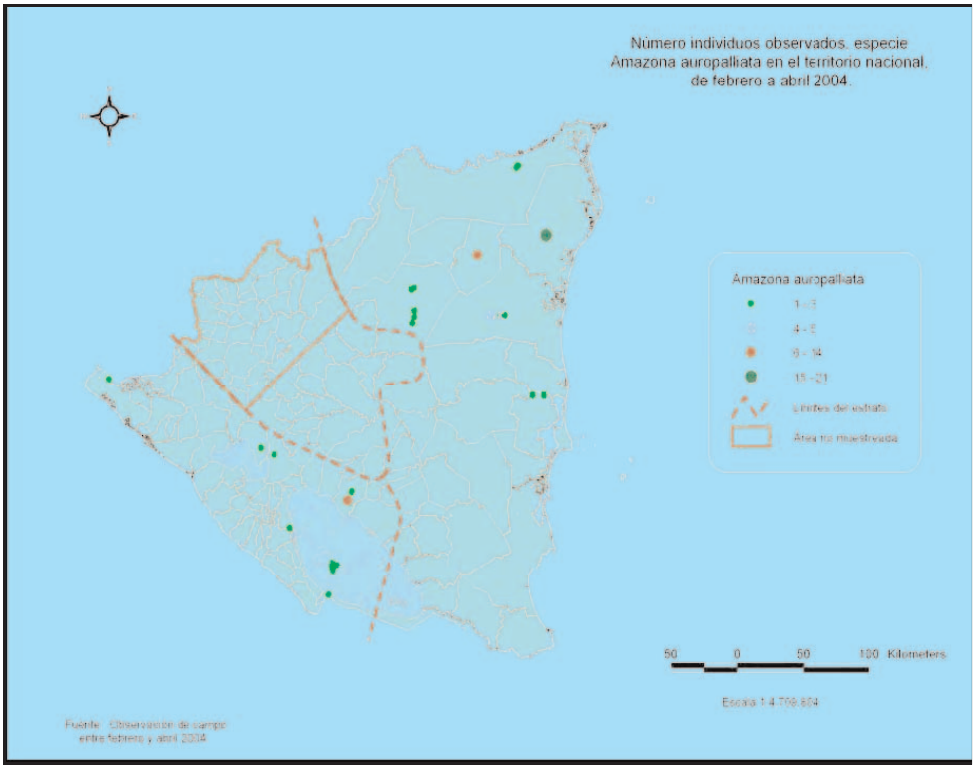
1.1 Scientific and common names

Amazona auropalliata (Lesson, 1842). Its common name within its distribution range is *lora nuca amarilla* (Yellow Nape Amazon). Registered scientific synonyms are: *Amazona ochrocephala auropalliata and Amazona auropalliata auropalliata*. Although it is mainly a species from the Pacific basin, subspecies are found in the Caribbean basin, such as *A. auropalliata parvipes*, which occurs from Colón, Honduras, passing through the southeastern lands including la Moskitia in Nicaragua, to the south down to the northern boundary of Bluefields (Monroe and Howell, 1966; Forshaw, 1977; Low, 1992;). Another known subspecies is *A. auropalliata caribaea* that lives in Bay Islands (Islas de la bahía), Honduras (Lousada, 1989; Lousada and Howell, 1996).

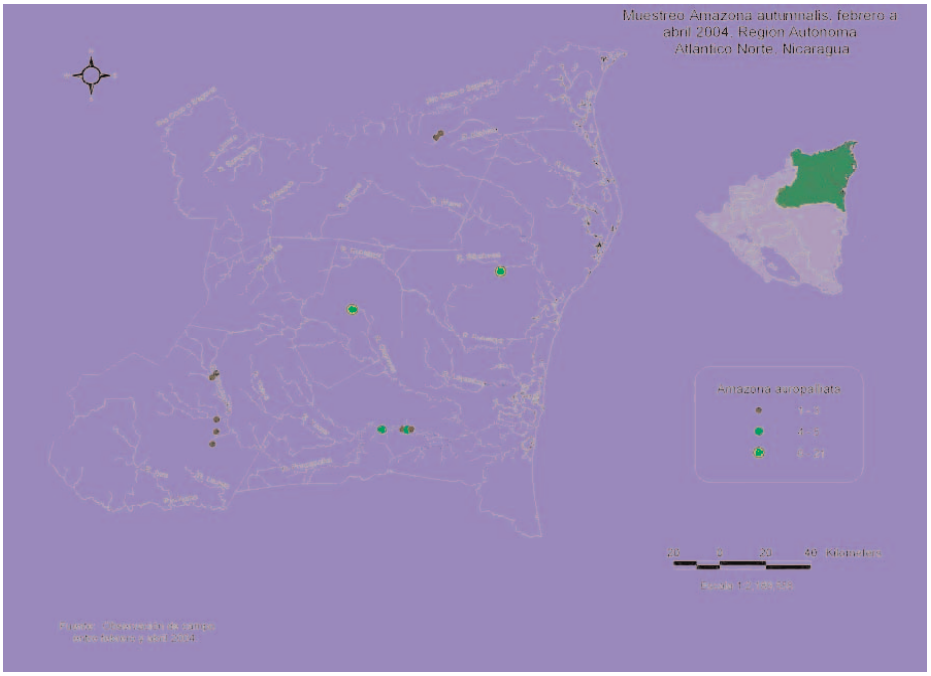
1.2 Distribution

This Mesoamerican species occurs from southeastern Mexico to northwestern Costa Rica, covering the territories of Guatemala, Honduras, El Salvador and Nicaragua. Its distribution range is closely related to deforestation processes that involve a loss by reduction and fragmentation. Formerly, it could be found throughout Nicaragua; neverthe-

less, as a result of the above-mentioned, there are many small and isolated populations especially in the Pacific region. It abounds in the Caribbean, mainly in remote areas where large wooded masses of broadleaf forest and pine forests are found. In the southern Caribbean, however, it is not so abundant (see map 1). In some Pacific areas the species is going through an ongoing process of extinction , whereas in protected areas with a good protection management it is plainly recovering. Sound populations can be found in the Pacific, in the Madera volcano on Ometepe Island, in Cosigüina peninsula, in Chinandega, as well as near the eastern coast of Cocibolca Lake close to Puerto Díaz. In the northern Caribbean, where the species is more abundant large populations are commonly found in the vicinity of the confluence of the lowland and humid land broadleaf forests with pine forests, and riparian or gallery forests, as well as in pine forests, especially those which are distant from the villages. In-detail distribution in the northern Caribbean can be observed in Map 2.



Map 1. Distribution of the Yellow Nape Amazon as per natinal count data



Map 2. Distribution of the Yellow Nape Amazon in Nicaragua's northern Caribbean as per data by Lezama *et al* (2004).

1.3 Biological characteristics of the species

1.3.1 *General Biological and life history characteristics*

It is a life-long monogamous species, although some researchers suggest divorces may exist, particularly among young couples. Based on observations performed in national zoos and in the wild, brood size rarely exceeds two chicks. Chick survival under natural conditions is not known with certainty. However, it has been observed in some pilot areas that in the absence of poaching all the chicks from the brood manage to become fledgling. First year and subsequent year survival is uncertain. In the Pacific area, natural mortality is associated to extreme weather conditions such as high temperatures throughout incubation month (January to February), in addition to natural enemies. Both in the Pacific and in the Caribbean, limiting factors for the population growth rate are nest poaching and natural enemies like predators and nest-tree competitors.

1.3.2 *Habitat types*

The yellow Nape Amazon is a typical inhabitant of close and open dense forests. Sometimes, it can live in open areas like scrub habitats and orchards when found in large populations. In the Caribbean it

does not occur in high and dense forests, but in open forests, seasonal swamp forests and pine forests. It prefers forests with enough nest-trees, regardless of tree density and height.

1.3.3 *Role of the species in its ecosystem*

It is an herbivorous species *par excellence* that can occasionally contribute to seed dispersal. Its little effectiveness as disperser relies on its strong habit of triturating the food prior ingestion. Nevertheless, regarding fruits and large seeds the Yellow Nape Amazon proves to be a good disperser. It is also a good pollinator because it enjoys feeding on fresh flowers in summer. It usually has levels of interspecific competition for food with large size herbivores, such as toucans and other psittacide birds; and because of its reproduction process it competes for natural cavities in trees from mid-size to mature trees in the forest. In this Country, I have found owls of undetermined species as well as honey bees (*Apis spp.*) using usual nests of Yellow Nape Amazons for a season. The natural enemies of this parrot bring about mortality during the early stages of its life cycle. Mid-size reptiles like lizards (*Ctenosaura similis*) prey on eggs during the first egg-laying weeks, whereas small mammals prey on nests, eating from few-day-old chicks to fully feathered individuals. The Pizote or white-nose coati (*Nasua narica*) has been identified as one of the mammals that eat two-or-more-week-old chicks.

1.4 Population

1.4.1 *Global population size*

National inventories have been prepared since 1994. National and local abundance estimators suggest a sharp decrease in the population. In 1995, the estimated figure was 2.3 individuals/km^2 nationwide, whereas in 1999 it shifted to 1.1 individuals/km^2. In the last inventory performed in 2004, the figure was smaller than 0.45 individuals/km^2. On a local basis, in the Pacific region the species appears in low-number populations. In the Isthmus of Rivas, near San Juan del Sur, a recent abundance estimator was of 0.025 individuals/ha. In localities where large and sound populations are found the number may come to 0.25 individuals/ha. In the Caribbean, populations are larger and may come to 0.45 individuals/ha locally.

1.4.2 *Current population trend*

___increasing __X_ decreasing ____ stable ____unknown

1.5 Conservation status

1.5.1 *Global conservation status* (according to IUCN Red List, see www.iucnredlist.org):

___Critically Endangered (CR)	___Near Threatened (NT)
___Endangered (EN)	__X_Least Concern (LC)
___Vulnerable (VU)	___Data Deficient (DD)

Note: Just like all the species of the Psittacidae family, it is protected in the Country by the nation-wide indefinite prohibition law (ley de veda). Although it is listed in Appendix I of CITES, there is still a significant issue to be taken into consideration. Protection currently provided for the Psittacidae family and for the species could have a positive impact in the middle and long term, so that the sustainable use of the species can become an option. Its management should include proposals such as the plan described in the paper, and should also be enriched by other experiences in the region, for instance, the management experience of the Blue Fronted Amazon parrot (*Amazona aestiva*) in Argentina by the wildlife authorities (www.ambiente.gov.ar). The aim of this management plan (PRP) or of another plan devised by researchers or relevant authorities must be to guarantee that wild populations are able to stand a removal quota for commercial purposes under conditions of sustainability and full community involvement.

1.5.2 *Conservation status in Nicaragua*
From 1993 to 2002, it was within the list of species under a national partial prohibition. In the same period, it was included in the IUCN Red List- Nicaragua. From January 2008 to date, the species has been under the protection of a national indefinite prohibition.

1.5.3 *Main threats in Nicaragua*

___No threats
__*X*_Habitat loss or degradation (human induced)
___Impact of invasive alien species (directly affecting the species)
__*X*_Direct exploitation (hunting, harvest)
___Accidental mortality (e.g. bycatch)
___Persecution (e.g. pest control)
___Pollution (affecting species and /or habitat)
___Others _____
___Unknown

2. SPECIES MANAGEMENT WITHIN THE COUNTRY FOR WHICH STUDY CASE IS BEING PRESENTED

2.1 Management measures

2.1.1 *Species management history*

From the late 1990s to 2005, Nicaragua was one of the main legal exporters of psittacide birds removed from the wild within its distribution range. The Yellow Nape Amazon parrot accounted for up to 25% in average of exported birds. However, worldwide, during that period Nicaragua exported, on average, between 600 and 800 parrots of the species a year as a part of a quota system. From 1993 to 2000, up to 74% of the total number of Yellow Nape Amazon parrots in international trade came from Nicaragua. In 2005, due to national administrative and legal measures and to the shift of the species to Appendix II of CITES the quota was cancelled. The largest economic benefits of its trade remained in the hands of exporters. Certainly, impacts such as a decrease in wild populations became obvious over the years (see item 1.4.1).

It is worth-mentioning that Nicaragua used to have a quota system in which the quota was assigned on a year basis to 12 private companies. These companies, grouped in an association, were given the quota without other procedures than submitting their fiscal records and operation plans. Public bidding processes were omitted as well as any other exploitation mechanisms that enabled the communities living in breeding areas of the species to be benefited. The annual quota was assigned to the association which divided the quota equitably among the qualified companies. Annual allocation was estimated on the basis of data from national monitoring which started in 1994. Prior to that year allocations were totally arbitrary. Estimation consisted in taking 5% of the lower limit of the abundance estimator obtined by distance methods (Distance), (Buckland,et al. 1993).

2.1.2 *Purpose of the management plan*

The paper I am presenting includes a proposal which was in once presented to the Government of Nicaragua as part of the results of the third national monitoring of psttacide birds based on the fact that the Yellow Nape Amazon was the most important species because of pressures exerted on it and on its habitat. The main purpose of this plan is to contribute to detect more efficient approaches to manage and preserve the Yellow Nape Amazon parrot, which does not exclude the other psttacide birds existing in the Country. The results justified the increase and improvement of the management performed up to that moment, without excluding sustainable alternatives for exploitation.

In that time, in the Country it was possible to adapt its management to more sustainable options.

2.1.3 *General elements of the management plan*

The proposal is presented as "Programas de Recuperación de Poblaciones de Psitácidos" (Programs for the Recovery of Psittacide Populations) (PRP Spanish acronym). It consists in areas with abundant habitat in terms of extension and quality (food availability and nesting sites with linking areas between large fragments) that allow the recovery of the populations through methods such as ranching and a broad community involvement together with habitat management. Based on the way it is defined, the PRP long term aim would be first the recovery of populations, mainly parrots, cockatoos, and macaws (genera *Amazona* and *Ara* respectively) and their habitat. There are many areas with a potential for implementing the PRP. The secondary aim is to benefit local communities and businessmen so as to meet the precept of enjoying the benefits of our natural resources in a wide and participative fashion. The benefit is understood as the participation in the exploitation with commercial purposes of chicks obtained within the PRP limits and which are allowed to be commercialized in accordance with national regulations and CITES.

People interested in implementing PRP shall prepare a diagnosis that allows the verification of a series of ecological indicators on habitat and populations of concern. As for habitat, variables of tree density, forest mean height, number of plant formations, flora diversity, dominance and heterogeneity, in addition to abundance and distribution of flora recognized as food source for psttacide birds should be considered. Along with habitat status a detailed study on availability of nest-trees, tree species, nest height from the ground, and nest estate (active, abandoned or destroyed) will be developed. Another set of habitat variables must allow measuring effects of fragmentation on psttacide populations, it is about estimating most important fragmentation metrics, including average size of fragments, average distance between them, and the level of connectivity with adjoining wooded masses, which may be protected areas.

Above-mentioned parameters are essential to consider safe quota estimations. As for psttacide populations, the diagnosis must assure the most accurate *abundance* estimation, the determination o*f breeding population* (sexually mature couples), *available nests* vs. *active nests* and vs. hatched nests (egg hatching and presence of young pigeons at least in the first week after incubation is completed). As nearly as practicable, it is suggested to extend the diagnosis to other structural parameters considered essential for establishing short term quotas,

which can be very useful for estimating population trends. Among them sex and age distribution, dispersion and dynamic parameters like survival-mortality, annual recruitment, birth, growth rate (r) and main natural mortality factors, without diminishing the other standards that may be included.

Comparative evaluation
After the habitat and population diagnoses have been completed, results obtained will be evaluated using criteria based on the ecological indicators related to space and habitat which, in turn, extrapolate natural preserved areas recognized as with non-existent human disturbance or with little human disturbance. These would be control-type data aiming to compare the data obtained from proposed PRP diagnoses.

Socioeconomic and institutional assessment
Based on the evaluation performed according to the indicators set forth in the previous paragraph and on other socioeconomic, administrative and legal considerations, the plan will proceed to the PRP implementation phase. However, it is worth mentioning what would be expected as optimal in socioeconomic terms for a good implementation of a PRP.

Basically, it is about having communities living in their own territories or in territories under legal possession with a low standard of living or below the poverty line as per official life standard indicators. This community environment must be off the boundaries of protected areas where biodiversity exploitation is not allowed. They can be situated in buffer zones. It is not necessary that the area to be affected by the PRP has an implemented management plan, many times the plan exists but there is no implementation. In the actuality of Nicaragua and of other countries in Central America, the optimal conditions for the execution of a PRP, from the socioeconomic perspective, are in the lands and communities of the Caribbean ethnic groups.

PRP MODALITIES

Short term implementation
It refers to a PRP in which habitat and population conditions are good so that an experimental one year lasting chick harvest of at least 5% of hatched and living chicks at the first week of life can be established. Under this modality, feasibility of artificial nests for amazons or other genera with a known low reproductive index such as the Brown-hooded Parrot (*Gypopsitta haematottis*) will be evaluated in the first harvest year. Besides, in this modality, measures will be implemented to

establish agreements on community participation in the management and conservation of populations, habitat enrichment, and psittacide population care.

Middle term implementation (5 years)
In this case, the results and evaluation of the diagnosis indicators suggest that a set of management techniques must be implemented: such as artificial nests, controlled harvesting, registration and organization of collectors, chick marking, breeding stocks that allow a population increase of 10% to 20% of nesting couples in the specified term, annual survival and recruitment. At the end of the period, evaluators will be able to present their findings based on the ecological indicators. Depending on said findings a preventive exploitation of 5% of the chicks born in a year and surviving at the first week of life will be approved, or an extension of PRP management-improvement time will be given.

Long term implementation (15 years)
It is carried out in areas in which the state of populations and habitat, as well as institutional arrangements with communities, show scarce viability for recovery and sustainable management so that PRP management should take longer before choosing a management form. This type of PRPs must be closely followed up by authorities. The ideal scenario would be that the Nicaraguan Government developed a legal framework prepared in accordance with the existing regulations. Having a wildlife law would be very convenient because it would give a very particular basis to wild life supervisors.

PRP Certification
In any modality, relevant authorities will be able to authorize the certification of the program or part of its processes (diagnoses, management techniques, exploitation techniques, etc.) as long as the people in charge of the PRP request so. Certification is advisable to be performed through evaluation of peers or experts detached from the PRPs along with the counterparts in charge of the PRP and government representatives (Ministry of Environment and Natural Resources (MARENA), or the corresponding territorial body. This way, the commission thus formed will perform the evaluation of the same project from three different perspectives. Accreditation will be presented as part of the final results of the evaluation (external peer, person in charge of the PRP, and national authority).Once it is completed, a code will be assigned to identify each exploited specimen. This code should be printed on metal rings which will be attached by the per-

son in charge of the PRP on the tarsus of each specimen to be commercialized.

The national authority, MARENA, will be fully empowered to prepare the regulations that establish conditions or rules for each PRP, so that sanctions for noncompliance, rule breaking, misdemeanors, or other fraudulent actions will be addressed in a timely manner with the aim of not damaging the nature, the objectives and the philosophy of PRPs.

2.1.4 *Restoration or mitigation measures*

Prevention of forest fires and strict control of the uses of forests which are the habitat of psittacide birds, including the Yellow Nape Amazon.

2.2. Monitoring system

2.2.1 *Methods used to monitor harvest*

Nest recognition and nest marking, estimation of chicken and fledgling survival/mortality up to the first six months of life, productivity and recruitment estimation, assessment of food availability, nest availability and natural enemies. An exploitation percentage would be determined according to productivity. The basic model assumes the use of one pigeon of each nest (regardless of the existence of more than two chicks). Should there only be one chick it will not be used. When there is more information available on the habitat and carrying capacity (K) the percentage of individuals to be used will be estimated through modeling.

2.2.2 *Confidence in monitoring*

Provided it is measured in time and space as per the recommendation and under the supervision of experts it will be highly reliable.

2.3 Legal framework and law enforcement

For several years, from the 1960s to the early 2000s, the species was listed in Appendix II of CITES. In 2002, it was moved to Appendix I on the initiative of Costa Rica and the other Central American countries. In a national level, the species was unprotected until the 1970s. In general, wild animal hunting in private areas was prohibited. There was not any other restriction from the legal perspective. From the 1970s to the early 1980s harvesting of the species was allowed obeying only administrative criteria (certain people were authorized). Harvest and trade were authorized by means of a commercial license.

In the 1980s, the Government banned hunting and trade of the species through a presidential decree. Between 1992 and 1993, its trade was reopened through the system of quotas and commercial

participation depicted in section 2.1.1. Trade restrictions, especially concerning domestic trade, were stressed as from 1996 with the enactment of the General Law on Environment (Law 217), which set forth clearer and more specific concepts on exploitation, wild fauna and biodiversity.

From 2004 to 2005, export trade was closed due to the information obtained from the last national monitoring, which indicated a population decrease to levels below the ones authorized and agreed by national authorities. In 2005, the Law on Environmental Crimes (law 559) was passed. It establishes the concepts of environmental crimes such as the violation of prohibition laws and breach to the regulations of Protected Areas Laws. As from January 2008, all psittacide birds are protected by a national prohibition established through Ministerial Resolution 003-2008.

3 UTILIZATION AND TRADE IN THE COUNTRY FOR WHICH THE STUDY CASE IS BEING PRESENTED

3.1 Type of use (origin) and destination (purpose)

In accordance with the national law (nation-wide indefinite prohibition) neither trade nor exploitation of psitticade birds are allowed. As a result of the cancellation of export permits issued by CITES in 2005, there is no exploitation quota for captive-bred animals and much less for animals captured in the wild. These animals are used as pets. They are removed from the wild in their nests few days after hatching. The Yellow Nape Amazon is the most wanted species because of its talkative ability and its ability to learn tricks. Apparently, breeding captivity of the species is made by private people and at the National Zoo, which is administered by law through a concession. Specimens reproduced in the Zoo and by private collectors are destined for the same collections.

3.2 Exploitation (harvest)

3.2.1 *Harvest regime*

There is neither legal nor official harvesting since 2005.

3.2.2 *Harvest management or control*

There is no legal or official system of quotas or permits.

3.3 Legal and illegal trade levels

Based on information on seizures, it can be estimated that between 600 and 1200 animals are moved annually through illegal traffic. Forty per-

cent of these animals is accounted by the Red-lored parrot (*Amazona autumnalis*) and the White-fronted parrot (*Amazona albifrons*). The rest is conformed by lesser species like Aratingas and Brotogeris and sometimes Naped parrots and macaws (Ara). Birds leave the Country by routes and spots which are difficult to control by the authority, many times these are the same routes used by drug trafficking. In the northern Pacific towards El Salvador and Honduras, close to Golfo de Fonseca the chicks are transported in boats among fishing products. They are also transported by land between Nicaragua and Honduras. It is known that hundreds of psittacide birds are removed from the Moskitia Hondureña in order to be commercialized in Jamaica, Nicaragua (Waspam), and neighboring islands where there is a lot of tourist activity. Domestic trade feeds on illegal traffic; although it is covered up there is a non-estimated amount of birds offered in market places and other popular places in major cities of the Country. The genera Aratinga and Brotogeris are the most common in the domestic market.

II. Non-detriment finding procedure (NDFs)

Provide detailed information on the procedure used to make the NODF for the species evaluated.

Is the methodology used based on the IUCN checklist for NDFs?
__YES _X_No

1. CRITERIA, PARAMETERS AND/OR INDICATORS USED

It is worth-stressing that although it is a proposal, as mentioned in section 2.1.3, the criteria are based on structural parameters of the population (abundance distribution, productivity), and on dynamic parameters such as mortality, survival, recruitment, growth rate. The other parameters are related to habitat: availability of nest trees, food sources, fragmentation, and carrying capacity (individuals/ha).

2. MAIN DATA SOURCES, INCLUDING FIELD EVALUATIONS, OR SAMPLING METHODOLOGIES AND ANALYSIS USED

Two types of data sources with different timing were identified One is the national monitoring of psittacide birds performed in three past periods: 1994-95, 1999 and 2004 (Lezama *et al*., 2004). The other would be prior evaluations of pilot areas with potential for being PRP (see section 2.2). A prior design would be developed and discussed with national authorities and related committees of CITES.

3. EVALUATION OF DATA QUALITY AND QUANTITY USED FOR THE EVALUATION

National monitoring has been accepted by the scientific community of Nicaragua, government authorities, and former exporters of psitticade birds.

4. MAIN PROBLEMS, DIFFICULTIES, AND CHALLENGES ON THE ELABORATION OF NON-DETRIMENTAL FINDINGS

It is not applicable in this case because it is a proposal.

5. RECOMMENDATION

It must be taken into consideration that on the subject of biodiversity there are restrictions in the actual enforcement of law in Nicaragua. Currently, the national system of prohibitions (sistema de vedas nacional) (Ministerial Resolution 003-2008) establishes a nation-wide indefinite prohibition for 14 out of the 16 psittacide species recorded in the bird lists (Martínez-Sánchez *et al*., 2007). Possibly, the omission of both missing species is due to factors relating to the practical management of the list. Although these laws must be reviewed on an annual basis it is likely that reaching the level of legal bird trade within a hypothetical PRP will not be so feasible. In this case, the PRP would be implemented with purposes of habitat and psittacide population recovery.

There are institutional weaknesses in terms of logistics which relate to the low budgets assigned for fulfilling *in situ* supervision tasks. These restrictions are present everywhere and get stronger as the institutions that watch the state of the environment and natural resources extend the range of responsibilities. It must be understood that the implementation of PRPs would overload the budgets of the agencies in charge of protected areas and biodiversity.

REFERENCES

BUCKLAND, S.T., D.R. Anderson, K.P. Burnham and J.L. Laake. 1993. *Distance Sampling: Estimating Abundance of Biological Populations*. Chapman and Hall, London, reprinted 1999 by RUWPA, University of St. Andrews, Scotland.

FORSHAW, J.M. (1997). Parrots of the world. New Jersey. T.F.H. Publications, Inc.

LEZAMA, M., S. Vilchez, M. Mayorga y R. Castellón. 2004. Monitoreo de Psitácidos 2004, Estado actual y Conservación. Secretaría CITES-Nicaragua y Corredor Biológico del Atlántico (CBA), Managua, Nicaragua.

LOUSADA, S. 1989. *Amazona auropalliata caribaea*: a new subspecies of parrot from the Bay Islands northern Honduras. Bull. Brit. Orn. Club. 109: 232-235

LOUSADA, S. and Howell S.N.G. 1996. Distribution, variation and conservation of Yellow-headed Parrots in northern Central America. COTINGA 5.

LOW, R. 1992. Parrots in Aviculture A photo Reference Guide. Silvio Mattacchione & Co. Ontario, Canada.

MARTÍNEZ-SÁNCHEZ, J. C., E. Castañeda & J. M. Zolotoff-Pallais. 2007. Lista Patrón de las Aves de Nicaragua. Segunda Edición. Alianza para las Aves de Nicaragua (ALAS), Red de Reservas Privadas, Managua, Nicaragua.

MONROE B.L. Jr. and T.R. Howell 1966. Geographic variation in Middle American parrots of the Amazona *ochrocephala* complex. Occ.Pap.Mus.Zool. Louisiana State University 34: 1-18.

NDF WORKSHOP
WG 6 – Birds
CASE STUDY 2 SUMMARY
Amazona auropalliata
Country – Nicaragua
Original language – Spanish

PROPOSAL FOR MAKING AN NDF BASED ON A PSITTACIDAE RECOVERY PROGRAM FOR NICARAGUA: THE *AMAZONA AUROPALLIATA* CASE

AUTHOR:
Martín Lezama-López

Amazona auropalliata was listed in CITES Appendix II in 1981. In subsequent years, Nicaragua set export quotas between 650 and 800 individuals for the species. Export quotas for *A. auropalliata* and the rest of the species of the parrot family (Psittacidae) have been suspended since the species was listed in Appendix I in 2003. Therefore, no detriment findings are currently made. The case study proposes an innovative scheme that implies the active participation of local communities in the management of the species. This type of scheme is of major importance for developing countries, where biological diversity is used by local communities. Given that the export of the species is not permitted, the scheme is presented as a hypothetical case. However, it is considered that the scheme can be used for other Appendix-II listed species, particularly those that occur in countries where very poor local communities play an essential role in wildlife management. *A. auropalliata* and the rest of the species of the parrot family are protected in Nicaragua by an indefinite country-wide harvest ban in accordance with the appropriate legislation (*Ley de Veda*).

Recovery Programs for Parrot Populations (designated by the acronym PRP in Spanish) are defined as areas with abundant habitat in terms of size, quality and food availability; they should also include nesting sites and connectivity areas between large fragments to allow parrot populations to recover by using practices such as ranching and the active participation of organized communities as well as habitat management. Communities that are potentially good candidates for a PRP must complete a diagnosis so that a series of ecological indicators about the habitat and target populations can be verified at a later stage. As regards the habitat, it is necessary to consider structural variables, fragmentation, abundance and distribution of plants recognized as sources of food. It is also essential to study the population, availability of nest trees, species used and state of the nests. A PRP implies the participation of indigenous communities under the strict supervision of the competent authorities. Current limitations are more related to the legal and institutional framework of the country than to technical and scientific issues.

Propuesta para la elaboración de NDF basada en un programa de recuperación de psitácidos para Nicaragua: el caso de *Amazona auropaliata*

G. Luca

M. Lezama

Figura1: Importaciones de psitácidos 2003

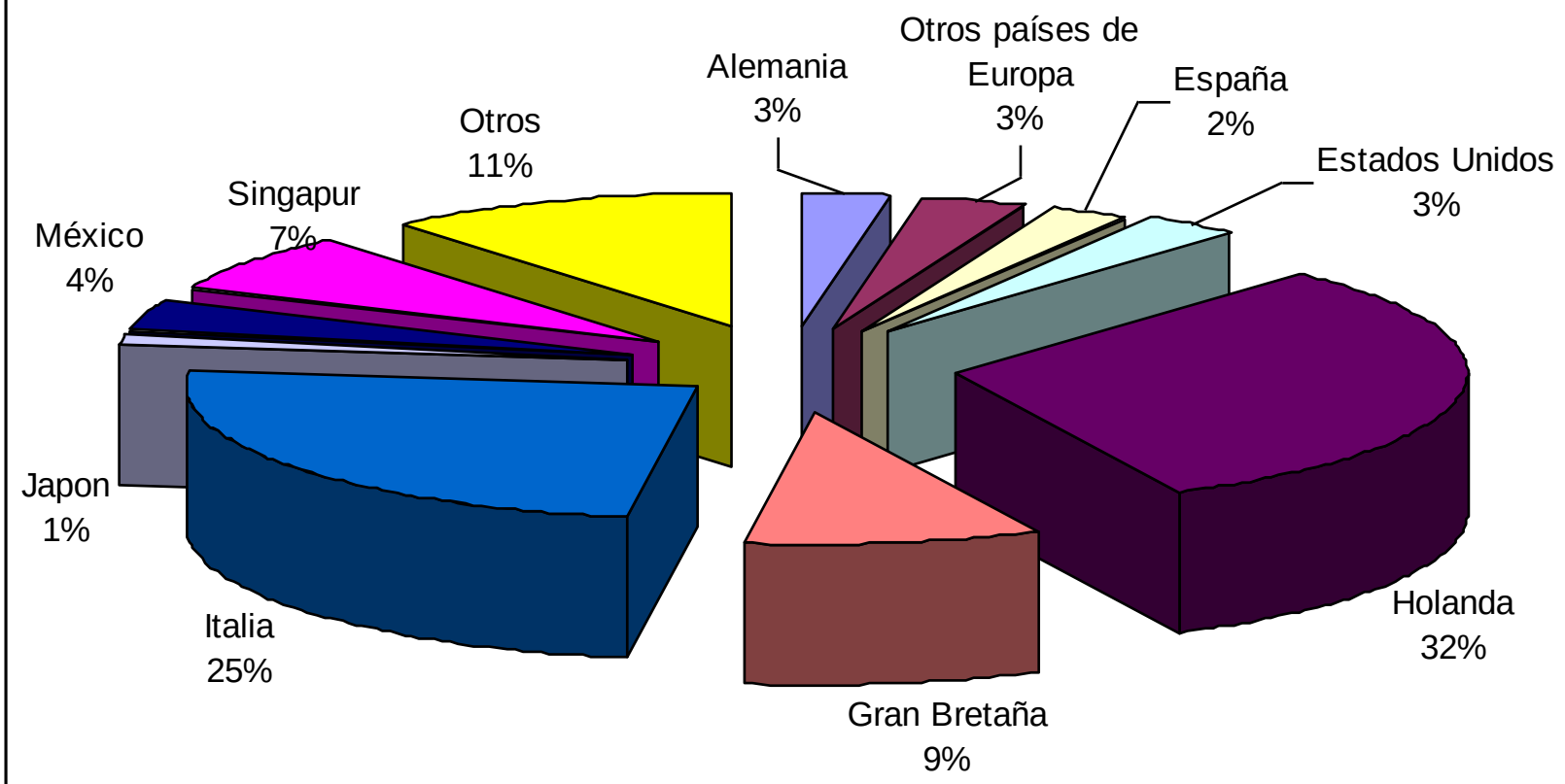
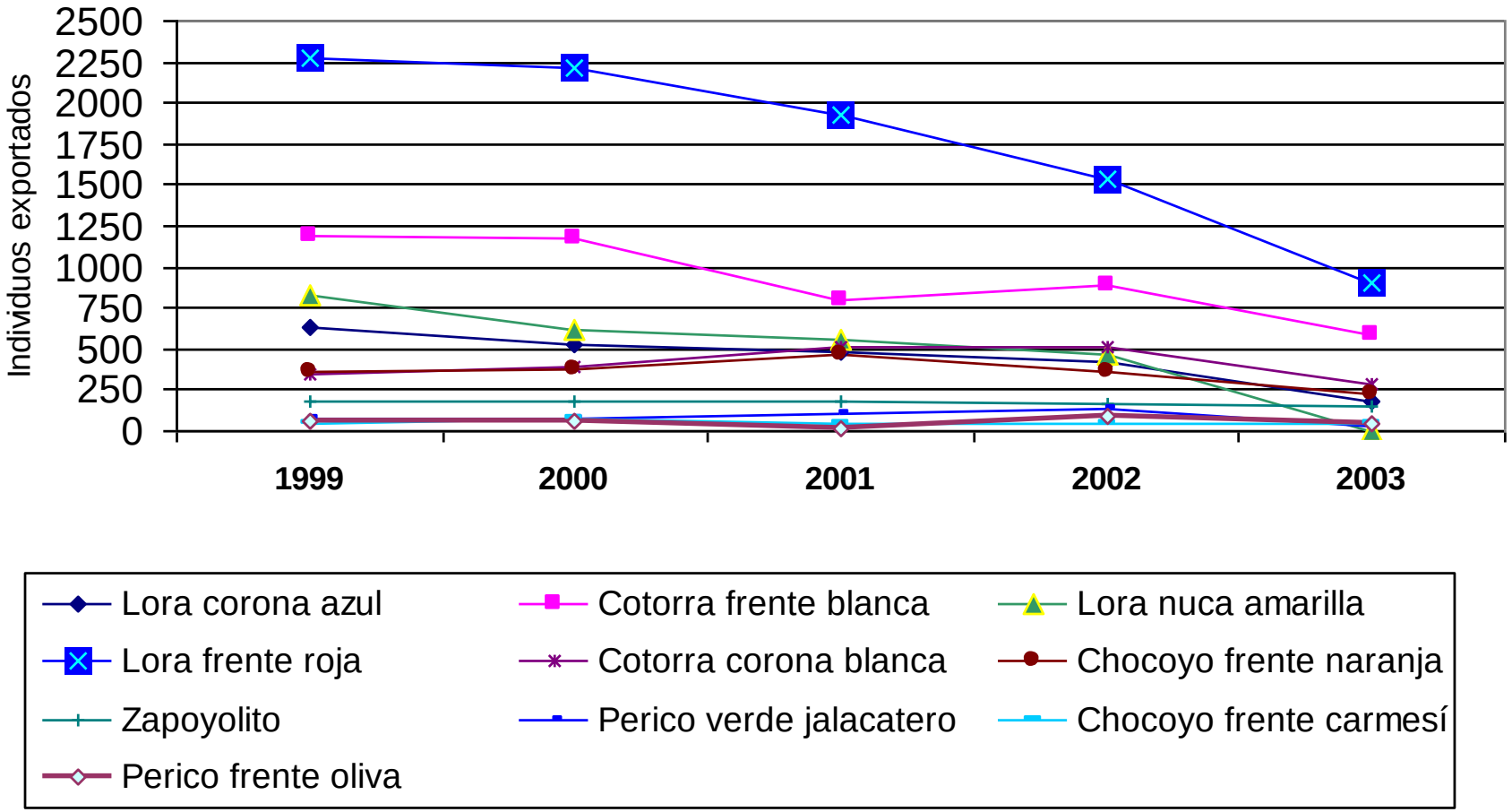


Gráfico 2.


Individuos exportados
2500
2250
2000
1750
1500
1250
1000
750
500
250
0
1999
2000
2001
2002
2003
Lora corona azul
Cotorra frente blanca
Lora nuca amarilla
Lora frente roja
Cotorra corona blanca
Chocoyo frente naranja
Zapoyolito
Perico verde jalacatero
Chocoyo frente carmesí
Perico frente oliva

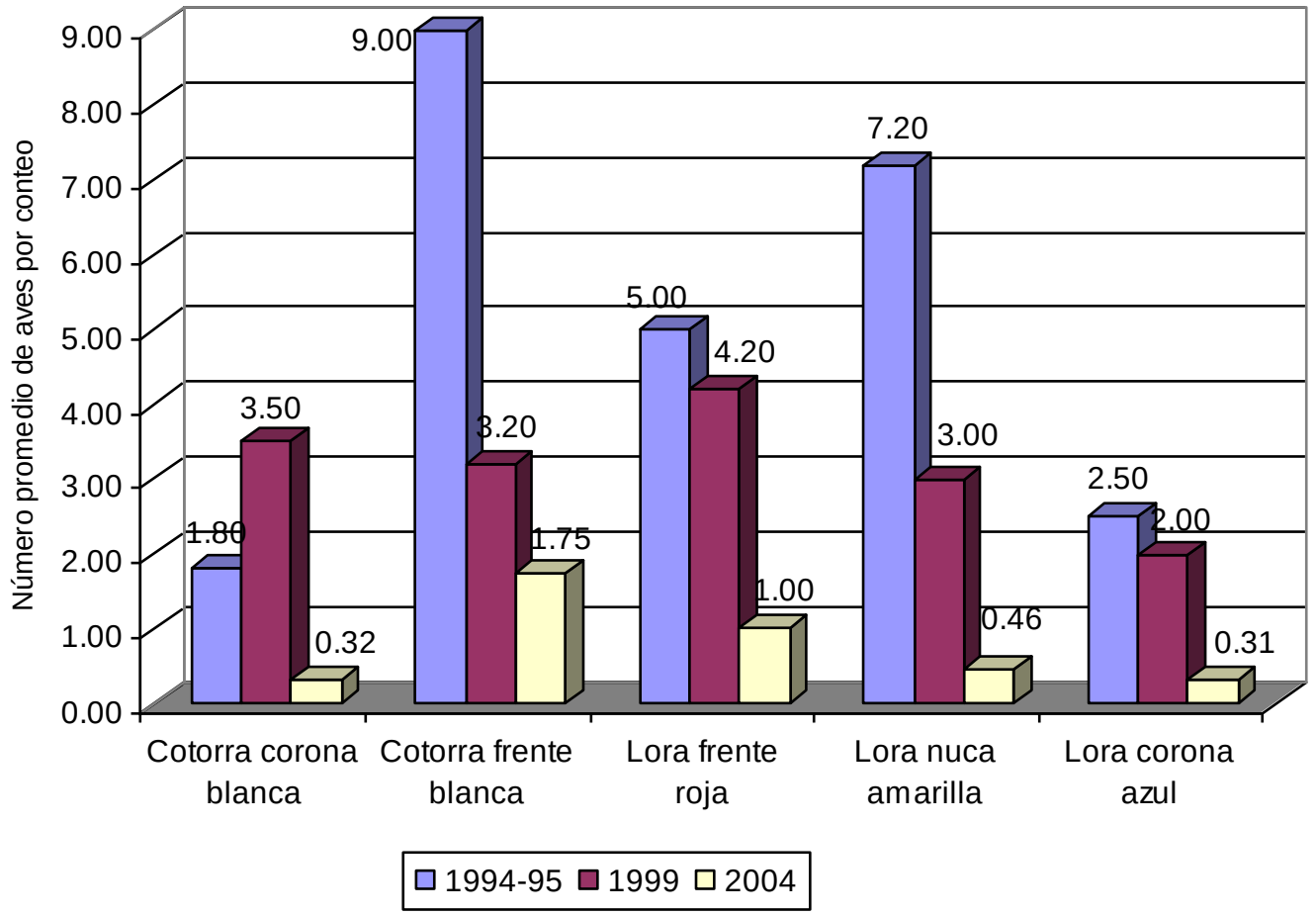
Cuadro No. 2 Exportaciones de especímenes vivos (unidades) periodo 1996 - 2006

Año	Mamí. W	C	Aves W	Reptiles W	C	Anfibios W	C	Arácnidos W	C	Insectos W
1996	19	0	8,449	33,536	61,267	4,102	36,023	6,338	0	0
1997	307	0	8,142	13,617	60,313	4,239	16,544	5,495	0	0
1998	117	2	6,997	11,944	63,460	3,649	10,338	3,931	25	0
1999	117	2	6,646	11,751	61,210	8,934	14,703	6,753	0	0
2000	**SIN DATOS**									
2001	0	19	5,932	3,876	84.594	1.83	20,558	6,673	0	0
2002	0	13	5,406	11,190	71,509	745	20,685	8,183	0	71
2003	3	20	3,310	13,785	62,058	100	22,664	4,170	0	0
2004	0	13	1,581	7,146	59,908	0	21,345	0	0	4
Sub tot. 1	**563**	**69**	**46,463**	**106,845**	**524,319**	**23,599**	**162,860**	**41,543**	**25**	**74**
Total W+C	**632**		**46,463**	**631,164**		**186,459**		**41568**		**75**
2005*	0	0	617	0	36,954	0	17,823	0	0	0
2006*	0	0	67	0	26,314	0	18,094	0	0	0
Sub tot. 2	**0**	**0**	**684**	**0**	**63,268**	0	**35,917**	**0**	**0**	**0**
Total C	**0**	**0**	**684**	**0**	**63,268**	**0**	**35,917**	**0**	**0**	**0**
Gran Total	**632**		**47,147**	**694,432**		**222,376**		**41,568**		**75**

W: Extraídos de naturaleza; C: Reproducida en cautiverio

*Fuente CITES-NI / * Datos en III informe Geo 2003-2006*

Figura 6C. Número promedio de aves por punto de conteo (cotorras y loras)

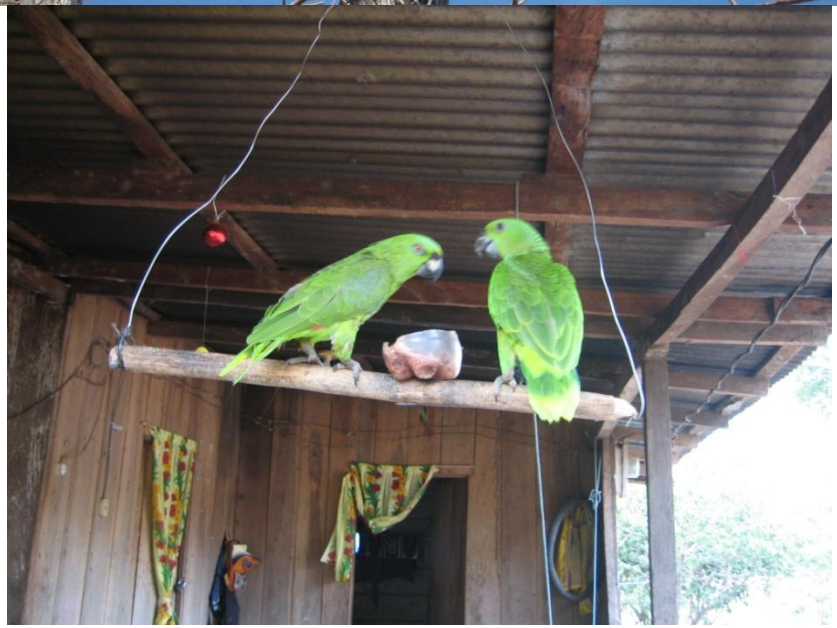


- En 1995 se estimó en 2.3 individuos/km^2 a nivel nacional
- En tanto en 1999 resultó de 1.1 individuos/km^2
- En el último inventario del 2004 fue de 0.45 individuos/km^2
- En 2008 localmente, en el Pacífico la especie aparece en poblaciones bajas. En el istmo de Rivas fue de 0.025 individuos/ha
- En el Caribe los estimados son más altos aunque como 0.45 individuos/km^2 aunque desde el 2004 no se hacen estudios específicos

- La cuota anual era otorgada a una asociación (privada) que se repartía de forma equitativa la cuota entre las mismas empresas habilitadas.

- La asignación anual era estimada en base a los monitoreos nacionales iniciados en 1994. Antes de ese año, la asignación era completamente arbitraria.

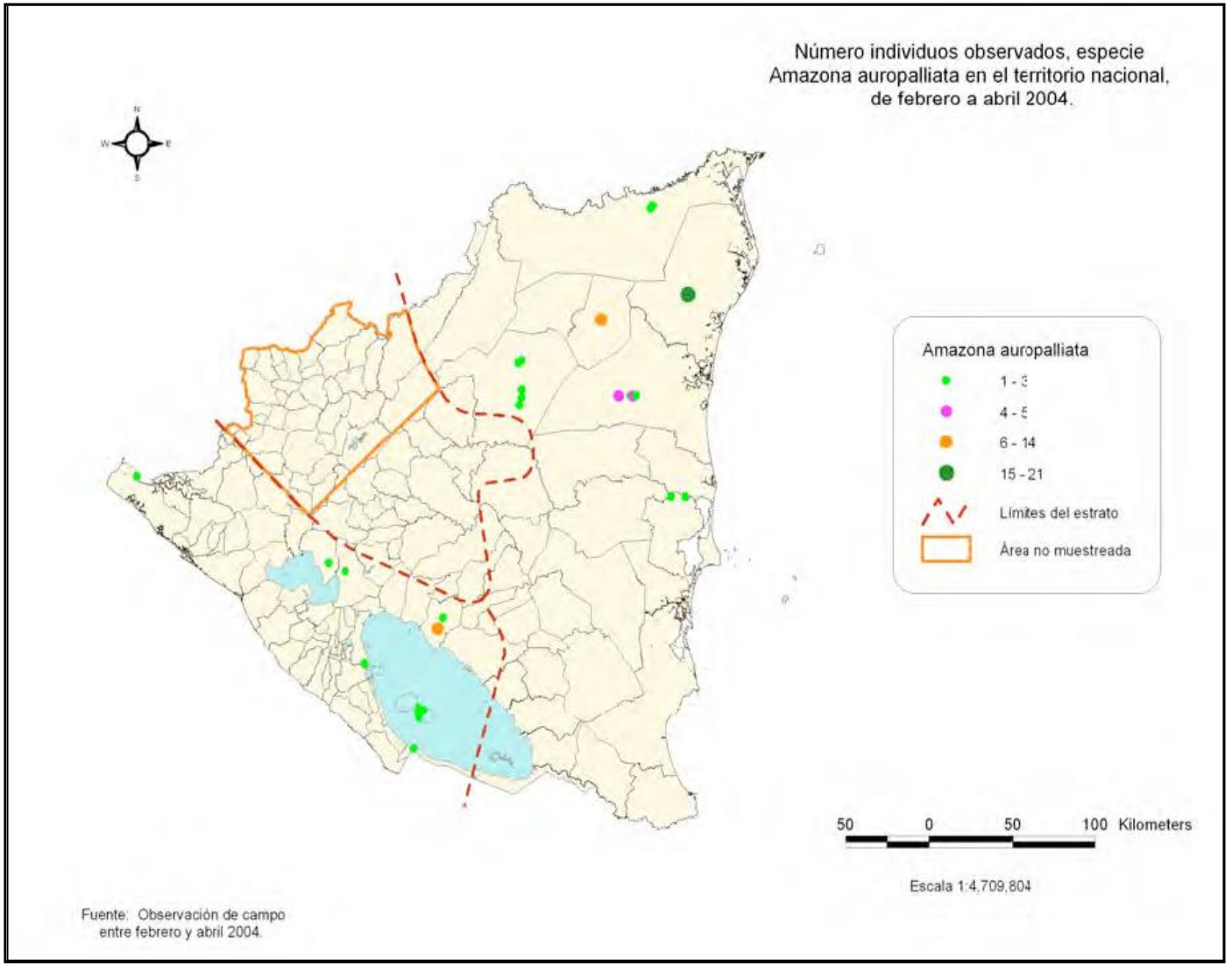
- La estimación consistía en tomar el 5% del límite inferior del estimador de abundancia obtenido mediante métodos de la distancia

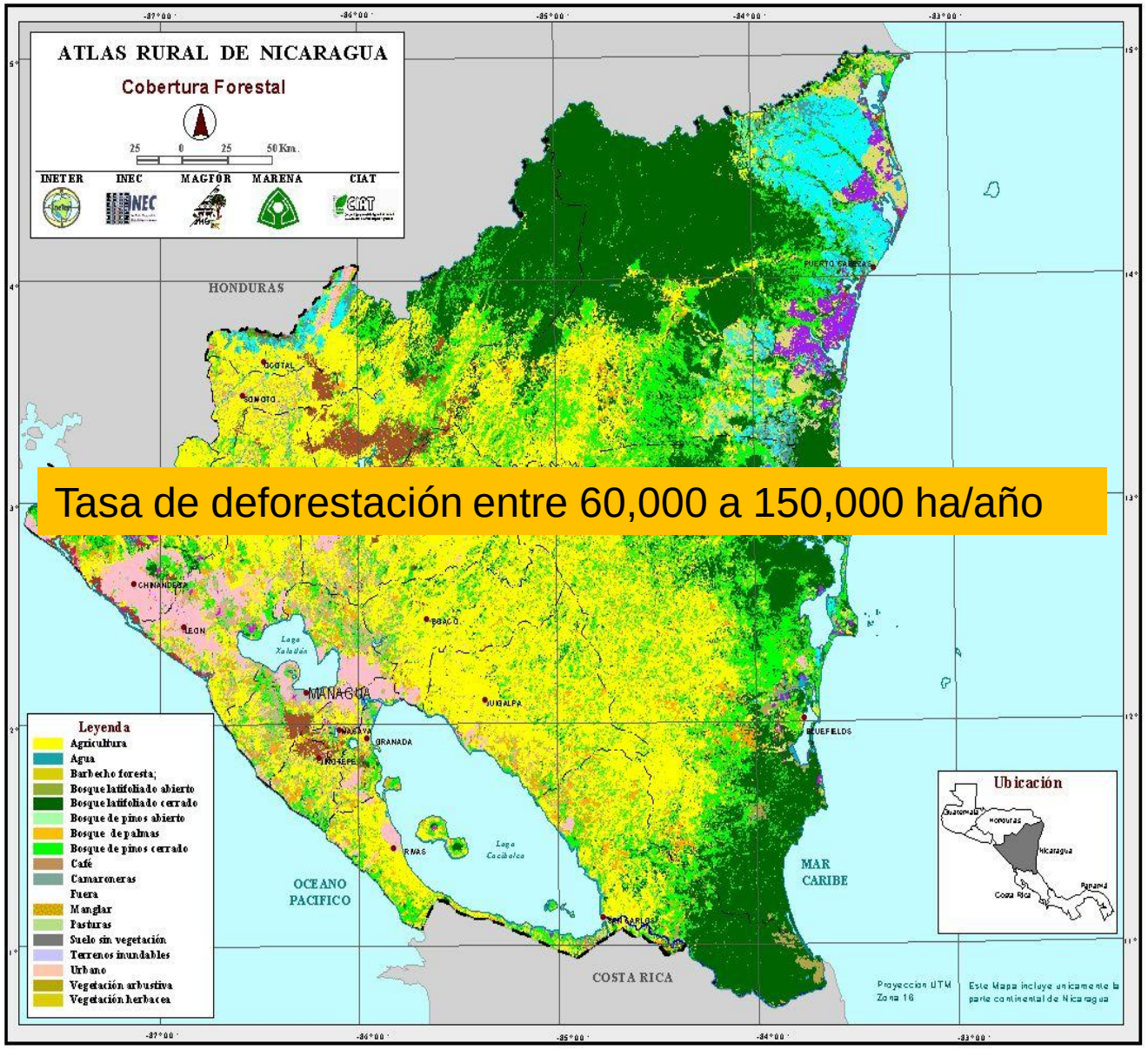


Programas de Recuperación de Poblaciones de Psitácidos (PRP).

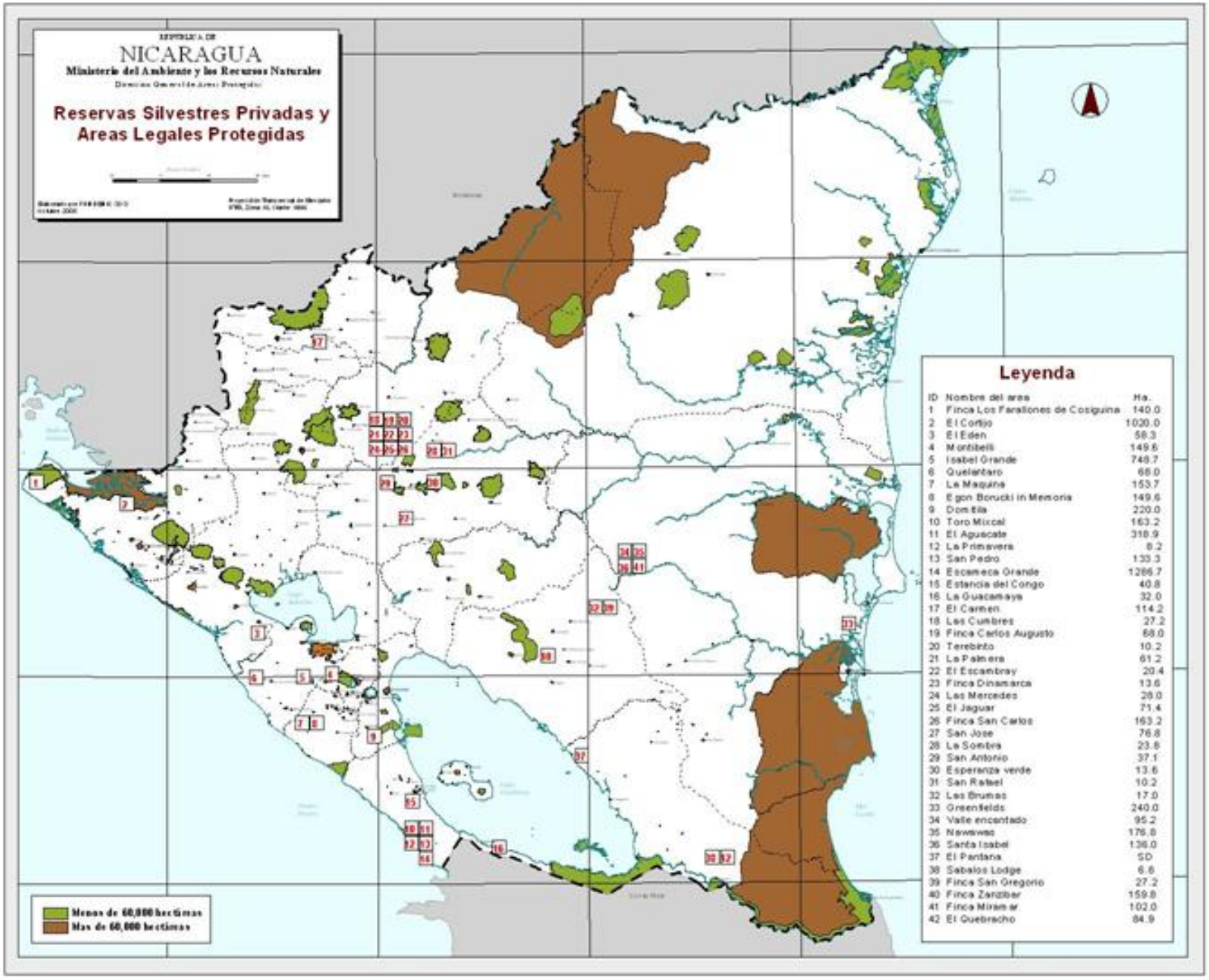
- Se define como áreas con abundante hábitat en términos de extensión, calidad y disponibilidad de alimento más sitios de anidamiento con áreas de conectividad entre grandes fragmentos que permitirán la recuperación de las poblaciones utilizando prácticas como rancheo y amplia participación de comunidades organizadas junto a manejo del hábitat.

- Las comunidades con potencial al PRP deberán completar un diagnóstico que permita verificar posteriormente una serie de indicadores ecológicos sobre el hábitat y las poblaciones de interés


Número individuos observados, especie
Amazona auropalliata en el territorio nacional,
de febrero a abril 2004.
Amazona auropalliata
1 - 3
4 - 5
6 - 14
15 - 21
Límites del estrato
Área no muestreada
50 0 50 100 Kilometers
Escala 1:4,709,804
Fuente: Observación de campo
entre febrero y abril 2004.



Tasa de deforestación entre 60,000 a 150,000 ha/año


REPUBLICA DE
NICARAGUA
Ministerio del Ambiente y los Recursos Naturales
Reservas Silvestres Privadas y Areas Legales Protegidas
Leyenda
ID Nombre del area Ha.
1 Finca Los Faralones de Cosiguina 140.0
2 El Cortijo 1020.0
3 El Eden 58.3
4 Montibelli 149.6
5 Isabel Grande 749.7
6 Quelantaro 66.0
7 La Maquina 153.7
8 Egon Borucki in Memoria 149.6
9 Domitila 220.0
10 Toro Mixcal 163.2
11 El Aguacate 316.9
12 La Primavera 8.2
13 San Pedro 133.3
14 Escameca Grande 1286.7
15 Estancia del Congo 40.8
16 La Guacamaya 32.0
17 El Carmen 114.2
18 Las Cumbres 27.2
19 Finca Carlos Augusto 68.0
20 Terebinto 10.2
21 La Palmera 61.2
22 El Escambray 20.4
23 Finca Dinamarca 13.6
24 Las Mercedes 28.0
25 El Jaguar 71.4
26 Finca San Carlos 163.2
27 San Jose 76.8
28 La Sombra 23.8
29 San Antonio 37.1
30 Esperanza verde 13.6
31 San Rafael 10.2
32 Las Brumas 17.0
33 Greenfields 240.0
34 Valle encantado 95.2
35 Nawawas 176.8
36 Santa Isabel 136.0
37 El Pantano SD
38 Sabalos Lodge 6.8
39 Finca San Gregorio 27.2
40 Finca Zanzibar 159.8
41 Finca Miramar 102.0
42 El Guebracho 84.9
Menos de 60,000 hectareas
Mas de 60,000 hectareas

Areas Protegidas	Comunidades	Extension de áreas protegidas (has)
Cerro Silva	Rama/Garífona / Creole	339,400
BOSAWAS	Sumo-Mayagna / Miskito	774,190
Wawashan	Miskito / Creole / Mestizos / Garífonas	231,500
Cayos Miskitos	Miskitos	412,500
Río Indio Maiz	Ramas / Creoles / Mestizos	263,980
Punta Gorda	Ramas / Creoles / Mestizos	54,900
Makantaka, Yulu, Kligna Alamikamba, Limbaica, Karawala	Miskito / Mayagna / Miskito	9,100
	Total	**2,085,570.00**

Fuente: OIT/ETEDPI, 2005; CBA, 2005

Las comunidades indígenas principalmente Miskitos, Mayangnas y Ramas, están asociados para la conservación de aproximadamente 2 055 570 has de las áreas protegidas de la región Caribe. El 80,6% del SINAP están en territorios indígenas por lo que su papel en la conservación y uso de vida silvestre es clave.

Los interesados en establecer PRP deberán completar un diagnóstico que permita verificar posteriormente una serie de indicadores ecológicos sobre el hábitat y las poblaciones de interés

Población

❑estimación más exacta de la abundancia,

❑población reproductora (parejas maduras sexualmente)

❑nidos disponibles vrs. nidos activos y vrs. nidos realizados (eclosión de huevos y presencia de pichones).

Otros parámetros de la población

❑ distribución de sexo y edad, dispersión

❑ dinámicos como sobrevivencia-mortalidad, reclutamiento anual, natalidad, tasa de crecimiento (r) y principales de factores de mortalidad natural

Hábitat

❑ disponibilidad de árboles-nido

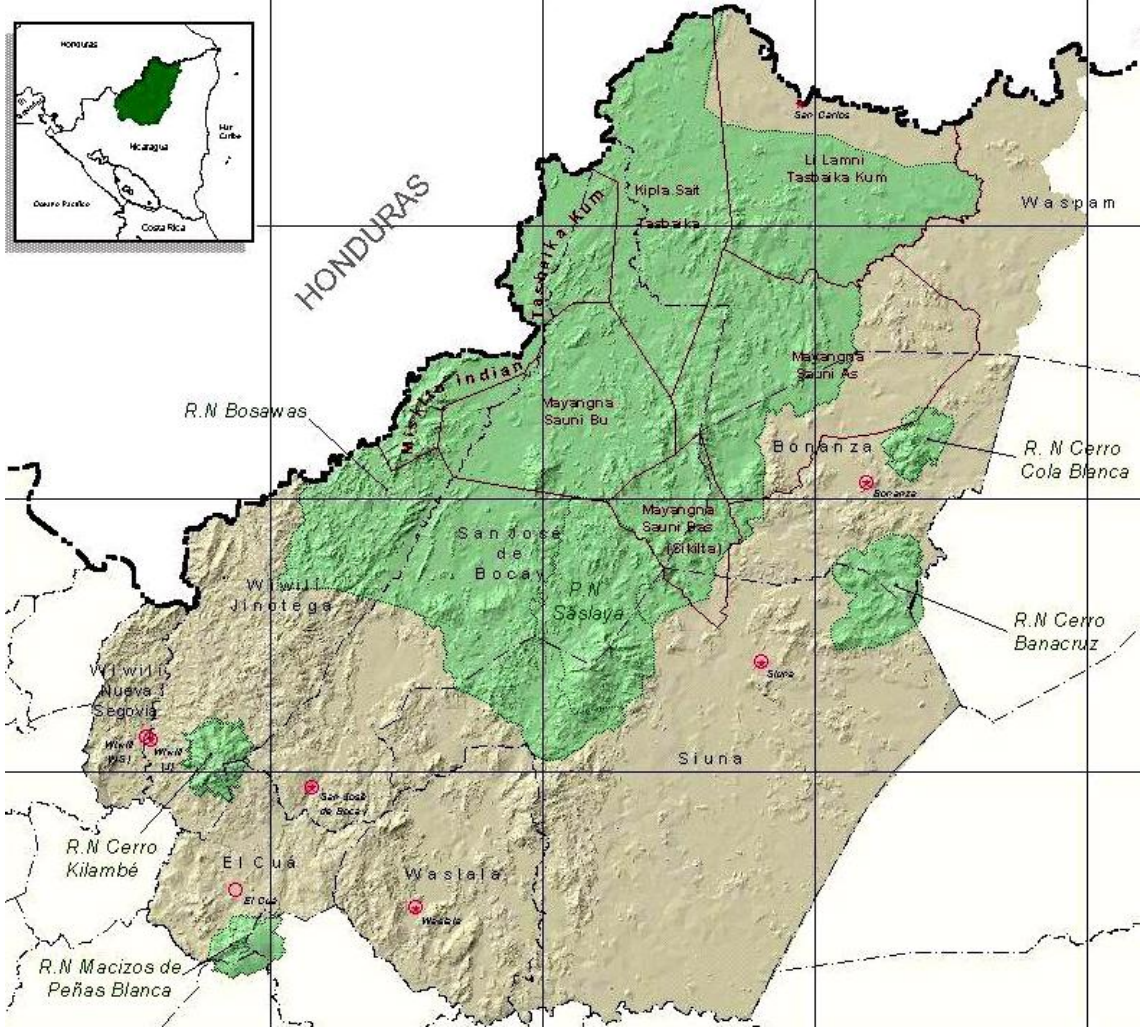
❑especie de árbol altura del nido estado; activos, abandonados o destruidos.

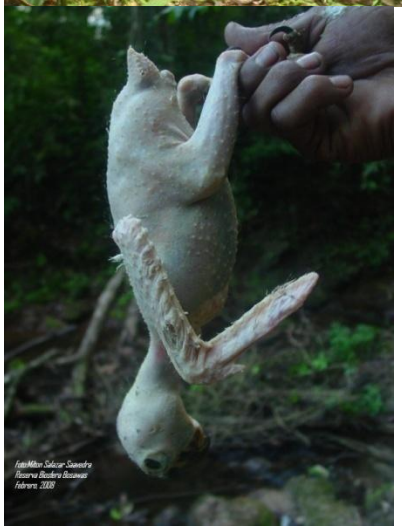
❑ Fragmentación Conectividad (áreas protegidas)

Evaluación del hábitat por qué?

- En cuanto al hábitat se deberá considerar variables estructurales, fragmentación, abundancia y distribución de la flora reconocida como fuentes alimenticias, potencial para nidificación y árboles nidos (cuantos podrían haber y cuántos hay en realidad).

- Fragmentación, es clave por amplios territorios usados por *Amazonas*. Dieta variada y necesaria para asegurar sus requerimientos pre y reproductivos.


Honduras
Nicaragua
Mar Caribe
Océano Pacífico
Costa Rica
HONDURAS
San Carlos
Li Lamni Tasbaika Kum
Kipla Sait Tasbaika
Waspam
Tasbaika Kum
Mayangna Sauni As
Mayangna Sauni Bu
R.N Bosawas
Bonanza
R. N Cerro Cola Blanca
Mayangna Sauni Bas (El Kilta)
San José de Bocay
P.N Saslaya
Wiwilí Jinotega
R.N Cerro Banacruz
Siuna
Wiwilí Nueva Segovia
Siuna
R.N Cerro Kilambé
El Cuá
Waslala
R.N Macizos de Peñas Blanca



© SLZ

Ejecución PRP

Ejecución de corto plazo.

Inmediato, una vez hechas las evaluaciones con resultados favorables

Ejecución de mediano plazo, 5 años)

No se procede y se brinda un plazo. Aplican técnicas de manejo como nidos artificiales, registro y organización de colectores, marcaje de pollos, planteles de cría que permitan en el plazo indicado el incremento de la población en por lo menos un 10 a 20% de parejas anidantes, la sobrevivencia y reclutamiento anual

Ejecución de largo plazo (15 años).

Se trata de áreas en el que las condiciones de las poblaciones, hábitat y los arreglos institucionales con las comunidades demuestran poca viabilidad de recuperación y aprovechamiento sostenible de forma que amerita tomar más tiempo en el manejo del PRP antes de decidir por alguna forma de aprovechamiento. Estos PRP deberán contar con seguimiento muy estricto de las autoridades.

Procesos de Supervisión
Evaluación
Uso de esquema de MRS

Una invitación

Red Mesoamericana de Conservación de Psittacidos

www.sociedadmesoamericana.org/git/psittacidos/psittacidos.html

NDF WORKSHOP CASE STUDIES
WG 6 – Birds
CASE STUDY 3
Platycercus eximius
Country – **NEW ZELAND**
Original language – English

EASTERN ROSELLA *PLATYCERCUS EXIMIUS*, EXPORTS FROM NEW ZEALAND, CASE STUDY

AUTHOR:
Rod Hay
New Zealand CITES Scientific Authority

I. Background information on the taxa

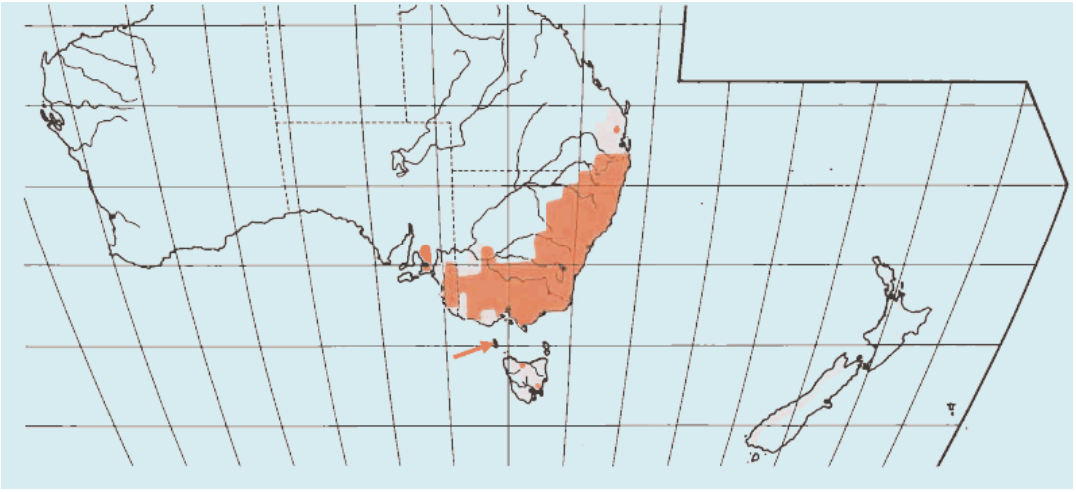
1. BIOLOGICAL DATA

1.1. Scientific and common names:

Platycercus eximius
Eastern Rosella; Common, Red, Red-headed, Golden-mantled, Rose Hill or White-cheeked Rosella; Nonpareil or Rosella Parrot; Golden-mantled, Rosehill or Rosella Parrot; Joey; Pretty Joey

1.2 Distribution

From Higgins (Ed.) 1999.



South-eastern Australia from southern Queensland south to Tasmania, including Bass Strait islands, and west to eastern South Australia.

Introduced to New Zealand through cage-escapes. Very common in the northern North Island, south to the Waikato and Bay of Plenty and also in the Wairarapa and Wellington in the southern North Island. Otherwise scattered throughout the rest of the island. In the South Island, mostly in Otago around Dunedin, with scattered records more widely in the south and east of the island (Robertson *et.al*. 2007).

1.3 Biological characteristics

1.3.1 *General biology and life history:*
A gregarious species, seen in pairs or flocks up to 50, though sometimes also occurring singly.

1.3.2 *Habitat types:*
In Australia, open woodland and grassland and often in suburban areas. Similar habitat in New Zealand, though also found within forest.

1.3.3 *Role of the species in its ecosystem*
Feeds on seeds of grasses, shrubs and trees, and also fruits, buds flowers, nectar and insects and their larvae

1.4 Population

1.4.1 *Global population size*
Not assessed but with a population range of up to 1,000,000 km^2, and a high density over much of that range, considered to be abundant

1.4.2 *Current global population trends:*
Increasing in both the natural and feral range.
_X__increasing ____decreasing ____ stable ____unknown

1.5 Conservation status

1.5.1 *Global conservation status:*

___Critically endangered	___Near Threatened
___Endangered	_X_Least concern
___Vulnerable	___Data deficient

1.5.2 *National conservation status for the case study country*
Not threatened, increasing in range and population and classed as a pest in some areas.

1.5.3 *Main threats within case study country*
_X_No Threats
___Habitat Loss/Degradation (human induced)
___Invasive alien species (directly affecting the species)
___Harvesting [hunting/gathering]
___Accidental mortality (e.g. Bycatch)
___Persecution (e.g. Pest control)
___Pollution (affecting habitat and/or species)
___Other_____
___Unknown

2. SPECIES MANAGEMENT WITHIN THE COUNTRY FOR WHICH CASE STUDY IS BEING PRESENTED

2.1 Management measures

2.1.1 *Management history*
As an introduced species, with the potential to have damaging effects on agricultural production or on native species they are, in a number of regions of the country, included in statutory Pest Management Strategies. There is significant concern about competitive influence on New Zealand *Cyranorhamphus* parakeets and other native birds, particularly hole-nesting species.

2.1.2 *Purpose of the management plan in place*
Regional pest management strategies in New Zealand are established under the Biosecurity Act 1996 to monitor populations of the species and, where necessary, to regulate or control them in order ensure they do not reach serious pest status.

2.1.3 *General elements of the management plan*
Environment Waikato, the regional authority for that part of the country, has declared Rosellas as "Nuisance Animal Pests", which do not justify region-wide control programmes but for which individual land-holders are encouraged to maintain control along with the Authority in key sites. In the Bay of Plenty Region, amidst concerns about damage to orchards, the species is classified as a "surveillance pest".

2.1.4 *Restoration or alleviation measures*
No restoration or alleviation measures are in place in NZ.

2.2 Monitoring system

2.2.1 *Methods used to monitor harvest*
The only monitoring carried out in New Zealand is in the context of the pest or potential pest programmes referred to above.

2.2.2 *Confidence in the use of monitoring*
While the populations are classified as non-protected, the requirement for robust monitoring programmes is determined according to the species' pest status. While there is a potential for cockatoos to become significant pests in parts of NZ, they have not yet done so to any great degree. The low level surveillance activities that are undertaken are therefore appropriate.

2.3 Legal framework and law enforcement

Rosellas are not protected in New Zealand. They are listed in the 5th Schedule of the Wildlife Act 1953 as "Wildlife not Protected". The Biosecurity Act 1993 enables Pest Management Strategies (PMSs) to be developed for each of the important pests. These PMSs are to be developed at the regional level (RPMSs) or at the national level (NPMSs).

Under the Trade in Endangered Species Act 1989, which implements CITES in New Zealand, a permit is required for each consignment exported from the country.

3. UTILIZATION AND TRADE FOR STATE

3.1 Type of use and destinations

Commercial use of this species in NZ is almost exclusively for the pet trade. A proportion is traded domestically and the rest (probably more than half) are exported.

3.2 Harvest

3.2.1 *Harvesting regime*
Forty per cent of exported Rosellas were bred in captivity, the remainder being captured in the wild, either as adults, juveniles or, less frequently, nestlings.

3.2.2 *Harvest management/control*

Given the unprotected and potential pest status of this species in NZ, there is little regulation of harvest, except where it is undertaken on public conservation land (government managed reserves), in which case the operator requires a concession and permit.

3.3 Legal and illegal trade levels

Of the 2900 live Eastern Rosellas exported from New Zealand between 1981 and 2006, most went to the USA and Japan, with significant numbers also being sent to Mexico and Malta. To place this in context, the total trade in this species between all Parties over the same period was over 100,000 individuals. The majority of this trade comprises captive-bred birds exported from European countries.

TRADE FROM OTHER RANGE STATES

Australia is the only native range-state for the species. While a very small number of birds was exported from that country over the last 25 years, most were scientific specimens or for zoos.

II. NON-DETRIMENT FINDING PROCEDURE (NDFS)

1. IS THE METHODOLOGY BASED ON THE IUCN CHECKLIST FOR NDFs?

No it is not. Given that the species is introduced into New Zealand (and is in some regions regarded as a pest), trade in wild-caught and captive-bred birds is regarded as non-detrimental to the populations of the species in the range state (Australia).

2. CRITERIA, PARAMETERS AND/OR INDICATORS USED.

In order to minimise the chances of parrots being smuggled from Australia or elsewhere, and being declared as captive-bred or wild-caught in New Zealand, each export application for parrots is assessed by both the Scientific and Management Authorities of NZ.

3. MAIN SOURCES OF DATA, INCLUDING FIELD EVALUATION OR SAMPLING METHODOLOGIES AND ANALYSIS USED.

Each export application must be accompanied by a declaration on the part of the breeder or supplier to the exporter. In the case of captive-bred birds, the identity and location of the parents must be provided in the event that the DNA tests are requested. If, on the advice of the Scientific Authority, the Management Authority requires validation by way of a DNA test, the applicant bears reasonable costs.

In the case of wild-caught birds, the applicant must provide detailed location information so that the capture site may be verified. In both cases, the information is provided as a legal statutory declaration, witnessed by a Justice of the Peace.

4. EVALUATION OF DATA QUANTITY AND QUALITY FOR THE ASSESSMENT

In practice, given the relative ease of breeding this species in captivity or capturing it in the wild, DNA tests and field inspections are not undertaken, though breeding facilities may be inspected to ensure that their productivity figures are realistic. In the case of less abundant and higher value species, including Appendix I parrots, DNA tests are more frequently required.

5. MAIN PROBLEMS, CHALLENGES OR DIFFICULTIES FOUND ON THE ELABORATION OF THE NDF

The process for elaborating the NDF for species such as this is cost-effective and is designed to practically negate the chances of any impact on the populations within the range states. Indeed, the availability of captive or feral populations suitable for trade can reduce the chances of illegal trade from the range countries.

6. RECOMMENDATIONS

The definition of Range State needs clarification where a species is being traded from a population that is well outside its natural range.

REFERENCES

HIGGINS, P.J. (Ed.) 1999. *Handbook of Australian, New Zealand and Antarctic Birds. Volume 4. Parrots to Dollarbird*. Oxford University Press. Melbourne.

ROBERTSON, C.J.R., P. Hyvonen, M.J. Fraser and C.R. Pickard. 2007. *Atlas of Bird Dsitribution in New Zealand 1999-2004*. The Ornithological Society of New Zealand Inc. Wellington.

NDF WORKSHOP CASE STUDIES
WG 6 – Fishes
CASE STUDY 3
Cacatua galerita
Country – **NEW ZELAND**
Original language – English

SULPHUR-CRESTED COCKATOO *CACATUA GALERITA*, EXPORTS FROM NEW ZEALAND, CASE STUDY

AUTHOR:
Rod Hay
New Zealand CITES Scientific Authority

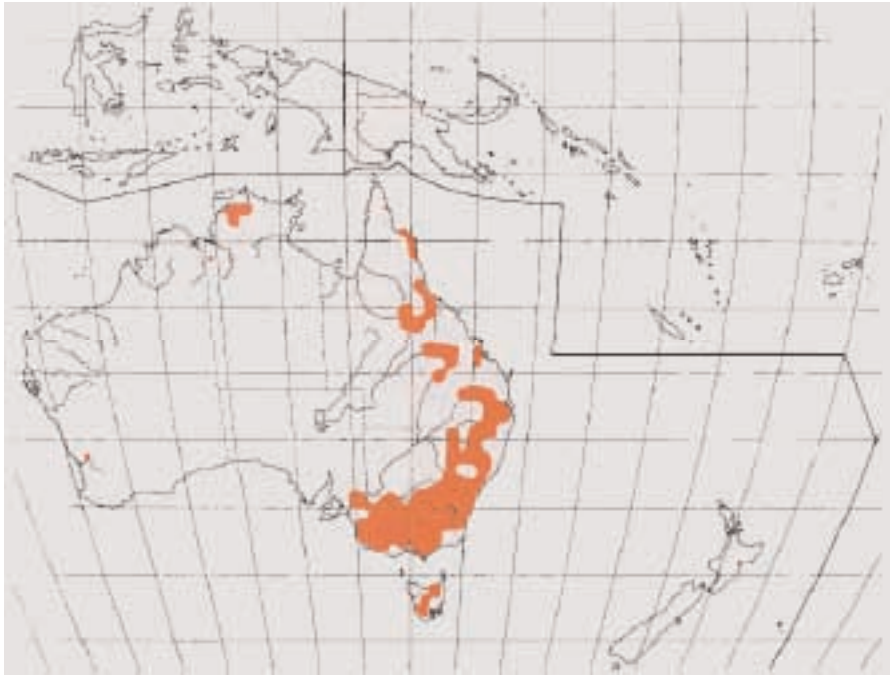
I. Background information on the taxa

1. BIOLOGICAL DATA

1.1 Scientific and common names

Cacatua galerita

Sulphur-crested Cockatoo, White Cockatoo, Greater Sulphur-crested Cockatoo



1.2 Distribution

From Higgins (Ed.) 1999.

Widespread in north, east and south-eastern Australia (including Tasmania) with feral populations in south-western Australia. Also across most of New Guinea and nearby island groups (West Papuan islands, islands in Geelvink Bay, Kai Is., Aru Is., D'Entrecastaux and Louiasiade Archipelagos, Trobriand Is. and Woodlark Is.).

Introduced to New Zealand as a result of cage escapes but there is also evidence of genuine vagrants arriving from Australia. Scattered established populations are found in the North Island in the Auckland region, Waikato, Bay of Plenty, Hawkes Bay, Wellington and particularly in the Wanganui district, but birds are occasionally observed throughout. In the South Island there is an established population around Banks Peninsula and occasional records in the Nelson, West Coast and Otago regions (Robertson et.al. 2007).

Also introduced into Singapore.

1.3 Biological characteristics

1.3.1 *General biology and life history*

This is a gregarious and highly visible species, often seen in pairs, small groups, or flocks of up to hundreds of birds in its Australian range, though flocks are generally much smaller in NZ.

1.3.2 *Habitat types*

In Australia, the species generally occurs in wooded areas, including tropical and temperate rainforests, wet and dry woodlands, and shrublands. They also inhabit plantations of *Araucaria* and *Pinus*. In New Zealand they are found in a range of forest types from rainforest to remnant woodlands and pasture.

1.3.3 *Role of the species in its ecosystem*

Feed mainly on seeds of grasses and herbs, including cereal and oilseeds, but also fruits, flowers, bulbous roots and insect larvae. Consume significant quantities of crops such as cereals in some areas.

1.4 Population

1.4.1 *Global population size*

The population has not been formally estimated but, because it inhabits a range between 1,000,000 and 10,000,000 km^2, and is in much of that range abundant, the population is regarded as substantial.

1.4.2 *Current global population trends*
Probably increasing, as some contractions in range in parts of Australia have been offset by substantial increases in other areas, including in New Zealand
_X_increasing ____decreasing ____stable ____unknown

1.5 Conservation status

1.5.1 *Global conservation status*

___Critically endangered	___Near Threatened
___Endangered	_X_Least concern
___Vulnerable	___Data deficient

1.5.2 *National conservation status for the case study country*
Legally protected, but not of conservation concern

1.5.3 *Main threats within case study country*
___No Threats
___Habitat Loss/Degradation (human induced)
___Invasive alien species (directly affecting the species)
___Harvesting [hunting/gathering]
___Accidental mortality (e.g. Bycatch)
_X_Persecution (e.g. Pest control)
___Pollution (affecting habitat and/or species)
___Other_____
___Unknown

Natural factors such as periodic drought may cause substantial fluctuations in population in the range states, but the most significant threat in NZ is its pest status in some regions of the country.

2. SPECIES MANAGEMENT WITHIN THE COUNTRY FOR WHICH CASE STUDY IS BEING PRESENTED

2.1 Management measures

2.1.1 *Management history*
As an introduced species, with the potential to have damaging effects on agricultural production or on native species they are, in a number of regions of the country, included in statutory Pest Management Strategies.

2.1.2 *Purpose of the management plan in place*
Regional pest management strategies in New Zealand are established under the Biosecurity Act 1996 to monitor populations of the species and, where necessary, to regulate or control them in order ensure they do not reach serious pest status.

2.1.3 *General elements of the management plan*
In Auckland, for example, they may be controlled as part of integrated site-led pest management programmes. In Manawatu, which covers probably the largest population of the species, it is identified in the Horizons (the Regional Council) Pest Management Strategy as a 'non-statutory problem animal'. This means that it is an undesirable animal, but has not met all the criteria for inclusion as an animal pest. Where values in High Value Conservation Areas (HVCA) are at risk and in other exceptional circumstances these animals may also be controlled by Horizons. HVCA's are important areas of native bush and wildlife habitat in the Region. In the Wellington Strategy, they are listed as a "key native ecosystem pest". In Canterbury they are on a list of "potential pests", for which there is a surveillance project run jointly by the Environment Canterbury (the Regional Council) and the Department of Conservation (government conservation agency).

2.1.4 *Restoration or alleviation measures*
No restoration or alleviation measures are in place in NZ.

2.2 Monitoring system

2.2.1 *Methods used to monitor harvest*
The only monitoring carried out in New Zealand is in the context of the pest or potential pest programmes referred to above.

2.2.2 *Confidence in the use of monitoring*
While the populations are classified as non-protected, the requirement for robust monitoring programmes is determined according to the species' pest status. While there is a potential for cockatoos to become significant pests in parts of NZ, they have not yet done so to any great degree. The low level surveillance activities that are undertaken are therefore appropriate.

2.3 Legal framework and law enforcement
Sulphur–crested cockatoos are not protected in New Zealand. They are listed in the 5th Schedule of the Wildlife Act 1953 as "Wildlife not Protected". The Biosecurity Act 1993 enables Pest Management

Strategies (PMSs) to be developed for each of the important pests. These PMSs are to be developed at the regional level (RPMSs) or at the national level (NPMSs).

Under the Trade in Endangered Species Act 1989, which implements CITES in New Zealand, a permit is required for each consignment exported from the country.

3. UTILIZATION AND TRADE FOR STATE

3.1 Type of use and destinations

Commercial use of this species in NZ is exclusively for the pet trade. A proportion is traded domestically and the rest (probably more than half) are exported. Over the period from 1989 until 2006 a number of countries have imported birds from NZ, with the greatest numbers going to Europe, Japan and the United States of America in that order.

3.2 Harvest

3.2.1 *Harvesting regime*

Of the 1733 live birds reported as imported from NZ between 1989 and 2006 for which the source is recorded, 36% were bred in captivity and 64% captured in the wild, mostly as nestlings. Because hand-reared birds attract the best prices, nestlings are generally harvested by traders.

3.2.2 *Harvest management/control*

Given the unprotected and potential pest status of this species in NZ, there is little regulation of harvest, except where it is undertaken on public conservation land (government managed reserves), in which case the operator requires a concession and permit.

3.3 Legal and illegal trade levels

UNEP-WCMC trade statistics record a total of 1923 imports of birds from NZ in the period 1981 to 2006. Over the same period, New Zealand reported the export of a total of 2971 birds. This is believed to be a relatively accurate figure. As indicated above, 60% of exports are to Europe, with 16% going to Japan, around 10% to the US, and the remainder mainly to Mexico, South Africa and countries in Asia.

3.4 Exports from other range states

The CITES trade database records significant exports of this species from the three states, Australia, Papua New Guinea and Indonesia, that make up the natural range of this species.

The past 25 years have seen some 850 recorded exports from Papua New Guinea, almost all of which were of feathers from wild caught birds. There is no information on the impacts of this trade on the wild population, including whether the sources of the feathers were returned to the wild but, given the size and extent of the species in Papua New Guinea, and the fact that only a small number of birds are recorded as original exports, the trade wild birds is not seen as significant.

The largest volume of exports from a range state is from Indonesia, with over 15,500, mostly live birds, over the same period. By a very large majority, these are sourced from captive populations.

From Australia, which constitutes most of the range of the species, some 1300 exports are recorded over the same period, the majority of which were scientific specimens. The remainder were mainly captive bred and for personal use.

II. Non-detriment finding procedure (NDFs)

1. IS THE METHODOLOGY BASED ON THE IUCN CHECKLIST FOR NDFs?

No it is not. Given that the species is introduced into New Zealand (and is in some regions regarded as a pest), trade in wild-caught and captive-bred birds is regarded as non-detrimental to the populations of the species in the range states (Australia, Papua New Guinea and Indonesia).

2. CRITERIA, PARAMETERS AND/OR INDICATORS USED

In order to minimise the chances of parrots being smuggled from Australia or elsewhere, and being declared as captive-bred or wild-caught in New Zealand, each export application for parrots is assessed by both the Scientific and Management Authorities of NZ.

3. MAIN SOURCES OF DATA, INCLUDING FIELD EVALUATION OR SAMPLING METHODOLOGIES AND ANALYSIS USED

Each export application must be accompanied by a declaration on the part of the breeder or supplier to the exporter. In the case of captive-bred birds, the identity and location of the parents must be provided in the event that the DNA tests are requested. If, on the advice of the Scientific Authority, the Management Authority requires validation by way of a DNA test, the applicant bears reasonable costs.

In the case of wild-caught birds, the applicant must provide detailed location information so that the capture site may be verified. In both cases, the information is provided as a legal statutory declaration, witnessed by a Justice of the Peace.

4. EVALUATION OF DATA QUANTITY AND QUALITY FOR THE ASSESSMENT

In practice, given the relative ease of breeding this species in captivity or capturing it in the wild, DNA tests and field inspections are not normally undertaken, though breeding facilities may be inspected to ensure that their productivity figures are realistic. In the case of less abundant and higher value species, including Appendix I parrots, DNA tests are more frequently required.

5. MAIN PROBLEMS, CHALLENGES OR DIFFICULTIES FOUND ON THE ELABORATION OF THE NDF

The process for elaborating the NDF for species such as this is cost-effective and is designed to practically negate the chances of any impact on the populations within the range states. Indeed, the availability of captive or feral populations suitable for trade can reduce the chances of illegal trade from the range countries.

6. RECOMMENDATIONS

The definition of Range State needs clarification where a species is being traded from a population that is well outside its natural range.

REFERENCES

HIGGINS, P.J. (Ed.) 1999. *Handbook of Australian, New Zealand and Antarctic Birds. Volume 4. Parrots to Dollarbird.* Oxford University Press. Melbourne.

ROBERTSON, C.J.R., P. Hyvonen, M.J. Fraser and C.R. Pickard. 2007. *Atlas of Bird Dsitribution in New Zealand 1999-2004.* The Ornithological Society of New Zealand Inc. Wellington.

SULPHUR-CRESTED COCKATOO *CACATUA GALERITA*, EXPORTS FROM NEW ZEALAND, CASE STUDY

AUTHOR:
Rod Hay

The sulphur-crested cockatoo is indigenous to Australia, Papua New Guinea and the West Papua Province of Indonesia. It is widespread and abundant in many areas across its range. It has been introduced into New Zealand and has established in a number of areas of the country where these feral populations are generally managed as pests.

The species is relatively common in trade, with around 40,000 exports (as pets) recorded in the CITES Trade Database in the last 25 years. The large majority of birds traded are captive-bred, with few wild-caught birds exported from countries other than New Zealand. Of the approximately 3000 birds exported from New Zealand over the period, two-thirds were wild-caught.

A precautionary approach is taken for all parrot exports from New Zealand, with non-detriment findings done in all cases. This minimises the potential for any illegally imported birds to enter the "legal" trade. Because New Zealand's feral populations are not protected and there is a desire to control or eradicate them, the basis of a non-detriment finding is that such harvest would inherently have no impact on the natural populations. This requires some clarification over what constitutes a "range-state" for a species that has been introduced beyond its natural range.

EASTERN ROSELLA *PLATYCERCUS EXIMIUS*, EXPORTS FROM NEW ZEALAND, CASE STUDY

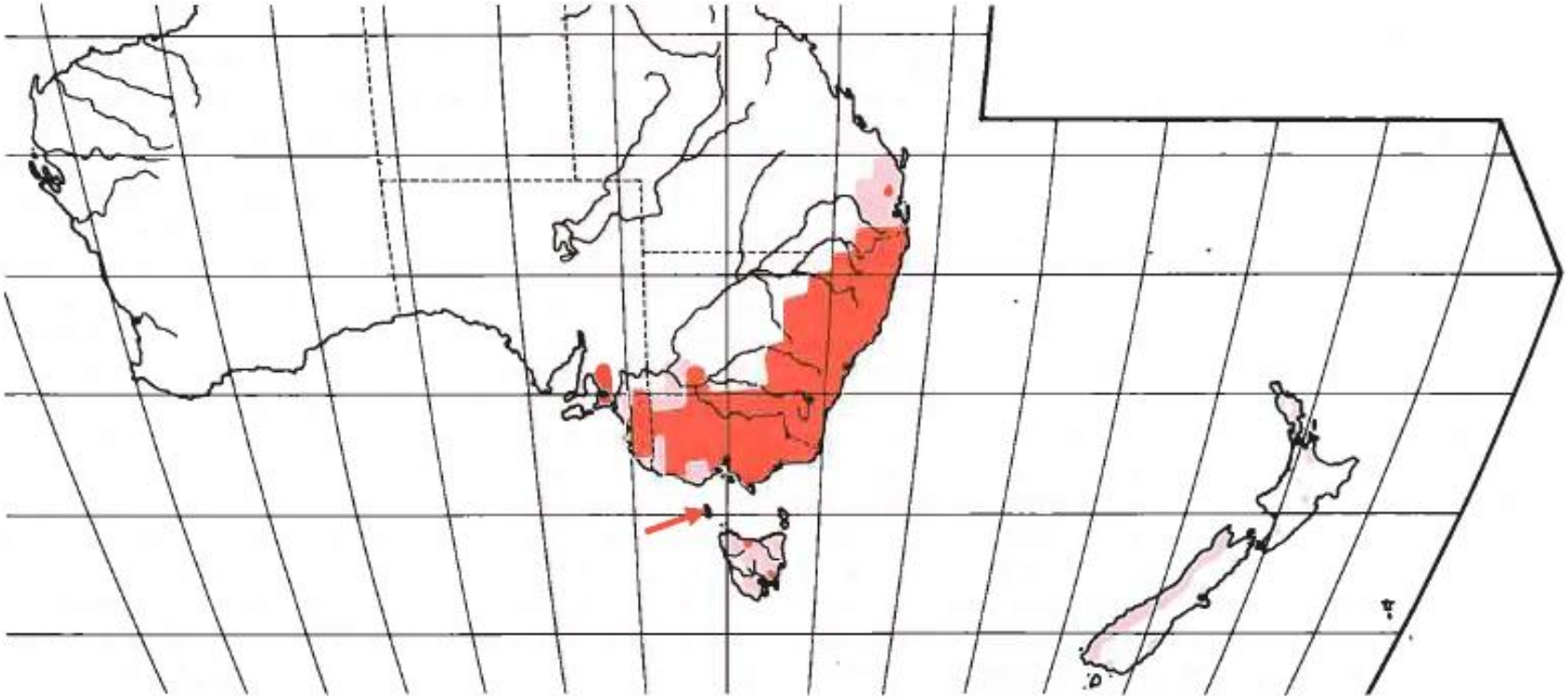
The eastern Rosella is endemic to Australia, with abundant populations over most of its range in the south-east of the country. It has been introduced into New Zealand and established feral populations over many parts of the country, particularly in the north. It is managed as a pest species in some areas of New Zealand, reflecting concerns about its effects on indigenous birds.

The species is very common in trade, with over 100,000 exported as pets over the last 25 years. The main sources of these appear to be European

captive populations. Of the 2900 birds exported from New Zealand in the last 25 years, a large proportion was harvested in the wild.

A precautionary approach is taken for all parrot exports from New Zealand, with non-detriment findings done in all cases. This minimises the potential for any illegally imported birds to enter the "legal" trade. Because New Zealand's feral populations are not protected and there is a desire to control or eradicate them, the basis of a non-detriment finding is that such harvest would inherently have no impact on the natural populations. This requires some clarification over what constitutes a "range-state" for a species that has been introduced beyond its natural range.

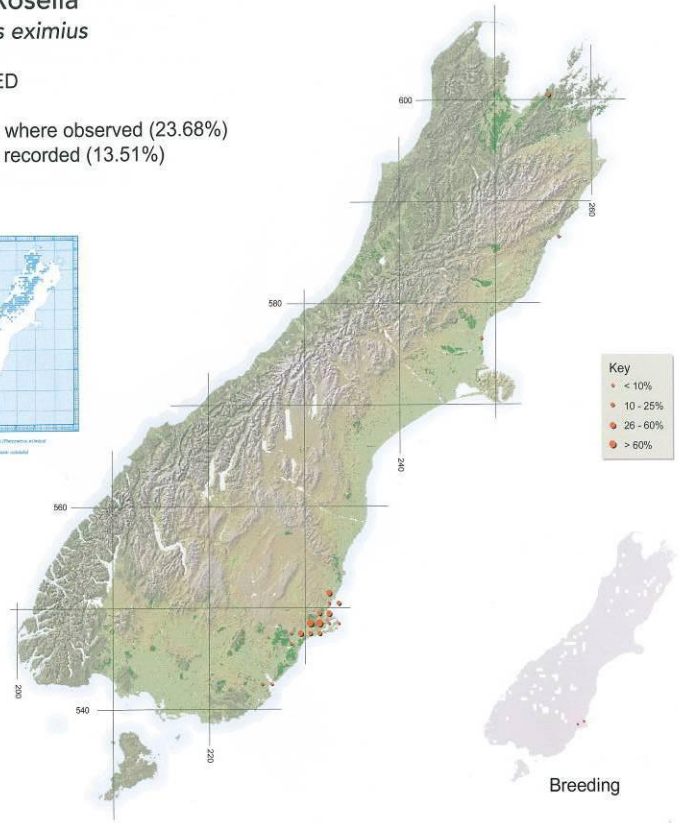
Eastern Rosella *Platycercus eximius*, exports from New Zealand



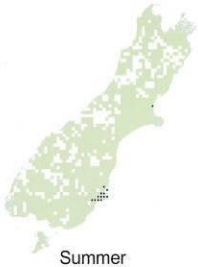
Natural and feral range of Eastern Rosella

Eastern Rosella
Platycercus eximius

INTRODUCED
roseas
729 Squares where observed (23.68%)
4299 Sheets recorded (13.51%)

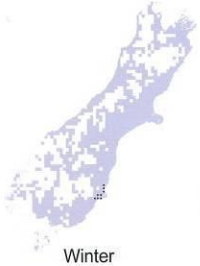


Breeding



Summer

Autumn



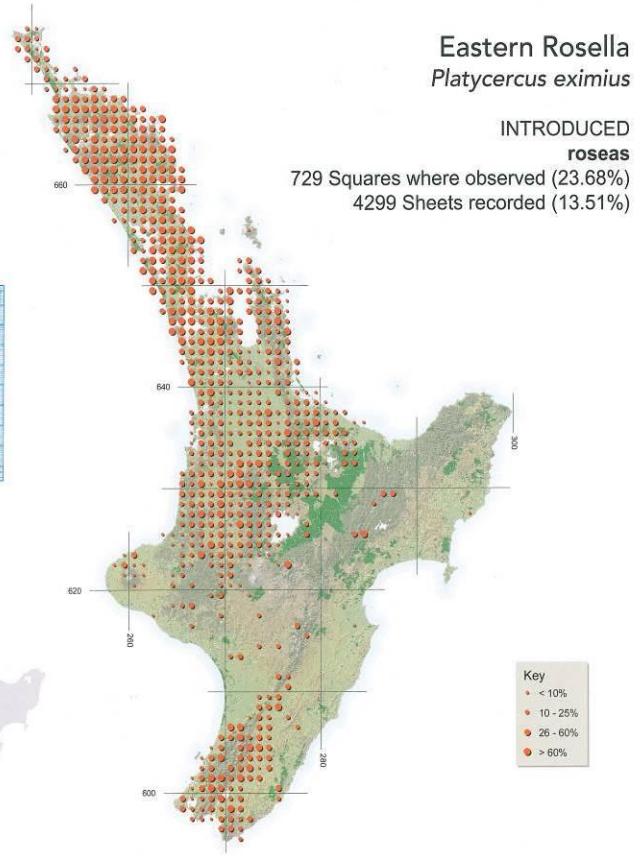
Winter

Spring

First established in the early 1900s. The South Is distribution has remained relatively confined, but with a slight expansion through Dunedin to the north. South Is records in the north may indicate outliers from the Wellington region. (see pages 372-373). Bull *et al.*, 1985.

Eastern Rosella
Platycercus eximius

INTRODUCED
roseas
729 Squares where observed (23.68%)
4299 Sheets recorded (13.51%)



Breeding

Summer

Autumn

Winter

Spring

This taxon exhibits the symptoms of an expanding population on two primary fronts, with outliers from both north and south. The Auckland population was founded in about 1920, and the Wellington population in the 1960s. (see pages 372-373). Bull *et al.*, 1985; Gill, 1989; Pierce *et al.*, 1993; Woon *et al.*, 2002.

Population Status

- Abundant
- Increasing range
- Significant expansion in New Zealand
- NZ population originated from cage escapes (some breeders release parrots illegally)

Threats

- Not under any threat currently
- No significant illegal trade
- Expanding despite pest status and impacts on other native birds, including CITES species, in NZ

Management and Monitoring

- Species is not monitored in NZ by the Management Authority
- Periodic monitoring of all birds undertaken through national Atlas scheme
- Local monitoring undertaken by Regional Authorities
- Unprotected in NZ

Harvest

- Sporadic harvest not significant in context of population abundance and trend

Trade

- Approximately 110,000 birds traded internationally between 1981 and 2006
- Most traded as captive-bred in Europe
- 2900 exported from NZ – 40% wild caught
- Destinations USA, Japan, Mexico, Malta

NDFs!

- Background of information on growing population
- All parrot consignments are assessed individually by Scientific Authority
- Exporter must make a Legal Declaration documenting source of birds
  - If captive-bred, location of parents
  - If wild-caught, co-ordinates of capture site
- DNA-testing can be required but never implemented in NZ for this species.

Lessons and Questions

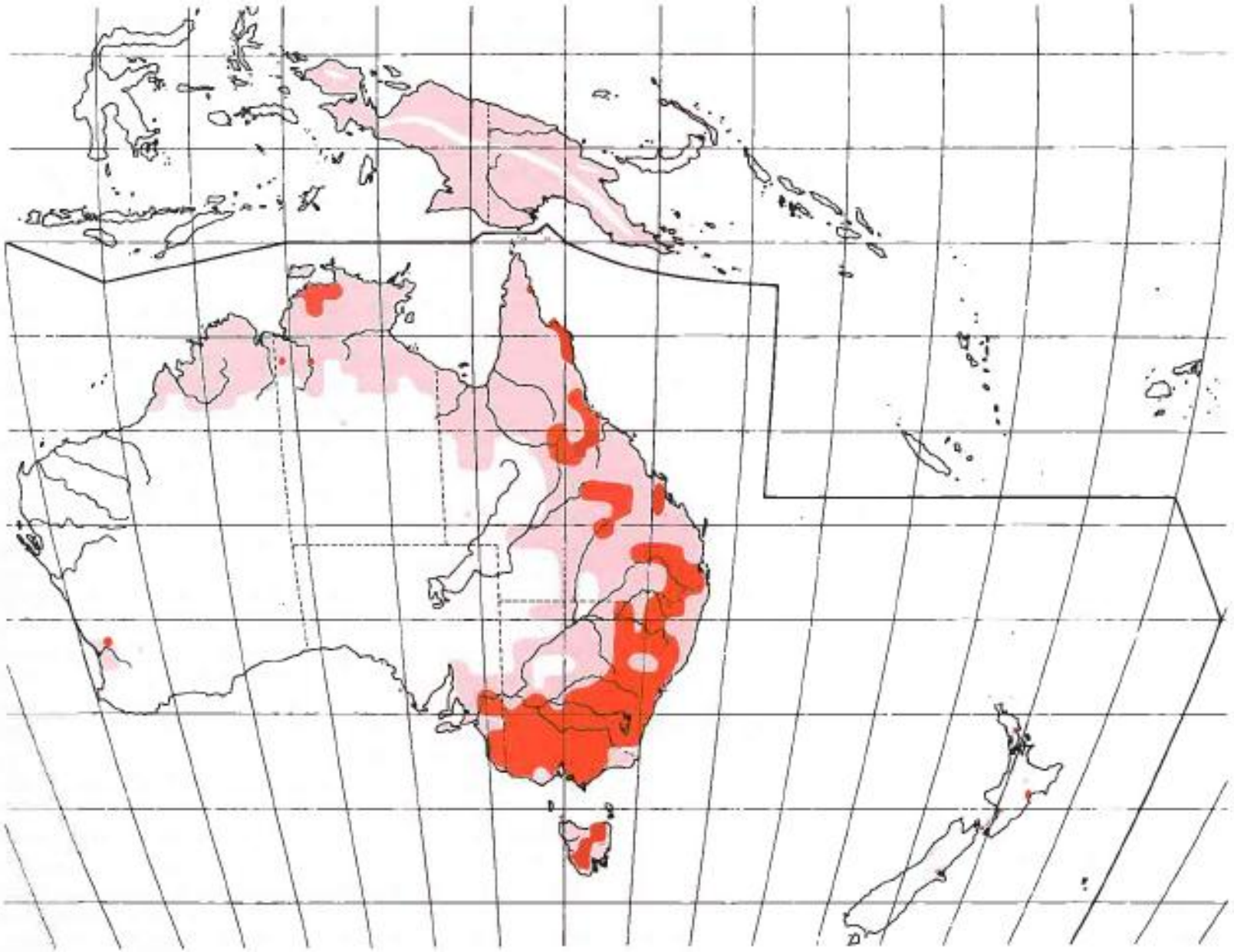
- Is a country in the feral or introduced range of a species included in the list of range states?
- Does export from such places reduce the pressure on the indigenous populations?
- Is an NDF required for such exports?

References

HIGGINS, P.J. (Ed.) 1999. Handbook of Australian, New Zealand and Antarctic Birds. Volume 4. Parrots to Dollarbird. Oxford University Press. Melbourne.

ROBERTSON, C.J.R., P. Hyvonen, M.J. Fraser and C.R. Pickard. 2007. Atlas of Bird Distribution in New Zealand 1999-2004. The Ornithological Society of New Zealand Inc. Wellington.

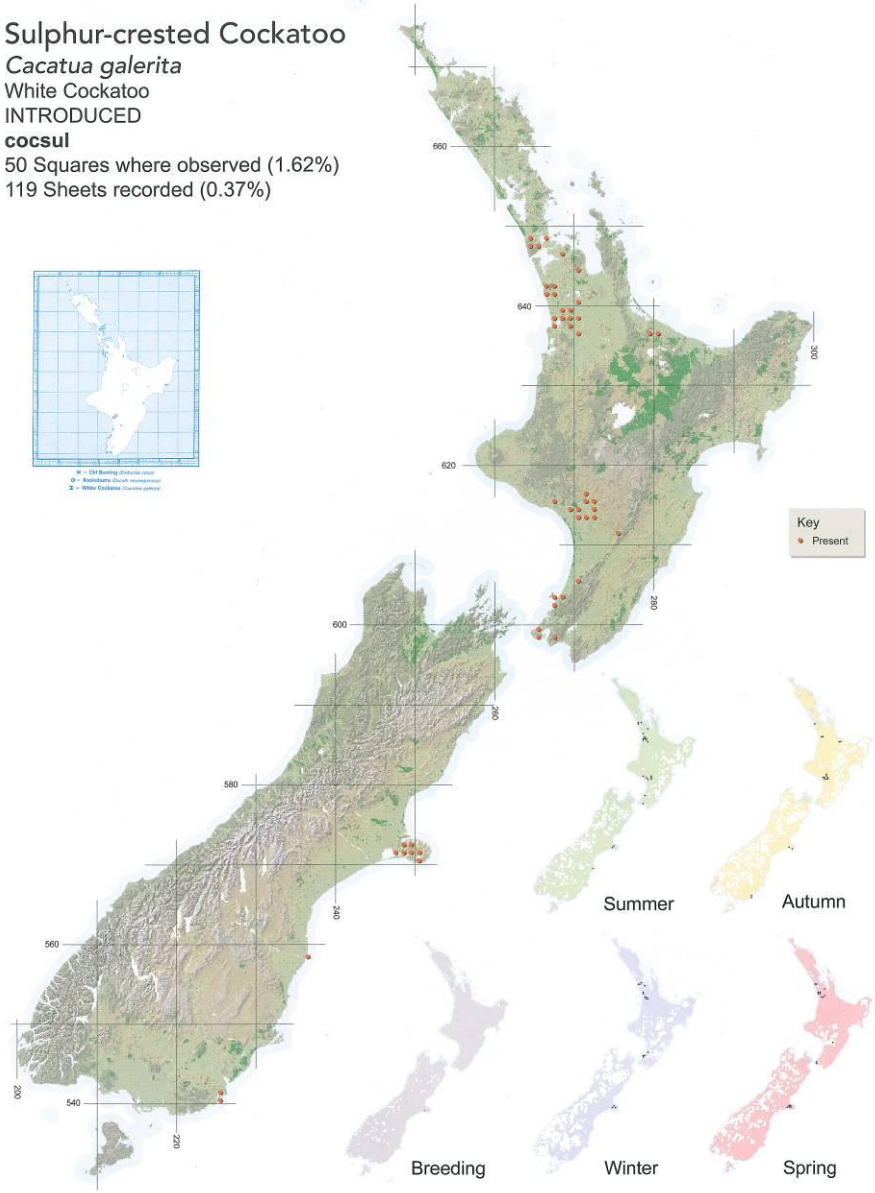
Sulphur-crested cockatoo *Cacatua galerita*, exports from New Zealand



Sulphur-crested cockatoo, natural and feral range

Sulphur-crested Cockatoo

Cacatua galerita
White Cockatoo
INTRODUCED
cocsul
50 Squares where observed (1.62%)
119 Sheets recorded (0.37%)



Not previously recorded in South Is. Clusters in the North Is have expanded their range. A taxon whose future expansion warrants further monitoring. Bull *et al.*, 1985.

Population Status

- Abundant
- Some range changes in Australia
- Expansion in New Zealand
- NZ population originated from cage escapes but birds may also arrive on their own

Threats

- Pest status in NZ constitutes greatest “threat”
- “Pet” status is a theoretical threat, but there does not appear to be significant illegal trade

Management and Monitoring

- Species is not monitored in NZ by the Management Authority
- Periodic monitoring of all birds undertaken through national Atlas scheme
- Local monitoring undertaken by Regional Authorities

Trade

- Approximately 20,000 birds traded internationally between 1981 and 2006
- 15,000 captive-bred from Indonesia
- 3000 exported from NZ – 64% wild caught

Harvest

- Hand-reared parrots attract a higher price
- Chicks or eggs taken from nest for rearing

NDFs!

- All parrot consignments are assessed individually by Scientific Authority
- Exporter must make a Legal Declaration documenting source of birds
  - If captive-bred, location of parents
  - If wild-caught, co-ordinates of capture site
- DNA-testing can be required

Lessons and Questions

- Is a country in the feral or introduced range of a species included in the list of range states?
- Does export from such places reduce the pressure on the indigenous populations?
- Is an NDF required for such exports?

References

HIGGINS, P.J. (Ed.) 1999. Handbook of Australian, New Zealand and Antarctic Birds. Volume 4. Parrots to Dollarbird. Oxford University Press. Melbourne.

ROBERTSON, C.J.R., P. Hyvonen, M.J. Fraser and C.R. Pickard. 2007. Atlas of Bird Distribution in New Zealand 1999-2004. The Ornithological Society of New Zealand Inc. Wellington.

NDF WORKSHOP CASE STUDIES
WG 6 – Birds
CASE STUDY 4
Cacatua sulphurea
Country – **INDONESIA**
Original language – English

CASE STUDY: *CACATUA SULPHUREA*

AUTHOR:
Siti Nuramaliati Prijono*
*Research Center for Biology, the Indonesian Institute of Sciences Cibinong Science Center, Jl. Raya Bogor-Jakarta Km 46, Cibinong, Indonesia.

I. Background information on the taxa

The Yellow-crested Cockatoo *Cacatua sulphurea* is one of Indonesia's most striking and popular parrots, which has had a long association with its people and culture. There are four subspecies of *Cacatua sulphurea*. It is endemic to Indonesia and Timor Leste, where it was formerly common throughout Nusa Tenggara (from Bali to Timor), on Sulawesi and its satellite islands, and the Masalembo Islands (in the Java Sea). It is one of the Indonesian parrots threatened by trade and habitat degradation. Although there can be no doubt that habitat loss must have contributed substantially to the overall decline in the species population, the blame for the precipitous drop in numbers in the past quarter of the 20th century lies entirely with unsustainable exploitation for trade whether domestic or international. This bird is currently classified as a *Critically Endangered* species. It was listed in Appendix I-CITES, and is protected by Indonesian laws as well.

In this document we explain the NDF process for Appendix II species used in Indonesia, which is the process that was used when *Cacatua sulphurea* was appendix II.

1. BIOLOGICAL DATA

1.1. SCIENTIFIC AND COMMON NAMES:

— Class : Aves
— Order : Psittaciformes
— Family : Psittacidae
— Genus *Cacatua*
— Species : *Cacatua sulphurea* (Gmelin, 1788)
— Subspecies :
Cacatua sulphurea sulphurea (Gmelin, 1788)
Cacatua sulphurea citrinocristata (Fraser, 1844)
Cacatua sulphurea parvula (Bonaparte, 1850)
Cacatua sulphurea abbotti (Oberholser, 1917)

—Common names:
English : Yellow-crested cockatoo, Lesser Sulphur-crested cockatoo
French : Cacatoès soufré
Spanish : Cacatúa sulfúrea
German : Gelbwangenkakadu
Indonesian : Kakatua-kecil jambul-kuning

1.2. Distribution

The Yellow-crested or Lesser Sulphur-crested cockatoo is a virtual endemic to "Wallacea" in the central archipelagos of Indonesia, and on Timor Leste (known formerly as East Timor), occurring in four races, including the remarkably large and nearly extinct *C. s. abbotti*. In addition there are feral populations in Singapore and Hong Kong (Long, 1981; Lever 1987). Only in the wetter parts of north and central Sulawesi does it appear to have been naturally absent.

There are four known subspecies. The *C. s. sulphurea* was formerly widely distributed in Sulawesi, however since the early 1980s it has

become very rare (it may be locally extinct through much of its range) because of high rates of capture. *C. s. parvula* inhabits most of the Lesser Sunda Islands as Penida, Lombok, Sumbawa, Moyo, Komodo, Flores, Pantar, Alor, Timor, and Semau. *C. s. abbotti* occurs only on Masakambing, one of the Masalembo Islands in the Sulawesi Strait, this subspecies is already extinct on Masalembo. *C. s. citrinocristata* is endemic to Sumba island. In Timor Leste, *C. s. parvula* were recorded in six locations (Tilomar, Fatumasin, Sungai Clere, Lore, Monte Paitchau – Iralalora, Mount Diatuto) (Trainor, 2002).

1.3. Biological characteristics

1.3.1. *General biological and life history characteristics of the species*

The Yellow-crested Cockatoo nests in holes in tree. The nesting trees of the Yellow-crested Cockatoo, i.e. two species of Datiscaceae (Jones *et al*. 1995), *Stercula foetida, Tetrameles nudiflora, Ficus benyamina, Duabanga moluccana, Ceiba pentandra, Sterculia oblongata, Corypha utan, Borrassus flabelifer, Erythrine, Macaranga, Eugenia, Garuga floribunda* and coconut tree (Setiawan, 1996). Nest hole was located at the height of 6 -18 m above ground. The eggs are white and there are usually two to three in a clutch. The female lays the eggs in a tree hole, and the incubation is shared by both parents, the female at the night, the male during the day. Incubation commenced with the first egg and lasted 28 days. Hatching weight of 16 g. The young are naked and blind when hatched. The chicks' eyes start to open at about 12 days. The young leave the nest when about 3 months old. The age of first breeding in this or indeed most other cockatoos is unknown, but possibly not in the first year. As in most parrots, the sexes in this species form very strong bonds: Schmutz (1977) reported how the widowed mate of a bird he shot from a crop-raiding flock and hung up (in a vain attempt at discouragement) returned later to sit in silence close to the body of its partner. The birds may live at least 30 years.

The breeding season appears protracted. White and Bruce (1986) gave September–October for Button and April-May for Nusa Tenggara, but in reality the situation is more complicated, although these periods do seem to represent peaks. On Button, 1996, a pair seen entering a nest-hole in mid July were still occupying the site in November (Catterall, 1997). A pair was investigating a potential nest-hole in a tree at the edge of forest in September on Tanahjampea (Dutson, 1995). On Masakambing nest prospecting was witnessed (in a coconut palm) in October, and nesting reported in coconuts in November/December (Cahyadin *et al*, 1994a). On Flores, nest were recorded in November (one), February (one) and April (three)

(Verheijen, 1964); two young males not fully fledged were brought in at the end of April, and gonads of a female from July were slightly swollen (presumably following breeding, since these two pieces of evidence were taken to indicate a breeding season in March and April. Of 46 active or old nests found (in August-October, 1995) on Sumba and 30 potential nesting trees have been found (in March-April, 2005), whereas 18 were active on Sumba.

1.3.2 *Habitat Types*

This is a bird which inhabits primary and tall secondary lowland and hill forest and forest edge, scrub and agriculture (in Sulawesi), moist deciduous monsoon forest and gallery forest (in Nusa Tenggara), and adjacent areas of lightly wooded scrub and cultivation, mainly in the lowlands to 1,200 m (Watling, 1983; Butchart *et al*. 1996; Coates & Bishop 1997). The species eats many cultivated foods, so a high proportion of records (where any records exist) are from the neighbourhood of settlements. On Sumba the birds are absent or rare in forest area of less than 10 km^2, and they prefer undisturbed primary forests characterised by large trees offering nest sites (Kinnaird, *et al*., 2003). The case of Masakambing (Masalembo islands), where all original habitat except the mangroves has been cleared, indicates that substantial modification of landscape can still be tolerated by the species. In Komodo National Park the birds were found in dry coastal monsoon woodland and thorn scrub (Bishop, 1992; Butchart *et al*. 1996), but they commonly also use mangroves. On Sumbawa the birds were seen in semi-evergreen forest and roosting in tall riverine forest dominated by Duabanga moluccensis; on adjacent Moyo island it was present in "rainforest and gardens" (Johnstone *et al*. 1996; Butchart *et al*. 1996). On Flores it penetrates into cultivated land and has been recorded in remote savanna at Wae Wuul (Sudaryanto, 1997 in litt.).

1.3.3. *Role of the species in its ecosystem*

The role of the Yellow-crested Cockatoo in its ecosystem is insufficiently known. However, this species feeds on seeds, nuts, berries and fruits (Forshaw, 1989, Setiawan 1996) and might probably play a role in the distribution of plants. Furthermore, it is part of the food chain. For example, the Komodo dragon (*Varanus komodoensis*) preys upon eggs and uses nests of the Yellow-crested Cockatoo during their arboreal phase. There is a competition between the dragon and cockatoo in using *Sterculia foetida* for nesting (Agista & Rubyanto, 2001). Birds of prey might also attack young and adult Yellow-crested Cockatoo. There are two species, Spotted kestrel (*Falco moluccensis*) and White-bellied Sea-eagle (*Haliaeetus leucogaster*) have observed by Behrens

(1995) and Agista & Rubyanto (2001) to attack the cockatoo. The cockatoos can exploit cultivated plants to a considerable degree. The consequent pest status of the birds in certain areas has led to rural people catching them primarily to protect their livelihoods, and by extension to turn this self- defence into profit. However, some important scientific work is needed to assess the degree of damage the birds do to crops and to determine methods of reducing impact. It should not be assumed that the problem is either massive or insoluble (PHPA/BirdLife International-IP, 1998).

1.4. Population

1.4.1. *Global population size*

Sumba appears to support the largest remaining population, tentatively estimated (in 1992) at c.3,200 birds (but declining, perhaps by 500 birds annually with just 10% of the island still forested in 34 fragments), with other significant (but considerably smaller) populations on Komodo (c.500 individuals), Sulawesi, Buton, Moyo and Timor-Leste (Trainor, 2002). The Komodo population alone (where poaching is virtually absent) declined by an estimated 49% since 2000 (Agista & Rubiyanto, 2001). Its current status on several small islands is unclear. *C. s. abbotti*: In 1999, only five (5) individual of the Yellow-crested Cockatoo remained on Masakambing island (Setiawan *et al*. 2001). *C. s. sulphurea*: In Rawa Aopa Watumohai National Park Yellow-crested Cockatoo was only recorded in the southern area of the park near Laea-Hukaea and estuaries of the Laea, Pampaeae and Mempaho rivers dominated by lowland forest, mangroves and agricultural land. The total population size of Rawa Aopa Watumohai National Park is estimated to be about 100 individuals, and this is probably the most important population on the mainland Sulawesi (Agista *et al*. 2001).

On Pasoso island, however, the total population is estimated only 7-15 individuals (the biggest group recently observed was 7 individuals) with these mostly distributed in the south and central parts of the island in mixed secondary forest, scrub and dryland agricultural plots (Agista *et al*. 2001). *C. s. citrinocristata*: Studies from 1989 to 1992 (Marsden 1995) estimated the total population of Yellow-crested Cockatoo was between 1,150 – 2,644 birds. BirdLife Indonesia's survey (2002) resulted in an estimate of the total population of 229 – 1,195 birds outside the National Parks in Sumba (Persulessy et al. 2003). In 2002 Wildlife Conservation Society (WCS) conducted survey, which estimated the population density of 4,3 birds/km2 in four forest blocks in two national parks in Sumba. (Kinnaird, 2003). *C. s. parvula*: Like in the islands of Nusa Tenggara (part of lesser Sunda islands), the Yellow-

crested Cockatoo on Flores has declined dramatically. Until 1997, cockatoo was found only limited on few sites in small population. In the past 10 years, population of more than ten cockatoo have been found only on two locations. In 1997, 14 individuals was recorded in Ria and in 1998 it was recorded a flock of 15 individuals at Watubuku forest (part of Lewotobi area) (Setiawan *et al*. 2000). On one field survey, it was encountered 80 individuals on Alor Island, 29 individuals in Pantar Island, and 18 individuals in West Timor. Population estimate was 678-784 individuals in Alor Island and 444-534 individuals in Pantar Island. The survey in Moyo Island recorded 10 individuals and the abundance was estimated at 0,0278 individuals/km^2 in the sampling area (Setiawan *et al*. 2000). In Komodo National Park the Yellow-crested Cockatoo is still relatively common, being most frequently recorded in dry tropical forest (at sea level to 350 m) dominated by *Tamarindus indicus* and *Sterculia foetida* (Agista & Rubyanto 2001). Total population size for Komodo National Park is estimated to be 600 individuals with 500 on Komodo island and about 100 individuals on Rinca island. The population in Komodo National Park is believed to be the largest for the sub species *parvula* (Agista & Rubyanto, 2001). Survey in 1994 in Sumbawa it was observed at three sites and reported by islanders to occur at 14 more, albeit in very low numbers (Setiawan, 1996). Population size for Timor-Leste is crudely estimated at 500-1,000 individuals (Trainor *et al. in litt* 2004).

1.4.2. *Current global population trends:*

___increasing √√_X_decreasing ___stable ___unknown

The Yellow-crested Cockatoo has suffered (and may continue to suffer) an extremely rapid population decline, probably equivalent to more than 80% over three generations (given its longevity) (BirdLife International, 2001).

C. s. abbotti was "easily found" until 1980s, but they have been now apparently disappearing from Masalembo islands. Only 8-10 birds could be found on Masakambing island in early 1994 (Cahyadin et al. 1994a), and the latest survey by BirdLife and Kutilang IBC in 1999 found only five (5) individuals remaining on the island (Setiawan *et al*. 2001).

The population of *C. s. citrinocristata* in Sumba Island is also facing the same decline from 1980s until today. The sub species *C. s. citrinocristata* can only be found in the remaining forest blocks on Sumba Island, and the decrease of its population is due to habitat loss and trapping for trading (Persulessy *et al*. 2003). Based on up-to-date

BirdLife Indonesia's survey and data in 2003, the estimation population of *C. s. citrinocristata* in three different forest habitat types (outside national parks areas) in Sumba Island is 1-2 birds/1000 ha.

At many other sites in Sulawesi where *C. s. sulphurea* was once recorded, it has now disappeared. All the modern evidence, amassed in compilations and fieldwork by Andrew & Holmes (1990), Cahyadin *et al*. (1994b), and Mallo & Setiawan (1996), suggests that a very steep decline in population throughout the island has occurred in the past 20 years (PHPA/LIPI/BirdLife International-IP 1998).

Flores suffers massive declines in *C. s. parvula* population. The subspecies was "very common all over the island" in the early 1980's, but from the latest survey it was recorded only 15 individuals at Watubuku forest (PHPA/LIPI/BirdLife International-IP 1998; Setiawan et al. 2000). The representative populations of this sub species still occur in Alor, Pantar and Komodo Islands. West Timor and other small islands in Nusa Tenggara can only support few individuals (PHKA/LIPI/BirdLife International-IP 1998, Setiawan *et al*. 2000, Agista & Rubyanto 2001). Although the *C. s. parvula* race occurs on the largest islands in the Lesser Sundas, populations on Timor, Flores and Sumbawa have been decimated by captures for trade (BirdLife, 2001). The single largest population is considered to persist on Komodo Island (311 km^2) in Komodo National Park. Flocks of 20-30 birds were seen during brief observations from 1989 to 1995, and in 1999 an estimated 100 birds were seen by I. Mauro (BirdLife, 2001).

Table 1. Past (2000) and Current (2005) population of *Cacatua sulphurea* on Komodo Island (Agista & Rubiyanto, 2001)

Site	Population (2000)	Population (2005)	Density /km^{-2} (2000)	Density /km^{-2} (2005)	Population decline
Loh Wenci	6	6	14.29	14.29	0%
Loh Sebita	82	50	19.20	11.71	-39%
Loh Liang	190	62	30.45	9.94	-67%
Loh Pinda	18	3	10.00	1.67	-83%
Loh Wau	44	16	51.16	18.60	-64%
Total	**340**	**137**	**25.02**	**11.24**	**-60%**

The current population of Yellow-crested Cockatoo on Komodo (2005 survey) was only 137 birds, compared to the 340 birds in 2000 (Agista & Rubyanto 2001), which represents a major decline over a period of 5 years. There was a significant decline in the counts of Yellow-crested Cockatoo at the five valleys in 2005 compared with the results of the

2000 study, population declines per valley was varied from 0-80% (Imansyah, *et al* 2005). The Yellow-crested Cockatoo population on Komodo Island is largely immune from forest loss and captures for trade, yet we report a population decline of 60% between 2000 and 2005. Komodo Island presents a different context to the other Indonesian islands: cockatoo harvesting is effectively zero because of surveillance and enforcement and there is negligible loss of mature trees or forest loss through illegal logging (Ciofi & de Boer, 2004). On other islands, captures for trade and loss of mature hollow-bearing trees is undoubtedly driving the decline of populations, but on Komodo (where large hollow bearing trees are probably naturally limited) it might be caused by older trees senescing, and regular wild-fires that might have a greater impact on mature rotten and hollow bearing trees. The sub species *C. s. parvula* in Flores, Alor, Pantar, Timor and Moyo islands was found in moist-deciduous monsoon forest. This type of habitat is under severe pressure because of illegal timber cutting and forest fire. The main factor of population decline is illegal trade in 1980's. Another major factor is loss of forest area (Setiawan *et al*. 2000).

1.5. Conservation status

1.5.1. *Global Conservation status* (according to IUCN Red List)

_X_ Critically endangered	___ Near Threatened
___ Endangered	___ Least Concern
___ Vulnerable	___ Data deficient

The biological status of *C. sulphurea* is critically endangered: A 1cd + 2cd. Numbers have declined dramatically due to illegal trapping for the cage-bird trade. The current population is estimated at less than 10,000. In 1981 *C. sulphurea* was listed in CITES Appendix II and since 2002, it was listed in Appendix I of CITES. Appendix I is reserved for species threatened with extinction and for which commercial international trade is prohibited.

All sub species remain in very small populations, some of them are even nearly extinct. *C. s. sulphurea* and *C. s. parvula* survive in very small and isolated populations, and they are regarded as having low viability in the long term (PHPA/LIPI/BirdLife International-IP 1998). Significant population of *C. s. sulphurea* only exist in Rawa Aopa Watumohai National Park and Pasoso Island, and probably already extinct in north Sulawesi (Agista *et al*. 2001; BirdLife International, 2001). *C. s. parvula* is nearly extinct in Sumbawa (Butchart *et al*. 1996;

Johnstone *et al*. 1996; BirdLife International 2001) and is probably now extinct in Lombok with the only viable population in Komodo National Park, Alor Island, Pantar Island and Timor Leste (Agista & Rubyanto 2001, Setiawan *et al*. 2000, Trainor *et al*. 2004). *C. s. abbotti* is considered to be nearly extinct (Setiawan *et al*. 2001). *C. s. citrinocristata* has a small and declining and highly threatened but the species is probably viable population in Sumba Island (PHPA/LIPI/BirdLife International-IP 1998; Persulessy *et al*. 2003).

1.5.2. *National conservation status for the case study country*

Since 1999 all sub-species of *C. sulphurea* is fully protected in Indonesia in accordance with the Government Regulation No. 8 of 1999. A cooperative recovery plan has been developed and adopted. Populations occur in several protected areas, the most important being Rawa Aopa Watumohai and Caraente National Parks (on Sulawesi) which supports up to 100 individuals (Nandika, 2006), Suaka Margasatwa Nature Reserve on Pulau Moyo, Komodo National Park and two national parks on Sumba: Manupeu-Tanahdaru and Laiwangi-Wanggameti. The declared Nini Konis Santana National Park in Timor holds an estimated 100 birds (Trainor, 2002). Moratoria on international trade have been effective at allowing several subpopulations on Sumba to increase in number between 1992 and 2002, although densities remained below those typical of other cockatoo species (Cahill *et al*., 2006).

1.5.3. *Main threats within the case study country*

___No Threats
_X_Habitat Loss/Degradation (human induced)
___Invasive alien species (directly affecting the species)
_X_Harvesting (Hunting/gathering)
___Accidental mortality (e.g Bycatch)
___Persecution (e.g. Pest control)
___Pollution (affecting habitat and/or species
___Other_____
___Unknown

Its precipitous decline is almost entirely attributable to unsustainable exploitation for internal and international trade. The capture of Yellow-crested Cockatoo for trade has undoubtedly been the most critical factor in its population decline over the past three decades, and is the key factor that limits its recovery. Large-scale logging and conversion of forest to agriculture across its range has exacerbated the decline, and the use of pesticides since around 1989 is a further potential threat. At least formerly, the species was regarded as a crop-pest,

and consequently persecuted. High rainfall years appear to limit productivity considerably resulting in very low recruitment. Conversely, rainfall on Komodo has been low in recent years leading to limited availability of water sources. Competition for cavity nest sites with other parrots and owls in large trees (those by logging activities) leads to low productivity.

2. SPECIES MANAGEMENT WITHIN THE COUNTRY FOR WHICH CASE STUDY IS BEING PRESENTED

2.1. Management measures

2.1.1. *Management history*

Indonesia regulates the trade in wild caught birds through the allocation of capture quotas. The total number of birds taken from the wild in the period 1981-1992 could have been as high as 190,000 (PHPA/LIPI/BirdLife International-IP, 1998). The actual numbers of individuals caught in the wild during this period must be higher than these figures since mortality, domestic trade and any illegal trade must be added to export and import figures. No data exists on the magnitude of these factors. The high level of trade in this species during the 1980s prompted concern, and in 1992, *C. sulphurea* was among 24 species that were the subject of a Significant Trade Review on behalf of the CITES Animals Committee (WCMC, 1992. The recommended action of the review was that "The CITES Management Authority of Indonesia should institute a moratorium on exports until island surveys have been carried out, particularly in Sumba and eastern Nusa tenggara". Indonesia subsequently imposed a zero export quota and prohibition of hunting of the species in 1994, backed up in subsequent years by local (regency-level) legislation. Hence 1993 was the last year when this species was reported in export in large numbers, and the fall-off in international trade in wild birds from Indonesia has been complete. However, it cannot be assumed that the problem is solved. Since a zero quota caught birds was established in Indonesia, there has been increase of international trade in supposedly captive-bred birds; 900 alone in 2000 according CITES permit. Unfortunately, neither the zero quota nor the EU and US import bans for wild specimens appear to be effective. There is substantial evidence that birds still being taken from the wild, with some then passed on as captive-bred birds for international trade. Since 2002, this bird was listed in Appendix I of CITES.

2.1.2. *Purpose of the management plan in place*

a. To maintain viable wild populations of *C.sulphurea*;
b. To halt and reserve the decline in the status and distribution of the Yellow-crested Cockatoo;
c. To reduce poaching of *C. sulphurea*;
d. To promote a recovery of the Yellow-crested Cockatoo population through controls on capture and trade;
e. To conserve habitat and key features of habitat for the species throughout its range, include protect nest-trees;
f. To strengthen control and monitoring of trade;
g. To strengthen capacity and awareness in Indonesia, amongst government agencies, NGOs and local people, to support implementation of the Recovery Plan;
h. To enforce the law;
i. To provide alternative source of *C. sulphurea* through captive breeding.

The development a national management plan or equivalent is necessary to build the political will to establish the process of sustainable use.

2.1.3 *General elements of the management plan*
The species is included in CITES Appendix-I so that international trade in the specimens of the species is strictly regulated. National management plans has been developed in conjunction with local inputs. General elements of the management plan, i.e:

a). HABITAT CONSERVATION
- Conserve habitat and key features of habitat for the species throughout its range;
- Legal action and regulation from the forestry agency to prevent the cutting of tree which are used for nest holes;
- Conserve nesting trees;
- Establishment more protected areas and more a national park management unit;
- Explore ways using adapt (traditional) law to provide protection for the species and its habitat

b). RESEARCH
- Develop baseline of information on populations throughout the range, and undertake monitoring to assess effectiveness of plan;
- Monitoring of population and breeding success, with trials involving nest boxes;

- Determine status and distribution through island-wide survey and carry out population census for selected forest blocks;
- Encourage research into captive husbandry of *C.sulphurea*

c). Awareness.
- Promote community awareness through awareness programme and mass media;
- Training, through participation, in field survey and census methodologies;
- Essential educational activities are those concerned with reducing trapping of Yellow crested Cockatoos in the wild

d). Law enforcement
- Cooperation in traffic control ;
- Bupati (Regency) Decree to enhance national legislation and promote other aspects of recovery plan;
- Develop collaboration with CITES Management Authorities in main importer and exporter countries, to assist with implementation of Recovery Plan and especially prevent illegal trade.

e). Captive Breeding
- Establish captive breeding facilities and develop management system for captive breeding including licencing and regulatory mechanism.

2.1.4. *Restoration or alleviation measures*

Several strategies were identified and developed for habitat and species restoration which included:

a. protecting the remaining habitats from destructive human activities;
b. conserve nesting trees
c. initiating enhancement planting of native species of trees which are used for nest holes;
d. conserve and planting food plants;
e. expanding crucial food supplies, roost sites and water supplies.

2.2. Monitoring system

2.2.1. *Methods used to monitor harvest*

Monitoring of the harvest is vital and essential to ensuring the sustainability of any harvest.. Quotas alone do not provide adequate control of harvests and exports. To be effective, they must be combined with an integrated capture and export permit system that is tracted and

monitored. Permits must identify permissible harvests of each species for both domestic and international trade.

Monitoring of the harvest was carried out by Scientific Authority, student/researchers from local universities, wildlife personnel, NGO and local people. Information that have been considered for monitoring purposes includes distribution/range and population trends.

2.2.2. *Confidence in the use of monitoring*

A Scientific Authority may know that direct population estimates are conducted, but the budgetary, staffing and other constraints result in such population counts only being conducted at long intervals, insufficient to monitor the effects of an annual harvest programme. As well as the lack of confidence in the management system the harvest monitoring strategy is far from adequate. There is a need for field level studies or harvest impact. The current system of national export monitoring is likely to be relatively unreliable considering the lack of knowledge regarding levels of illegal trade.

2.3. Legal framework and law enforcement:

The species is totally protected in Indonesia, meaning that no capture, possession or trade in the specimens of the species is allowed. Liability for the infraction is up to five years in prison and up to 200 million rupiahs fine. A species recovery plan is in place and has been partially implemented.

Until 1997 *C. sulphurea* was unprotected in Indonesia. However, since 1994 catch quotas were set to zero. There were several local decrees. For *C. s. parvula* hunting of all birds has been prohibited on Lombok and Sumbawa since 1994 (instruction No. 20, 1994 of the Governor of Nusa Tenggara Barat) and similarly on Sumba, Flores and Timor (instruction No. 15, 1994 of the Governor of Nusa Tenggara Timur). On West and East Sumba, collection and transport of cockatoos has been banned since 1992 and 1993 (Decree No. 147, 1992 and No. 21, 1993 of the Mayor of the Regency of this island). *C. s. abbotti* has been protected since 1995 by Decree No. 5, 1995 (Regency of Sumenep, East Java). In 1997 *C. s. citrinocristata* was declared as a protected species by Ministerial Decree (Decree of the Minister of Forestry No. 350/Kpts-II/1997: 9 July 1997). Since 1999 all sub-species of *C. sulphurea* is fully protected in Indonesia in accordance with the Government Regulation No. 8 of 1999 (BirdLife International, 2001).

Indonesia has established protected areas important for protection of the species. These include: Rawa Aopa Watumohai National Park (105.194 ha); Pulau Pasoso (49-200 ha, depend sea water tide), Marine

Wildlife Sanctuary; Komodo National Park (1.817 km^2), off the west coast of Flores, which is also a World Heritage Site.

In 1998 following a recommendation by BirdLife Indonesia, the Indonesian Government represented by Ministry of Forestry created 2 (two) National Parks on Sumba, Manupeu-Tanadaru and Laiwangi-Wanggameti. Besides the two national parks, other forest areas on Sumba need also attention because they have the potential to support Yellow-crested Cockatoos (Persulessy *et al*. 2003).

The Tatar Sepang area has been proposed as a 40,000 ha Natural Forest Reserve (either Wildlife Sanctuary or Nature Reserve) located in south-west Sumbawa in Nusa Tenggara Barat (Sumbawa District). An important population of cockatoos along the Sejorong River has almost disappeared during the mine construction phase but the nest trees have been protected. Conserving cockatoo populations in adjacent areas will aid re-population of the cockatoo sanctuary in the Sejorong valley.

3. UTILIZATION AND TRADE FOR RANGE STATE FOR WHICH CASE STUDY IS BEING PRESENTED

3.1. **Type of use** (Origin) **and destination** (purposes)

Cacatua sulphurea has been traded in large numbers as pets and exhibits in zoos.

3.2. Harvest

3.2.1. Harvesting regime:

The aim of harvest regime for a species has a considerable bearing on the probability that a harvest will be sustainable. The main principle applied by Scientific Authority in Indonesia:

a. The harvests do not lead the population of each species (notably at the sub-species level) towards extinction.
b. When a species (i.e. sub species) of wildlife could be successfully bred in captivity the harvest of such species (sub-species) from the wild is immediately stopped.

Such principles are then applied in the following rules of action endorsed by the Indonesian Scientific Authority:

a. Species inhabiting man-made environments could be harvested as long as the harvest is ecologically sound;
b. Species which pairs for life sound only be subject to harvesting in a limited numbers;
c. Harvesting hole-nesting species is to be limited;
d. Harvesting only nestlings and not adults.

3.2.2. *Harvest management/control* (quotas, seasons, permits, etc.)

The national management plan was developed in conjunction with local inputs, because the majority of harvested species are likely to be patchily, so any harvest was managed at the local level to avoid local extirpations. Management plan at provincial level would be the equivalent of national management plan. Consequently, the optimum harvest management situation will include approved an co-ordinated local and national management plans. All harvests will be undertaken in a way that ensures environmental impacts are minimised.

Export quotas are the control measure of choice for the Management and Scientific Authority because Indonesia covers a vast geographic area which would require a large amount of resources to enforce otherwise. A new quota is set every year by the Indonesian CITES Scientific Authority, usually at the end of the year to take effect the following year. The quota is assigned by the Director of Biodiversity Conservation, Forestry Department and delivered through the Regional Office for the Conservation of Natural Resources (BKSDA, Conservation Unit Office) in all provinces and districts, from where it is distributed to traders/exporters. In accordance with the Decree of the Minister of Forestry the BKSDA office issues permits to catch *C. sulphurea* in the field based on the quota allocated for each province. The provincial offices of the Management Authority (BKSDA) control and enforce catch and collection permits, and implement quota management and monitoring for CITES-listed species in their administrative jurisdictions. For domestic transport, the specimens must be covered by permits issued by BKSDA or its Section Offices. Permits for domestic transport are issued in accordance with the annual quota and with reference to catch permits. The domestic transport permit, started from January 2005, is now standardized throughout Indonesia to facilitate better control. All permits (collection and domestic transport permits) are recorded and then reported to the Management Authority, which is expected to improve monitoring of internal (domestic) trade.

3.3. Legal and illegal trade levels :

3.3.1. *Legal international trade*

For many years *Cacatua sulphurea* was traded in large numbers for international pet market. Export data are available since 1981. Subspecies were not distinguished. International trade figures show a steady increase in volume of internationally traded cockatoos, so that by the end of the 1980s it was some four times higher than that at the start of decade. From 1981 to 1989 export numbers from Indonesia

increased dramatically with a total of 61,774 birds exported from Indonesia during that period.

Indonesia regulates the trade in wild caught birds through the allocation of capture quotas. Capture quotas for *C. sulphurea* for the period 1984-1991 are shown in Table 2. It is clear from import data (derived from CITES permits) that the actual trade (and presumably captures) for the years 1988-1991 must have exceeded the capture quotas set for the years. Some of the birds exported in 1988 may have been caught in the previous year, but traders do not generally keep stock for long periods so they are very unlikely to have been caught in years previous to 1987.

Since 1992 there have been an increasing trade of captive bred individuals. The Philippines, Singapore, South Africa and Indonesia are the main states exporting captive bred specimens of *Cacatua sulphurea*. Especially for Indonesia and Singapore there was a sudden turn up of captive bred specimens since 1994, the time the legal trade in wild-taken specimens stopped. Since few years ago Indonesia has exported captive bred specimens. Captive breeding operation on *Cacatua sulphurea* in Indonesia is running by two companies namely PT. Bali Exotica Fauna and PT. Anak Burung Tropikana. Both of these companies were located in Bali Province. Since the year 2002 PT. Bali Exotica Fauna was not running their business and since the year 2003 this company was taken over by PT. Anak Burung Tropikana.

Table 2. Capture quotas for C. sulphurea in Indonesia (1984-1991), divided by province, compared to reported exportd (no information is available on the quota for 1996) (PHPA/LIPI/BirdLife International-IP, 1998)

Sub species/ Province	**1981-1983**	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**
C.s.sulphurea Sulawesi		9,250	4,800	—	2,525	2,900	4,265	3,065	1,900		
C.s parvula East Nusa Tenggara		2,250	1,500		550	550	725	1,100	2,950		
C.s citrinocristata – East Nusa Tenggara		2,000	1,500		600	1,500	2,300	1,500	—		
C.s.parvula West Nusa Tenggara		625	500		250	250	300	265			
C.s.parvula East Timor		0	0		0	0	0	500			
TOTAL QUOTA		15,125	8,300		3,925	5,200	7,400	6,430	5,700		1,000
Exports-Indonesia	22,948	7,680	5,199	6,244	8,930	10,510	13,467	10,748	9,099	2,055	1,440
TOTAL IMPORTS		**8,000**	**5,898**	**7,045**	**9,752**	**11,014**	**13,734**	**6,114**	**5,879**		**2,439**

3.3.2. *Illegal trade*

What is at once evident from available data is that, whilst reported trade in Yellow-crested Cockatoos has decreased enormaously since the export moratorium imposed by Indonesia in 1994, a significant number of Yellow-crested Cockatoos are still traded (Table 3).

Table 3. Reported in C. sulphurea, 1993-1996 based on CITES Annual Report data analysed by WCMC (WCMC in PHPA/LIPI/BirdLife International-IP 1998)

	1993	**1994**	**1995**	**1996**
C. sulphurea				
Net exports incl. captive bred	2055	411	359	288
Captive bred only	75	169	116	238
C.s.citrinocristata				
Net exports incl. captive bred	472	262	290	137
Captive bred only	54	57	59	73
Total net exports (All spp)	2,527	673	649	425

Illegal trade is a major threat to *Cacatua sulphurea*. On Buton island *C. s. sulphurea* is under great pressure from illegal trapping. Birds are readily available in markets at Kendari (capital city of the province of South-east Sulawesi), and locally trapped birds can be seen throughout Buton island (Caterall, 1997). On Komodo National Park trapping occured in remote areas of the National park (Butchart et al. 1996). On Sumba illegal trade in *C. s. citrinocristata* is continuing (Jones *et al*. 1995; Persulessy *et al*. 2003). Furthermore, in 1999 the species was still offered in two of Jakarta's bird markets (Indrawan in BirdLife International, 2001). In 2000, in Java and Bali 127 birds were found in bird markets in which 49 birds were from Sumba. Field data from an investigation team of NGOs showed that in June 2002 one collector in Waikabubak exported 52 Yellow-crested Cockatoos to other islands (Persulessy et al. 2003). In June 2003, 52 individual birds were shipped from Sumba (based on BirdLife Indonesia investigation data). One from 10 wildlife traders on Sumba has been sent to the first ever prison (6 months in jail and heavy fine) in 2003.

The major exporting nations are now two of Indonesia's close neighbours, Singapore and Philippines. Indonesia is frequently mentioned as the country of origin for non captive-bred birds, in particular for the many birds have been exported from Singapore. There is a strong possibility that wild caught *C. sulphurea* are leaving Indonesia illegally and are then being traded legally from other countries in Southeast Asia. Since 1992 illegal birds were confiscated, summing up to 70 birds (WCMC, 2001). There is a strong possibility that wild caught Yellow-crested cockatoos are illegally transferred from Indonesia to other countries in Southeast Asia, e.g. Singapore, and then traded legally (PHPA/LIPI/BirdLife International-IP 1998). Evidently, more than 1,000 birds were smuggled on this way after 1993 (BirdLife International 2001). During 2001-2003, there were 100-300 birds still found in bird markets in Java and Bali. The Yellow-crested Cockatoo still smuggled to Singapore through Batam Island. In 2002, 8 *Cacatua sulphurea* which was known to be not captive bred birds, found in pet shop in Singapore. In 2003, there were 10 non captive bred birds found in pet shop in Singapore (based on ProFauna, an East-Javan-based NGO's investigation data). A significant proportion of captive-bred birds originate in the Philippines. In total, in three years (1994-1996) after exports of Yellow-crested Cockatoos from Indonesia was stopped, an average of 237 captive birds were reported in trade each year, of which 430 (60% of the total) originated in the Philippines. There is possibility that not all of these individuals are captive bred, and that some may derive from wild caught birds illegally imported into the Philippines by boat. Many Philippine fishing boats trade in

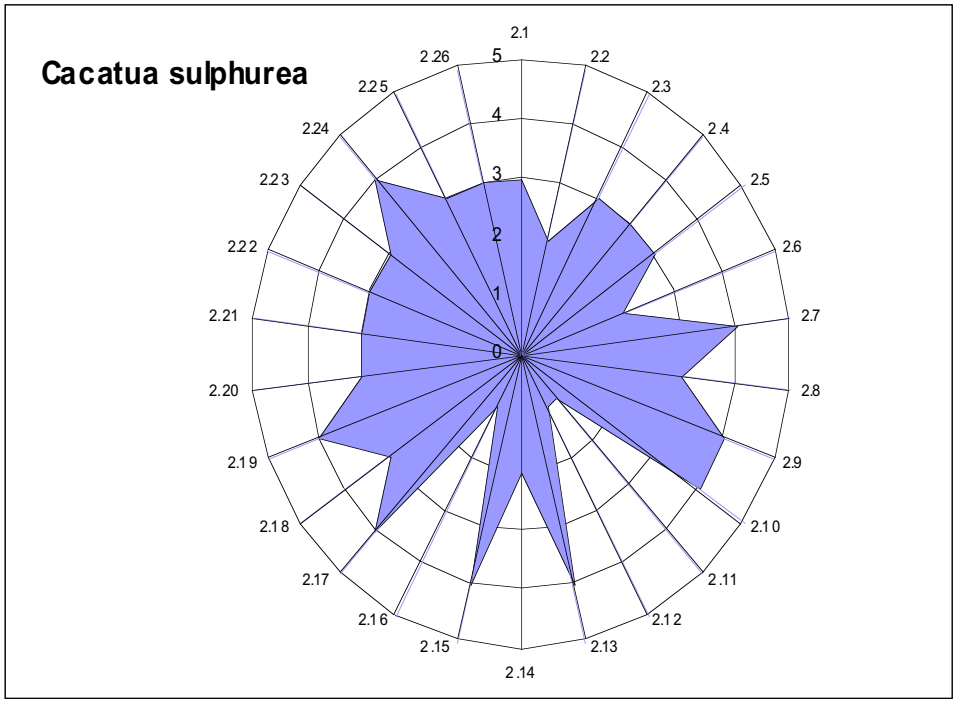
Indonesian waters, and some are known to carry illegal shipments of Indonesian parrots to Mindanao (Lambert 1997).

II. NON-DETRIMENT FINDING PROCEDURE (NDFS)

Provide detailed information on the procedure used to make the non-detriment finding for the species evaluated.

1. IS THE METHODOLOGY USED BASED ON THE IUCN CHECKLIST FOR NDFs?

_X_yes ___no



2. CRITERIA, PARAMETERS AND/OR INDICATORS USED

The Indonesian Scientific Authority uses a wide range of information to determine whether export of this bird will not be detrimental to the survival of the species. The status of *C. sulphurea* is assessed by field inventories, population assessments, scientific literature, monitoring local harvest levels, and district conservation and protection efforts.

3. MAIN SOURCES OF DATA, INCLUDING FIELD EVALUATION OR SAMPLING METHODOLOGIES AND ANALYSIS USED

Data accumulated from unregular monitoring programmes on species and conducted by Scientific Authority, Management Authority, NGOs, local universities and local peoples. BirdLife Indonesia, for example, has always participated in providing the scientific authority with actual data on *Cacatua sulphurea* population in the wild. Other source of data come from foreign scientists who conducted population surveys in Indonesia. When all data are available, the assessment of harvest level of traded species is a simple matter, but this has not always been the case. When data are minimum, the above rules of actions plays on important role in assessing the harvest level for the reason that such rules could manage wild populations of traded species. Another method of acquiring some information on the status of the species in the wild is to record data presently available from harvest activities. Transport and export permits provide information on the number of specimens for each species that has been harvested. Other information are the information on level of harvest of species under national and local protection and species of economic value, and statistics of international trade in these species; data on species distribution, population status, threats, protected measures taken, rearing and breeding conditions; domestic trade statistics from companies trading in animal parts and from specialized association related to wildlife use, etc.; local data sources comprise: biologists from local universities who have undertaken studies of distribution and status, or of use: national biodiversity inventories; government department of forestry, who may have figures on rates of habitat conversion, protected area managers, who can asses the proportion of the range or population under effective protection.

4. EVALUATION OF DATA QUANTITY AND QUALITY FOR THE ASSESSMENT

Data quantity an quality for the assessment of status population of *Cacatua sulphurea* are available, but field survey for monitoring their population should be continued,by repeating surveys conducted 8-10 years ago .

A reasonable knowledge of the biology of a species can permit one to predict fairly accurately whether a species is sensitive to exploitation. Based on this, one could lay down guidelines or quotas for exploitation of each species, taking account of domestic as well as international trade.

5. MAIN PROBLEMS, CHALLENGES OR DIFFICULTIES FOUND ON THE ELABORATION OF NDF

There are many constraint affecting the making of non-detriment findings by the SA in Indonesia, including a shortage of funds to allow the SA to work more independently and a lack of personnel with a strong biological background. In addition, there is a lack of complete and centralized information on the levels of harvest and use of species.

6. RECOMMENDATIONS

- Conduct further surveys to identify the most appropriate areas for conservation action and to periodically monitor key populations by repeating surveys conducted 8-10 years ago;
- Study the abundance and distribution of nest holes and water sources;
- Conduct ecological research to clarify options for its management and conservation;
- Encourage research into captive husbandry of *C. sulphurea*;
- Establish captive breeding facilities and develop management system for captive breeding including licencing and regulatory mechanism;
- Maintaining regular terrestrial patrols is a necessary approach to prevent disturbance to the population of Sulphur-crested Cockatoos in protected areas.
- Promote community awareness programmes;
- Provide support for relevant protected areas and conservation initiatives within its range and protect nest-trees where possible;
- Strengthen control and monitoring of trade;
- Improve law enforcement;
- Promote widespread community-based conservation initiatives;
- Providing artificial water sources near nest locations, i.e water ponds, is essential for Yellow-crested Cockatoo on Komodo Island.

REFERENCES

AGISTA, D. & D. Rubyanto. 2001. Telaah awal Status, Penyebaran dan Populasi Kakatua-kecil jambulkuning (*Cacatua sulphurea parvula*) di Taman Nasional Komodo, Nusa Tenggara Timur. PHKA/BirdLife International-Indonesia Programme, Bogor, Laporan No.17.

AGISTA, D., Sumardin, A. Hamid, F.N. Mallo, S. Alam, Harjun, and C. Mamengko. 2001. Telaah awal status, penyebaran dan populasi Kakatua-kecil jambul-kuning (*Cacatua sulphurea sulphurea*) di Taman Nasional Rawa Aopa Watumohai, Sulawesi Tenggara dan Pulau Pasoso, Sulawesi Tengah. PHKA/BirdLife International-Indonesia Programme, Bogor. Laporan No.16

ANDREW & D.A. Holmes. 1990. Sulawesi Bird Report. *Kukila* 5: 4-26

ARNDT, T. 1994. Zurück in die Freiheit. BBC Wildlife, Juli: 1-2.

BEHRENS, S. 1995. Ein Hilferuf für den Gelbwangenkakadu. Papageien 9: 280-285.

BIRDLIFE Indonesia. 2001. Conservation species: Yellow-crested Cockatoo *Cacatua sulphurea*. http://www.birdlife-indonesia.org/yellow.htm.

BIRDLIFE International, 2001. Threatened birds of Asia: The BirdLife International Red Data Book. Cambridge UK: BirdLife International.

BISHOP, 1992. New andinteresting records of birds in Wallacea. *Kukila* 6: 8-34.

BUTCHART, S.H.M., T.M. Brooks, C.W.N. Davies, G. Dharmaputra, G.C.L. Dutson, J.C. Lowen & A. Sahu. 1996. The conservation status of forest birds on Flores and Sumbawa, Indonesia. Bird Conservation International 6(4): 335-370.

CAHILL, A.J., J.S. Walker, and S.J. Marsden. 2006. Recovery within a population of the Critically Endangered citon-crested cockatoo *Cacatua sulphurea citrinocristata* in Indonesia after 10 years of international trade control. Oryx 40: 161 – 167.

CAHYADIN, Y., P. Jepson & S. Arif, 1994a. Status *Cacatua sulphurea abbotti* di Kepulauan Masalembo, Indonesia (The status of *Cacatua sulphurea abbotti* on the Masalembo Islands, Indonesia). PHPA/BirdLife International, Bogor, Laporan No. 2.

CAHYADIN, Y., P. Jepson & dan M. Syarief, 1994b. Telaah Singkat Status *Cacatua sulphurea sulphurea* di Propinsi Sulawesi Selatan (A rapid status assessment of *Cacatua sulphurea sulphurea* in South Sulawesi Province). PHPA/BirdLife International, Bogor, Laporan No.3.

CATTERALL, M. 1997. Operation Wallacea: results of the 1996 bird survey of Button Island, Sulawesi, Indonesia. Unpublished.

CIOFI, C & M.E. de Boer. 2004. Distribution and Conservation of the Komodo Monitor (Varanus komodoensis). Herpetological Jornal 14: 99-107.

COATES, B.J. & K.D. Bishop. 1997. A Guide to the Birds of Wallacea. Alderley, Queensland: Dove Publications.

DUTSON, G. 1995. The Birds of Salayar and the Flores Sea Islands. Kukila 7: 129-142.

Forshaw, J. M. 1989. Parrots of the world. Third (revised) Edition. London: Blandford Press.

IMANSYAH, M.J., D.G., Anggoro, N. Yangpatra, A. Hidayat and Y.J. Benu. 2005. Distribution and Characteristics of nesting tree of the Yellow Crested Cockatoo (*Cacatua sulphurea*) on Komodo Island in the Komodo National Park. (In Indonesian)). CRES Komodo Project-TN. Komodo, Denpasar. Report (Laporan) no. 4.

JOHNSTONE, R.E., P. Jepson, S.H.M. Butchart, J.C. Lowen & D. Prawiradilaga. 1996. The birds of Sumbawa, Moyo and Sangeang Islands, Nusa Tenggara, Indonesia. Records of the Western Australian Museum 18: 157-178.

JONES, M.J., M.D. Linsley & S.J. Marsden. 1995: Population sizes, status and habitat associations of the restricted-range species of Sumba, Indonesia. Bird Conservation

International 5 (1): 21-52.
KINNAIRD, M.F., A.F. Sitompul, J.S.Walker, and A.J. Cahill. 2003. Pulau Sumba. Ringkasan Hasil Penelitian 1995-2002: Dengan rekomendasi konservasi bagi Rangkong sumba, Kakatua cempaka dan habitatnya. PHKA/Wildlife Conservation Society-Indonesia Program, Memorandum Teknis 6.
LAMBERT, F.R. 1997. Field Assessment of the Conservation Status of the Red-and-Blue Lory *Eos histrio* in Indonesia. IUCN. Bangkok.
LONG, J.L. 1981. Introduced birds of the world. David and Charles, London, UK. Pp. 238-249.
LEVER, C. 1987. Naturilized of the world. Longmans, London, UK. Pp. 243-245.
MALLO, F.N. & I. Setiawan. 1996. Telaah Status *Cacatua sulphurea sulphurea* di Sulawesi Tengah. PHPA/BirdLife International, Bogor, Laporan No. 7.
MARSDEN, S.J. 1995. The ecology and Conservation of the Parrots of Sumba, Buru and Seram, Indonesia. Manchester: Department of Biological Sciences, Manchester Metropolitan University (Ph.D Thesis).
NANDIKA, D. 2006. Recent observations of the critically endangered sulphurea subspecies of yellow-crested cockatoo: Rawa Aopa Watumohai National Park SE Sulawesi, Indonesia. Psittascene 18: 10-11
PERSULESSY, Y., Y.B. Djawarai, and R. Marut. 2003. Survei Populasi dan Distribusi Kakatua-kecil jambul-kuning *Cacatua sulphurea citrinocristata* dan empat jenis paruh bengkok lain di Pulau Sumba (pada blok hutan di luar Taman Nasional). BirdLife Indonesia/ZGAP.
PHPA/LIPI/BirdLife International-IP. 1998. Yellow-crested Cockatoo Recovery Plan. PHPA/LIPI/BirdLife International-Indonesian Programme, Bogor, Indonesia.
SETIAWAN, I. 1996. The status of *Cacatua sulphurea parvula* in Nusa Penida, Bali, and Sumbawa, West Nusa Tenggara, Indonesia (Status *Cacatua sulphurea parvula* di Nusa Penida, Bali, dan Sumbawa, Nusa Tenggara Barat, Indonesia). PHPA/BirdLife International, Bogor, Report No. 6.
SETIAWAN, I., A. Jati, D. Lesmana, C. Trainor, and D. Agista. 2000. Telaah awal Status dan Penyebaran Kakatua-kecil jambul-kuning (*Cacatua sulphurea parvula*) di Pulau Alor, Pantar, Timor Barat, Flores dan Moyo. PHKA/BirdLife International-Indonesia Programme, Bogor. Laporan No.12.
SCHMUTZ, E. 1977. Die vogel der Manggarai (Flores), 2. Niederschrift. Unpublished.
TRAINOR, C. 2002. A Preliminary list of Important Bird Areas in East Timor: Interm list of priority sites for biodiversity conservation in Asia's newest country. BirdLife International – Asia Programme.
TRAINOR, C., F. Santana, A.Xavier, L. Dos Santos, F. Xavier, and J. Dos Lorenzo, in litt. 2004. Status of globally threatened, near threatened and restricted-range birds and internationally significant biodiversity sites in Timor-Leste (East Timor) based on participatory surveys. Summary information with particular reference to the proposed 'Conis Santana National Park (CSNP)'. BirdLife International – Asia Programme.
VERHEIJEN, J.A.J. 1964. Breeding Season on the Island of Flores, Indonesia. *Ardea* 52: 194-201.
WATLING, D. 1983. Ornithological Notes from Sulawesi. Emu 83 (4): 247-261.
WCMC, 1992. Review of Significant Trade in Animal Species Included in CITES Appendix II. Detailed Reviews of 24 Priority Species. Final report to the CITES Animals Committee. WCMC and IUCN Trade specialist Group. Cambridge.
WHITE, C.M.N. & D. Bruce. 1986. The Birds of Wallacea (Sulawesi, The Moluccas & Lesser Sunda Islands, Indonesia). British Ornithologists' Union, c/o Zoological Society, Regent's Park, London, NW1 4RY.

CASE STUDY: *CACATUA SULPHUREA*

AUTHOR:
Siti Nuramaliati Prijono

The Yellow-crested Cockatoo *Cacatua sulphurea* is one of Indonesia's most striking and popular parrots, which has had a long association with its people and culture. There are four subspecies of *Cacatua sulphurea*. It is endemic to Indonesia and Timor Leste, where it was formerly common throughout Nusa Tenggara (from Bali to Timor), on Sulawesi and its satellite islands, and the Masalembo Islands (in the Java Sea). *Cacatua sulphurea* is one of the Indonesian parrots threatened by trade and habitat degradation. Although there can be no doubt that habitat loss must have contributed substantially to the overall decline in the species population, the blame for the precipitous drop in numbers in the past quarter of the 20th century lies entirely with unsustainable exploitation for trade whether domestic or international. Inbreeding and stochastic events are likely to threaten very small and very isolated relict populations such as those on Masakambing and Nusa Penida. This bird is currently classified as a *Critically Endangered* species.

For many years *Cacatua sulphurea* was traded in large numbers for international pet market. In 1981 *C. sulphurea* was listed in CITES Appendix II. Indonesia regulates the trade in wild caught birds through the allocation of capture quotas. The total number of birds taken from the wild in the period 1981-1992 could have been as high as 190,000. The actual numbers of individuals caught in the wild during this period must be higher than these figures since mortality, domestic trade and any illegal trade must be added to export and import figures. There are many constraint affecting the making of non-detriment findings by the Scientific Authority (SA) in Indonesia, including a shortage of funds to allow the SA to work more independently and a lack of personnel with a strong biological background. In addition, there is a lack of complete and centralized information on the levels of harvest and use of species. The current system of national export monitoring was likely to be relatively unreliable considering the lack of knowledge regarding levels of illegal trade.

Indonesia subsequently imposed a zero export quota and prohibition of hunting of the species in 1994, backed up in subsequent years by local (regency-level) legislation. Since 1999 all sub-species of *C. sulphurea* is fully protected in Indonesia. However, it cannot be assumed that the problem is solved. Since NDF was implemented and a zero quota caught birds was established in Indonesia, there has been increase of international trade in supposedly captive-bred birds.

Unfortunately, neither the zero quota nor the EU and US import bans for wild specimens and protected by the Indonesian laws appear to be effective. There is substantial evidence that birds still being taken from the wild, with some then passed on as captive-bred birds for international trade. It seems that illegal trade is a major threat to *Cacatua sulphurea*. Therefore, since 2002, it was listed in Appendix I of CITES.

CASE STUDIES – SAKER FALCON (*FALCO CHERRUG*)

AUTHOR:
Frederic J. Launay
IUCN/SSC Re-introduction Specialist Group, Chair; Environment Agency-Abu Dhabi

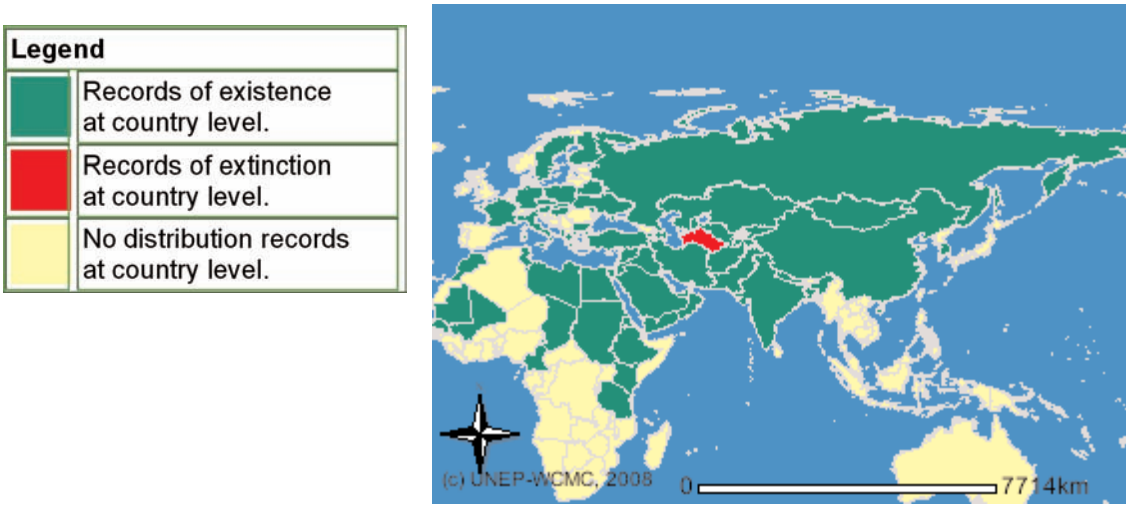
I. Background information on the taxa

1. BIOLOGICAL DATA

1.1. Scientific names and common names

Falco cherrug – two subspecies recognised so far: *F.c. cherrug* and *F.c. milvipes*
Common name: Saker Falcon

1.2. Distribution



Range & population *Falco cherrug* occurs in a wide range across the Palearctic region from eastern Europe to western China, breeding in Austria, Hungary, Czech Republic, Slovakia, Serbia & Montenegro, Bulgaria, Romania, Moldova, Belarus, Ukraine, Turkey, Iraq, Armenia, Russian Federation, Uzbekistan, Tajikistan, Kyrgyzstan, Kazakhstan, Mongolia and China, and at least formerly in Turkmenistan and probably Afghanistan, possibly India (Ladakh), with wintering or passage populations regularly in Italy, Malta, Cyprus, Israel, Jordan, Egypt, Libya, Sudan, Tunisia, Ethiopia, Kenya, Saudi Arabia, Yemen, Oman, UAE, Bahrain, Kuwait, Iran, Pakistan, India, Nepal, Afghanistan and Azerbaijan, with much smaller numbers or vagrants reaching many other countries[3,4,6,9,11]. The global population was estimated to be 8,500-12,000 pairs in 1990 compared to 3,600-4,400 pairs for 2003[6]. The population is therefore estimated to have declined by 48-70% over this period, with a best estimate (between median estimates for 1990 and 2003) of 61%. Declines for the following countries give particular cause for concern: Kazakhstan (90% decline from median of 1990 estimates to median of 2003 estimates), Uzbekistan (90% decline), Russian Federation (69%), Kyrgyzstan (68%) and Mongolia (59%)[6]. Assuming a generation length of five years and that the decline of the Saker began (at least in some areas) in the 1970s and 1980s (consumption of Sakers in the Middle East was heavy by mid-1980s), the declines over 13 years equate to 66% over 15 years (based on median estimates), with a minimum-maximum of 53-75%.

1.3. Biological characteristics

1.3.1. *General biological and life history characteristics*

Laying generally in April – may on cliff ledges and crags; also nest in tall trees, particularly in western part of its range. Can occupy abandoned nests of other raptors, corvids or other birds. In part of its habitats where deforestation is widespread, nesting has been recorded on pylons and exceptionally on small mounds on the ground. It can reuse same nest or move between various nests from year to year. The clutch is normally 3 to 5 eggs and replacement clutches have been recorded. Incubation last over 30 days, mainly by the female, the male bringing most of the food as the female usually does not hunt until the second half of the nestling period. Fledging generally occurs around 45-50 days and the young still depend on the parents for another30-45 days. Two to three chicks from a clutch of five will reach fledging age. Sexual maturity at 2-3 years, exceptionally as early as one year old. The species is mainly migratory or nomadic in part of its range. In the southern range it is dispersive or sedentary. Wintering visitor in the North

of Pakistan, Arabian Peninsula, Eastern Africa and in some parts of the Middle-East and China. In the northern part of its range will leave its breeding ground from late August to October. However some pairs have been recorded all year round even in Northern regions. Pairs return on their breeding grounds in March – April.

1.3.2. *Habitat types*

The main habitat is steppe, sometimes wooded, and in some cases even woodlands. Also occurs in rocky cliffs and canyons. Wide range of altitudinal distribution from plains to altitudes as high as 4700m. Outside the breeding season the range of habitat used in wider but mainly open, rarely along the coasts, sometimes over lakes or marshes.

1.3.3. *Role of the species in its ecosystem*

The Saker is physically adapted to hunting close to the ground in open terrain, combining rapid acceleration with high manoeuvrability, thus specialising on mid-sized diurnal terrestrial rodents (especially ground squirrels *Citellus*) of open grassy landscapes such as desert edge, semi-desert, steppes and arid montane areas; in some areas, particularly near water, it switches to birds as key prey, and has recently substituted domestic pigeons for rodents in parts of Europe[3,11]. It uses copses or cliffs for nest sites (sometimes even the ground), occupying the old nests of other birds. Clutch sizes vary from two to six, with means from 3.2 to 3.9 in different circumstances. Breeding success varies with year (especially in areas where rodents cycle). Birds are sedentary, part-migratory or fully migratory, largely depending on the extent to which food supply in breeding areas disappears in winter.

1.4. Population:

1.4.1. *Global Population size*

Despite its apparent rarity, the world population might number 35 to 40,000 pairs. The numbers and population trend are not accurately known, particularly over Asia, however it is generally accepted that the migrating Asian population is declining where some resident populations are relatively stable.

1.4.2. *Current global population trends*

___increasing __XX_decreasing __X_stable ____unknown

1.5. Conservation status

1.5.1. *Global conservation status* (according to IUCN Red List):

___Critically endangered ___Near Threatened
_X_Endangered ___Least concern
___Vulnerable ___Data deficient

1.5.2. *National conservation status for the case study country*

Protected under United Arab Emirates Federal Law 24 (1999). In most other countries of its distribution range the Saker falcon is protected

1.5.3. *Main threats within the case study country*

___No Threats
_X_Habitat Loss/Degradation (human induced)
___Invasive alien species (directly affecting the species)
_X_Harvesting [hunting/gathering]
___Accidental mortality (e.g. Bycatch)
___Persecution (e.g. Pest control)
___Pollution (affecting habitat and/or species)
___Other_____
___Unknown

In Europe the Saker has suffered mainly from the loss and degradation of steppes and dry grasslands through agricultural intensification, plantation establishment and declines in sheep pastoralism, causing a decline in key prey species; offtake for falconry is also a problem, which has caused local extinctions. In eastern Hungary, landscape reversion following the abandonment of agriculture could have a negative influence, as most prey species require short swards that are maintained by agricultural practices. Elsewhere declines are mainly attributable to offtake for falconry, although human persecution, pesticide use (notably in Mongolia in 2003) and agrochemical deployment play a lesser part. Estimated numbers of Sakers trapped annually for Middle East falconers are 4,000 in Saudi Arabia, 1,000 in Qatar and 500-1,000 in each of Bahrain, Kuwait and UAE, which, allowing for a 5% mortality prior to receipt, indicates an annual consumption of 6,825-8,400 birds. Of these, the great majority (77%) are believed to be juvenile females, followed by 19% adult females, 3% juvenile males and 1% adult males, potentially creating a major bias in the wild population. Hybridisation with escaped or released hybrid falcons could influence the genetic integrity of wild populations. In the UAE, the threats are mainly trapping for falconry and / or illegal trade, mainly from Central Asia, Iran, and Pakistan.

2. SPECIES MANAGEMENT WITHIN THE COUNTRY FOR WHICH CASE STUDY IS BEING PRESENTED

2.1. Management measures

2.1.1. *Management history*

This is mainly a winter migrant to the UAE and therefore would only be found here in the winter months. Management of the species was initiated after CITES issued a trade suspension on the UAE (originally not link to trade of falcon species. To overcome the trade suspension, a management system for falconry birds needed to be put in place.

2.1.2. *Purpose of the management plan in place*

The purpose of the management plan is to eliminate the illegal trade of saker falcons and control the legal trade. It is also aimed at allowing the traditional practice of Arab falconry (with frequent transborder crossing for hunting trips) with the legal obligation of international law, in particular CITES.

2.1.3. *General elements of the management plan*

The main elements are a strict application of CITES for import – export and re-export of Saker Falcons, the enactment of a strict national legislation on wildlife trade, confiscation, registration of the falconry birds in the country (through a network of dedicated falcons hospital. The registration needs to happen within a week of the legal import of any falconry birds (wild or captive-bred) or within two weeks on a bird being hatched in one of the UAE captive-breeding centres. At registration each birds is given a close – ring and PIT, its owner, sex, photo, ring and PIT number, entry (or hatching date) are entered in a register. The hunting birds are also issued a "falcon passport" under CITES to allow for regular movements of the bird across borders.

2.1.4. *Restoration or alleviation measures*

A number of captive-breeding have been established in the UAE and elsewhere, and the UAE recently banned the import of wild-caught saker falcons. A number of conservation initiatives (falcons' releases, artificial nesting and field studies) have also been initiated by the UAE in various range states in Central Asia, China and Mongolia).

2.2. Monitoring system

2.2.1. *Methods used to monitor harvest*
There is a small harvest which takes place under special circumstances of wintering falcons. These falcons are then fitted by an open ring and PIT by the proper authorities and register.

2.2.2. *Confidence in the use of monitoring*
The import monitoring is now quite strict. It is however difficult to control the illegal shipment arriving through third parties, as the real origin of the birds is difficult assesses.

2.3. Legal framework and law enforcement:

UAE FEDERAL LAW:

- There is a UAE Federal Law 24 (1999) Concerning Protection and Development of the Environment as amended, and its Executive Order issued by Council of Ministers Decree No. (37) of 2001.
- UAE Federal Law 11 of 2005 on Wildlife Trade. This law enforce strictly all requirements of the CITES convention within the legal system of the UAE.

CITES:

- Notification to the Parties, No. 2006/012, which states that UAE will not allow live falcons to be imported into the UAE unless they have a closed ring whose number or ID is also clearly marked on the CITES permit.
- Notification to the Parties, No. 2006/061, regarding Review of Significant Trade Trade in *Falco cherrug*. With nine range States where the species was categorized as 'of urgent concern' and to 26 range States where it was categorized as 'of possible concern'. With regard to the range States for which trade in *Falco cherrug* was categorized as of 'urgent concern', the Secretariat informs Parties that until further notice, the Islamic Republic of Iran, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, the Russian Federation, Saudi Arabia, Turkmenistan and Uzbekistan have suspended the issuance of export permits for *Falco cherrug*. Also the Parties are requested to inform the Secretariat if an export permit for specimens of *Falco cherrug* from one of these countries is presented to them.

3. UTILIZATION AND TRADE FOR RANGE STATE FOR WHICH CASE STUDY IS BEING PRESENTED

3.1. **Type of use** (origin) **and destinations** (purposes)

This species is mainly used for falconry purposes. Since the UAE Notification No. 2006/012 does not allow birds without closed rings this would imply that falcons coming in would either be from captive-bred operations and/or ranching operations. Also due to notification No. 2006/061 there are some bans in place on countries which were legally exporting specimens e.g. from quotas or ranched operations.

3.2. Harvest:

3.2.1. *Harvesting regime*

There is some live trapping allowed under special circumstances as the UAE does not allow hunting of its natural resources as per its Federal Laws.

3.2.2. *Harvest management/ control* (quotas, seasons, permits, etc.)

The birds captured have to be fitted with an open ring and such birds when presented to the appropriate management authority have to sign a document under oath.

3.3. Legal and illegal trade levels

To the extent possible, quantify the level of legal and illegal use nationally and export and describe its nature. It is estimated that between 6 to 9,000 saker falcons are imported in the Arabian Peninsula (Saudi Arabia, Kuwait, Qatar, Bahrein and the UAE) for falconry purposes. In the UAE, it is estimated now that since the implementation of Federal Law 11 in 2005, around 90% of the imports are now legal. Since UAE notification 2006/012 the number of wild caught sakers imported in the country has dramatically decreased. However it has been reported that wild caught sakers are now finding their way through Qatar and Saudi Arabia. The export of saker falcons from the Arabian Peninsula is minimal, and essentially to send prime falcons to breeding facilities abroad.

II. NON-DETRIMFNT FINDING PROCFDURE (NDFS)

1. IS THE METHODOLOGY USED BASED ON THE IUCN CHECKLIST FOR NDFs?

_X_ yes ___ no

2. CRITERIA, PARAMETERS AND/OR INDICATORS USED

3. MAIN SOURCES OF DATA, INCLUDING FIELD EVALUATION OR SAMPLING METHODOLOGIES AND ANALYSIS USED

4. EVALUATION OF DATA QUANTITY AND QUALITY FOR THE ASSESSMENT

5. MAIN PROBLEMS, CHALLENGES OR DIFFICULTIES FOUND ON THE ELABORATION OF NDF

6. RECOMMENDATIONS

NDF are only useful if they are known and available to the importing countries. Export permits are issued by the country of origin, not by the importing country. In most cases the importing country does not know if NDF has been done, and even if done, the importing country does not know it validity. In the case of the UAE, it did happen several time, that UAE did confiscate falcons that were imported with CITES documents issued by the "proper" country of origin authorities but where the birds where not the one declare on the papers, where declared as captive-bred when no such facilities exists in the country of origin, or when UAE authorities were made aware of a suspicious consignment.

CASE STUDIES – SAKER FALCON (*FALCO CHERRUG*)

AUTHOR:
Frederic J. Launay

Falco cherrug occurs in a wide range across the Palearctic region from eastern Europe to western China, The global population has declined an estimated 61% from 8,500-12,000 pairs in 1990 to 3,600-4,400 pairs in 2003 with the greatest reductions in Kazakhstan, Uzbekistan, the Russian Federation, Kyrgyzstan and Mongolia. While other estimates suggest the population may be higher, it is still listed as Endangered by IUCN. Threats to the species include habitat changes and other impacts of changes in agricultural practice across much of its range, and harvesting for falconry.

Management in the United Arab Emirates, which is part of the migratory but not the breeding range, has been implemented in order to control illegal trade and manage legal trade. The species is under strict protection, and meeting CITES requirements constitutes a central feature of management, particularly for import, export and re-export. Live-trapping of wild birds is only permitted under special circumstances.

Since the implementation of federal laws it is estimated that 90% of the 6-9000 saker falcons imported into UAE are from legal sources and very few of them are wild caught. Because there are presently no exports of wild individuals from UAE, NDFs are not currently undertaken.

In some cases the UAE has refused imports of birds when the NDF information available to them has not been able to be validated. However, generally, the importing country does not know whether and NDF has been done or how to assess its validity. This case study illustrates the value of the details of NDFs being known and available to the importing countries.

NDF WORKSHOP
CASE STUDIES
WG 6 – Birds
CASE STUDY 6
Psittacidae
Country – **MEXICO**
Original Language – **Spanish**

CONSERVATION AND SUSTAINABLE USE OF PARROTS IN MEXICO

AUTHOR:
Ariel Rojo Curiel

This document is based on the results of the Workshops on Conservation and Sustainable Use of Wild Birds and Mammals in relation with Wildlife Management Units (known as UMAs) in Mexico[1], organized by the General Directorate for Wildlife (*Dirección General de Vida Silvestre*, SEMARNAT), the National Institute of Ecology (*Instituto Nacional de Ecología*, SEMARNAT), *Unidos para la Conservación A.C.* and Oscar Sánchez, and held on 24-26 July 2006 and 4-6 September 2006 respectively in Mexico City.

PREFACE

The current administrative framework for the sustainable use of wildlife in Mexico is based on the concept of Wildlife Management Units known as UMAs (*Unidades de Manejo para la Conservación de Vida Silvestre*). One of the main premises of this framework is that properties registered as UMAs must promote the conservation of local native biota by maintaining the natural richness of wild communities and local and regional species abundance and recruitment patterns, which contribute to the functioning of the ecosystems present. UMAs are especially responsible for guaranteeing the continuity and functionality of the local and regional populations of the target species they are interested in using.

To achieve this, technical experts in charge of UMAs and government officials overseeing the implementation of conservation programs need to have a shared framework of reference for the biological principles to consider in their respective tasks. Besides, technical staff in charge of conservation programs in UMAs also need guidelines to establish and implement programs for the assessment, management and monitoring of wild populations and their habitats within the property but also considering its surroundings. The staff must also

[1] DGVS, 2006. Talleres sobre conservación y uso sustentable de aves y mamíferos silvestres, en relación con las Unidades de Conservación y Manejo de Vida Silvestre (UMA) en México. INE-SEMARNAT-UPC.

have elements available to help them make cautious decisions about the viability – or not – of harvesting part of the populations (that the fraction observed in the UMA belongs to). If the biological viability of such harvest is fully justified, the technical staff need to have clear expertise, skills and guidelines to be able to systematically monitor the status of the target populations to observe their trends and changes, so that they can better guide their management practices towards long-term sustainability.

The ideas mentioned above were the basis for the design and development of the Workshops on Conservation and Sustainable Use of Wild Birds and Mammals in relation with Wildlife Management Units (UMAs) in Mexico. The workshops were attended by experts from academic institutions and NGOs with experience in the conservation of the conservation of the most widely used wild species in Mexico, as well as technical experts from Mexican and American government agencies working jointly on binational wildlife conservation projects.

One of the working groups in the workshops was devoted to Parrots. The results of the working group are explained below with the aim of contributing to the discussions of the Working Group on Birds of the International Expert Workshop on CITES Non-Detriment Findings.

PARROTS

The discussions of the working group were based on the model proposed by Ariel Rojo Curiel and Lizardo Cruz Romo (*Dirección General de Vida Silvestre*, SEMARNAT), which was analyzed and optimized by the participants at the Workshop.

Preparation of the document

Katherine Renton, Eduardo Íñigo Elías, Juan Cornejo, Lizardo Cruz Romo

Participants in the working group

Gerardo Carreón, NATURALIA, A. C.
parkswatch@naturalia.org.mx
Juan Cornejo, AFRICAM SAFARI
jcornejo@africamsafari.com.mx
Lizardo Cruz Romo, DGVS – SEMARNAT (moderator)
jesús.cruz@semarnat.gob.mx
Carlos Gracida, ASOCIACIÓN U'YO'OLCHÉ A. C.
betogracida@gmail.com
Eduardo Íñigo Elías, CORNELL LAB OF ORNITHOLOGY
eei2@cornell.edu
Filemon Manzano, DGVS – SEMARNAT
filemon.manzano@semarnat.gob.mx
Tiberio Monterrubio, UNIVERSIDAD MICHOACANA DE SAN NICOLÁS DE HIDALGO tiberio@zeus.umich.mx
Katherine Renton, ESTACIÓN DE BIOLOGÍA CHAMELA – UNAM
krenton@ibiologia.unam.mx
Yamel Rubio, FAC. DE BIOLOGÍA - UNIVERSIDAD AUTÓNOMA DE SINALOA
yamel@uas.uasnet.mx

Introduction

The parrot family (Psittacidae) is a group represented by 352 species globally. Mexico has 22 species of parrots, which occur in practically all the states of the country (PREP, 2000). Parrots have zygodactyl feet (two toes forward, two backward), adapted to move about easily in the forest canopy. Mexican parrots have a great variety of sizes, with a length ranging from 12-14 cm in *Forpus cyanopygius* to 96 cm in *Ara macao*. Their color patterns are also very diverse, but they are generally recognized by their bright green color, which is common in the species of the genera *Amazona* and *Aratinga*. Although they usually have little sexual dimorphism, certain species have different color patterns on their head. This also helps distinguish juveniles from adult specimens. Besides, the eyes of juveniles have a darker pigmentation than those of adults, whose eyes are usually pale or amber (Howell and Webb, 2001).

Parrot chicks are altricial (helpless at birth) and therefore require great parental care. This usually occurs in tree hollows, termite mounds or rock cavities. Availability of such cavities – a crucial aspect in the reproductive biology of this bird family – is a limiting factor. Although parrots are mainly distributed in tropical regions, two species in Mexico occur exclusively in the pine forests in the mountain ranges of the Sierra Madre Occidental and the Sierra Madre Oriental (Ceballos and Eccardi, 1996). In these regions, parrots feed mainly on seeds and fruits (Howell and Webb, 2001).

Currently, close to 31% of Neotropical parrots are at risk of extinction (Collar, 1996). The main causes that have led these species to such levels of risk are the loss, fragmentation and degradation of their habitat – mainly habitat directly related to breeding –, the harvest of individuals for the pet trade, and the killing of large groups of these and other species in crop farming areas to reduce crop losses. The reproductive biology of these species itself increases the scope of such threats, as parrots are long lived and most of them are monogamous, forming bonds that last for life in many species; they also have very specific nesting sites and their young require great parental care; finally, the breeding success of these species is usually low. For all these reasons, annual recruitment in these populations is low and should be considered as a key aspect when determining the sustainability of harvesting these species.

A. Important population aspects of the species (or groups of species) for the conservation and management of a sustainable harvest in Wildlife Management Units (UMAs)

According to the dimensions of the known home ranges of various species of parrots, the surface of most UMAs is usually not large enough to guarantee their proper management. It is important to consider that these birds move considerably throughout the year depending on the availability of resources. One of the basic parameters for responsible management is the productivity of populations, which requires knowing at least the availability of nesting sites in a given UMA, the actual occupation of such sites and effective reproductive output.

Under these considerations, two basic scales have been identified to determine the status of the populations:

- It is necessary to increase regional knowledge about each species and subspecies, including the conservation status of the habitat, densities, and the level of risk faced by the species in that region.
- On a local level, it is essential to know the density and specific productivity levels of populations in a given area.

Study methods to apply at the local level are explained below; regional management is dealt with in Section C of this document.

The most important aspects of population biology or population ecology that should be considered when dealing with the conservation of parrots, especially regarding their management in large UMAs related to such species, are the following:

a) The baseline population size appropriate for the conservation of the species;
b) Population trends (which need to be monitored by sampling the population at least once a year; this exercise should be repeated regularly in the long term);
c) Size of the area required by the population;
d) General and specific nesting habitat requirements (critical for the natural development of every species);
e) Population demographics (productivity, mortality, age at first reproduction, and population growth rate, among others);
f) Historic and recent impacts affecting the species or the population in the UMA and the region where it is located (historic harvest level, impact of natural climatic phenomena, level of deforestation in the area, restoration activities undertaken or surface of habitat conserved in the UMA, presence of protected areas and management).

Estimated population size (surveys)

To estimate population size, we propose a protocol that defines the time frame, effort and method of analysis of data obtained through sampling:

Sampling time frame.- The recommendation is to work at the beginning and towards the end of the breeding season of each annual period (November to February) to estimate the resident population. Dates may slightly vary depending on the species dealt with and the region of the country where it occurs; however, to avoid overestimating the population size, the sampling should not be made during periods when all the individuals of the population are grouped together, including fledglings produced in the same season. Additionally, in one breeding season it is possible to observe the pairs that will try to breed in the next season, which provides information about population demographics.

Sampling effort.- For the most common species, it is recommended to use at

least 100 point counts (50 point counts is acceptable if counts are made 2 or 3 times during the breeding season). Sampling effort should be increased if it is not enough to make an appropriate estimate of population density.

Sampling protocols should be designed according to the conditions of the habitat and the species studied (it is not the same to estimate the population of an *Aratinga*, whose movements cover relatively small areas, than to estimate that of a macaw, which can move around an area covering several states or even countries). The representativeness of the sampling method in analyzing the counts made can be assessed with counting software such as DISTANCE. This makes it possible to determine whether the sampling was representative for the area of interest (Buckland *et al*. 1993).

In any case, the sampling effort should always be described; that is, the number of point counts per transect, the number of transects and the length and direction of the transects. The points and transects should also be marked on a geographical map with the help of a GPS at a scale that shows their location unequivocally. To do so, it is necessary to include the UTM (Universal Transverse Mercator) coordinates of each point count and the start and finish of each transect. If the UMA has a fixed infrastructure for the point counts, such as observation towers or platforms in tall trees, such places should be clearly shown on the maps, indicating their coordinates.

Sampling schedule.- Point-distance sampling should take place in the first three hours of the morning, when parrots are most active; travel routes, roosts and feeding grounds should be avoided so as not to overestimate the population.

At each point count, the counting interval should not exceed 10 minutes; in each transect or sampling route, the points should be at least 200 or 300 m from the observation limit, that is, the farthest distance to the center of the area where an individual or group of individuals was seen (Casagrande and Beissinger, 1997; Marsden, 1999; Bibby *et al*., 2000).

Additionally, relevant data about the site should be recorded, such as the weather conditions at the time of sampling, type of habitat, time of detection, bird species, number of individuals, mode of detection (visual or call), activities such as perching, escape due to the presence of the observer or simple flight over the area. The distance between the observer and the bird should be recorded as accurately as possible. If possible, additional observations should be recorded, such as the direction of the flight or the direction observed in the bird or flock.

To calculate the density of individuals, data analysis techniques based on the algorithm of distance to the transect should be used (the DISTANCE computer package mentioned above, for example.
See http://www.ruwpa.st-and.ac.uk/distance/).
In this case, it is important to record individuals that are perched (i.e., effectively using the habitat) and measure the distance between the observer and the bird accurately to obtain a reasonable estimate of the number of individuals per unit of area.

Sampling should be stratified, that is, transects should cover the different types of representative natural habitat of the UMA. This is done by considering the surface occupied by each habitat in proportion to the total surface of the UMA. In each habitat, the point counts or transects should be placed randomly as much as possible to avoid sampling biases; such biases usually happen when transects are placed in areas with a high concentration of individuals, that is, around crop fields, migration routes or roosts (a specific technique is proposed for sampling roosts; see below). As mentioned earlier, density estimates should be based on records of individuals perched in the habitat. They should be calculated for individual species and habitat types separately. To do so, we suggest using the format included in Annex I.

Sampling roosts.- There is an additional possibility of making counts in roosts to obtain a specific estimate of the number of individuals that use the site. This involves finding the different roosts and making the counts in the morning, precisely when the individuals leave these sites. We recommend making 5 randomly chosen counts for each of these sites in a month to obtain an estimate of the average number of individuals per roost and determine sample variation (Cougill and Marsden, 2004; Berg and Angel, 2006). Counts made in roosts must not be taken as a basis for – or lead to – an estimate of the number of individuals per area, because they do not include any information about the distance traveled by the individuals congregating in the roost. In some cases, individuals may travel up to 25 km between their roost and feeding grounds.

Sampling from high observation points.- This method can be used to estimate the relative abundance of a parrot species in the area. The following protocol should be followed in this type of observation: count the number of individuals for 10 or 15 minutes and use the average, that is, the number of individuals flying in just one direction (e.g., towards the roost). It is very important to clarify that the use of this method does not exempt the operator from monitoring the distance from the individuals detected to the transects. This leads to a better knowledge of relative density and eventually leads to determining the minimum size of the population that frequents the area. It is also important to highlight that this method should not be used alone to estimate abundances in parrot species as it may lead to population overestimates, especially when the sampling area is located near protected areas. Therefore, the result of this type of counts should be compared with fixed point monitoring, as mentioned in this document.

Local sampling efforts aimed at making population estimates can provide important information about population trends in the region in the medium term if they are conducted for several consecutive years. This is of considerable importance, as it can show declines in the abundance of parrots in specific areas (the case of certain parrot species in the state of Guerrero, for example).

Estimating the production of a population

Certain demographic parameters are necessary, not only to estimate the status and trends of a population, but also to set reasonable harvest rates every year for different species with an approach clearly based on conservation and sustainable use. The General Directorate for Wildlife (*Dirección General de Vida Silvestre,* DGVS) has already made a bibliographic review of various documents.

This has been used to produce a table with the known population productivity parameters of several parrot species, with a special focus on Mexican species but also considering genera that also occur in other regions of America. Additionally, the table has made it possible to establish reference values to define a cautious harvest algorithm (Table 1).

Although there is currently abundant information for some species in certain regions of the country, it is necessary to determine the regional contribution of productivity in UMAs that manage parrots; the following method should be used to determine the productivity of the population of each UMA:

a) The method is based on counting the number of nests in the study area (UMA or region in the case of small UMAs).
b) The characteristics of the nests should be identified: tree species where the nest is located, living or dead tree, tree diameter at breast height, tree height, height of the cavity and type of habitat. If there is a plan to place artificial nests in the UMA, it is essential to obtain key data beforehand on the characteristics of the natural cavities used (e.g., height from the ground, orientation, entrance size, shape, and depth, among others).
c) Clutch size (total number of eggs laid in each nest to calculate the average clutch size with data for several years, comparing different regions).
d) Nesting success: proportion of successful nests (nests with at least one fledged chick).
e) Productivity: number of fledglings per successful nest and number of fledglings per pair.

The previous data should be used to produce reasonable estimates of chick births and deaths. This kind of monitoring should be made during the harvest season in the nests whose harvest has been planned, to avoid disturbing the nests that are not going to be harvested each season. We recommend using the format shown in Annex I to collect data from nest monitoring.

As we already mentioned earlier, relative population density should be analyzed using the DISTANCE computer package (http://www.ruwpa.st-and.ac.uk/distance/). Distance is used to determine population density using the perpendicular distance of individuals from the transect line; this refers to the number of individuals seen (alone or in groups), their location along the transect, and their distance from the observer. The computer program also assesses the representativeness of the sample and can produce comparative values if the sampling is separated by habitat type. However, when calculating relative density with DISTANCE, a cautious criterion should be applied: only values corresponding to the lower limit of the confidence interval should be used.

Additionally, when counting individuals in roosts, it is necessary to count the average number of individuals of each species counted in each sampling. This figure will only provide a relative abundance index, so it is still necessary to determine density using distance from the observer in points along transects.
Productivity should be not only be estimated by considering the number of pairs that make nesting attempts every year. It is also necessary to consider the average number of observations of eggs, chicks – during the systematic

monitoring of nests – and fledglings/successful nest every season, as well as losses at each stage of development.

Early warning signs of declining trends in a population of parrots include the following:

- Decline in population size estimates
- Three consecutive years of drought in the area
- Three consecutive years of low productivity in the population: high chick mortality or decline in clutch size or brood size
- Increase in the type, number and/or scope of threats to the population in the area, such as capture of individuals with nets, for example

B. Important habitat-related aspects of the species (or groups of species) for the conservation and management of a sustainable harvest in Wildlife Management Units (UMAs)

The most important components of the habitat for parrot species include the habitat area required by the individuals of the species for their daily activities (also known as home range); nesting habitat, that is, species and size of the trees used; foraging habitat or feeding sites; and resting areas. It is important to consider that some species are more flexible than others in using areas with a greater level of disturbance or even agricultural land. Others, however, have stricter habitat requirements and require undisturbed areas. As regards home range, the information available is limited to the few species that have been the subject of this type of study.

In a UMA, it is necessary to identify the surface occupied by the different habitat types present (forest, conserved primary habitat, regenerating secondary habitat, deforested areas and agricultural land). As a complement to this information, it is important to record vegetation types and their characteristics, as well as processes and trends in vegetation types and land use.

The following information about the habitat should be provided by the technical staff in charge of a UMA in its Management Plan:

a) Total surface of the UMA
b) Location and area covered by the various vegetation types in the UMA
c) Description of the characteristics of the vegetation types and list of tree species present in the UMA

The following procedure should be followed every year to monitor the characteristics of the habitat:

- Sample specific plots in each vegetation type, using a compass to measure the distance to the closest tree towards the four cardinal points; measure the diameter and height of the tree and identify the closest tree species (Marsden and Pilgrim, 2003);
- Record changes in land use or changes in vegetation caused by the impact of hurricanes or fire, among other causes;
- The habitat type in each UMA should be placed in its regional context,

based on the information available in INEGI (the Mexican National Institute of Statistics and Geography) or the forest inventories available (SEMARNAT-INE-*Instituto de Geografía* UNAM). This will produce an index with information about the general trend of the habitat type in the region, which can be compared to those observed in the rest of the country.

Before organizing the harvest, it is necessary to generate reliable information about the habitat and area requirements of each target species to determine whether the harvest is viable. If so, the minimum requirements should be defined to guarantee a sustainable harvest of parrots at the appropriate working scale for each species. Again, we recommend using a standard format to capture data on habitat status. Our recommended format is shown in Annex I.

UMAs planning to manage parrot species for a commercial harvest must contain the necessary natural habitat to sustain stable breeding populations. This absolutely requires an assessment of the nests in the area, identifying active nests (and potential nesting sites, even if they were not active when reviewed).

Habitat management practices recommended in some cases to promote the presence of species of interest include the following:

- Reforestation with native tree species
- Increase of the forest area devoted to conservation
- Placement and monitoring of artificial nests when the species' reproductive biology makes it possible
- Protection of natural nests against predators
- Surveillance of nests to prevent nest poaching, destruction of nests and especially legal and illegal logging

We identified the following as early warning signs of habitat degradation:

- Increase in the rate of change of land use and decline of conserved forest area
- Serious drought in the region for 3-4 consecutive years
- Adverse climate forecasts for the region (e.g., increase in the intensity and frequency of hurricanes caused by habitat deforestation; loss of food resources caused by the destruction of foliage, flowers and fruits and a consequent increase in the intensity of fires in the dry season after the hurricane season – a common phenomenon over the last 10 years in the states of the Yucatan Peninsula and the Pacific side of Chiapas).
- Increase in the legal or illegal logging of important trees providing food or nesting sites for the species.

Table 1. Productive parameters in free-ranging Mexican parrots and genera shared with other countries

	Species and category in the Mexican endangered species list	Breeding population %	No. of eggs/ nest	Hatching success	Fledgling success	Nesting success (at least 1 chick)	Production of fledglings/ successful nest	Fledglings/ breeding pair	Source
Mexican species	*Amazona*		3.77	0.82					Gracida, 1998
	Amazona autumnalis		2.7	0.72	0.56	0.48		0.9	Masello & Quillfeldt, 2002
	Amazona finschi (Threatened)	15-20	2.6	0.74	0.57	0.42	2.27	0.99	Renton & Salinas, 2004.
	Amazona oratrix (Endangered)		2.6	0.94	0.33	0.22		0.3	Masello & Quillfeldt, 2002
	Amazona viridigenalis		3.4	0.84	0.47	0.48		1.4	Masello & Quillfeldt, 2002
	Aratinga strenua (Threatened)		2.8	0.91	0.5	0.5		1.3	Masello & Quillfeldt, 2002
	Rhynchopsitta pachyrhyncha (Endangered)		2.7	0.81	0.78	0.82		1.7	Masello & Quillfeldt, 2002
Non-Mexican species	*Forpus passerinus*		7	0.81	0.83	0.64		4.7	Masello & Quillfeldt, 2002
	Brotogeris versicolorus		5.4		0.41			0.5	Masello & Quillfeldt, 2002
	Amazona leucocephala		3.5	0.56	0.54			0.8	Masello & Quillfeldt, 2002
	Amazona vittata		3	0.84	0.49	0.69		1.5	Masello & Quillfeldt, 2002
	Amazona barbadensis		3.38	0.51	0.41			1.27	Sanz & Rodriguez, 2006
	Amazona aestiva	50	3.67	0.89		0.62	2.87	1.77	Banchs & Moschione, 1995
	Amazona barbadensis		3.42	0.76				1.48	Banchs & Moschione, 1995
	Amazona vittata		3	0.77			2.17	1.3	Banchs & Moschione, 1995

Note. Mexican species for which no data are available as well as *Ara militaris* and *A. macao* were omitted from the table

C. Species conservation and management of sustainable harvest in UMAs

Species considered to be potentially viable for a commercial harvest are those not listed in the current version of the Mexican Endangered Species List (NOM-059-SEMARNAT). Parrot species listed as Subject to Special Protection (*Sujetas a Protección Especial*) in the List may also be considered as potential candidates. It is not recommended to authorize the commercial harvest of species listed as Threatened (*Amenazadas*) or Endangered (*En Peligro de Extinción*) until there is certainty that the populations are stable enough to warrant their transfer to a lower risk category in the List. In any case, the regulations of the General Wildlife Act (*Ley General de Vida Silvestre*, LGVS) must be followed.

If, for any reason, the possibility of harvesting parrot species listed as Threatened or Endangered was considered, it would be absolutely necessary to carry out a thorough prior review of the General Wildlife Act and the General Act on Ecological Balance and Environmental Protection (*Ley General del Equilibrio Ecológico y Protección al Ambiente* – LEGEPA). It would also be essential to conduct population studies to obtain reliable data on primary population parameters (natality and mortality) over several years. It is important for such data and reports to be supported by people or institutions with recognition in the study and management of the species of interest (Art. 87 and 88, LGVS).

The capture of adult specimens should never be authorized, whether it involves nets, glue or decoys. As long as the harvest has been considered to be sustainable in the long term, it is only recommended to harvest 5-6 week-old chicks through an extremely careful management of the nests.

The sustainable harvest of parrots based on the precautionary principle should be determined on the basis of the information generated by the monitoring of the populations and their productivity as well as the surface of optimal habitat available for the species. According to the Mexican Program for Wildlife and Productive Diversification of Rural Areas, one of the main functions of UMAs is to provide legitimate landowners with alternative ways of obtaining income so that the natural habitat of wildlife is conserved. The rationale is to make these activities more attractive than traditional practices that often imply the clearing of natural vegetation. For this reason, only areas whose surface corresponds to the types of primary natural vegetation can be considered as optimal habitat; the consideration of optimal habitat does not apply to areas disturbed mainly by agriculture, including livestock farming, and areas with secondary vegetation on land that has not been left fallow for long. The density of individuals obtained in the sampling and calculated with DISTANCE may only be extrapolated to surfaces with primary vegetation.

For the moment, we suggest using the model proposed by the General Directorate for Wildlife to calculate wildlife harvest rates with a few modifications for parrots following the model proposed by Runge *et al*. (2004). The model is known as PBR (Potential Biological Removal) and defines the maximum possible harvest, considering a logistic relation between carrying capacity and population density, where the maximum possible harvest is equal to half of the maximum intrinsic growth rate of a population (rmax; see its calculation below). Runge *et al*. (2004) state that an uncertainty value can be

introduced; they define it as Recovery Factor (Fr), which is calculated according to the species' risk category. The formula proposed by Runge *et al*. (2004) is the following:

$$\mathbf{PBR = \tfrac{1}{2}\, r_{max}\, N_{min}\, Fr}$$

where PBR is Potential Biological Removal; rmax is the maximum value of the intrinsic growth rate; Nmin is the minimum population estimate and Fr is the recovery factor. The method to calculate each value is shown further below, and Nmin is calculated using the lower limit of the confidence interval of the relative density estimated by DISTANCE.

The model as modified by the General Directorate for Wildlife includes two basic factors for the implementation of the model – the data available about parrot species to calculate $\mathbf{r_{max}}$ and their risk category in the Mexican Endangered Species List. The lack of accurate information on the various species to calculate the value of **r** was overcome by making a bibliographic review of the birth and survival rates of parrots in general in their first stages of life. The information available was used to estimate the theoretical productivity of species of the genus *Amazona*. Although little demographical data are available on species of other genera such as *Aratinga*, it was decided to apply the same values for such species as those used for those of the genus *Amazona*, given that they are even more conservative. There is a lot of information about the remaining species, mainly those of the genera *Ara* and *Rhynchopsitta*. However, the status of their natural populations is still critical and <u>does not</u> make them eligible for harvest schemes.

The information obtained was used to identify the values that make it possible to determine productivity in general terms and carry out basic statistical analyses to stay within the limits of the confidence intervals authorized. The summary of the information is synthesized in Table 1. The values selected to estimate productivity are the following:

- Proportion of the population that is reproductively active in one season
- Sex ratio,
- Proportion of successful nests
- Production of fledglings, and
- Survival rate of fledglings in their first year of life (value included in the Expert Workshop held in 2006).

These values led to the following equation to calculate $\mathbf{r_{max}}$:

$$\mathbf{(Ne \times C \times Sn \times P \times Sv) = r_{max}}$$

where:

Ne = Estimated proportion of the population that is reproductively active
C = 0.5 This is a constant, assuming a 1:1 sex ratio
Sn = Proportion of successful nests, expressed as a fraction
P = Production of fledglings per successful nest, expressed as the average number of fledglings produced per successful nest
Sv = Survival rate of fledglings in the first year, expressed as a fraction
$\mathbf{r_{máx}}$ = Total number of fledglings produced in a population

The values obtained from the lower limit of the confidence interval of the

demographic data available were used for the species included in Table 1 (Munn, 1992; Enkerlin-Hoeflich, 1995; Renton, 1998; Masello and Quillfeldt, 2002; Renton and Salinas-Melgoza, 2004; Salinas-Melgoza and Renton, in press). The following results were obtained:

0.24 (proportion of the population that is reproductively active in one season)
0.5 (sex ratio)
0.4277 (proportion of successful nests)
1.839 (fledglings per successful nest)
0.73 (survival rate of fledglings in the first year)
r_{max} = 0.0689 (population growth rate; production of fledglings in the population per year).

The modification of the uncertainty value proposed by Runge *et al.* (2004) to adjust to the categories of the Mexican Endangered Species List including **Fr** as a recovery factor was done as follows: Runge *et al.* (2004) originally proposed assigning a value of 0.1 to Endangered species, a value of 0.5 to Threatened species, and a value of 1 to species outside these categories. In this case, it was decided to maintain the value of 0.1 for Endangered species; a value of 0.5 for Threatened species; 0.6 for those Subject to Special Protection; and 0.8 for those not included in the categories of the List. This was decided as a precautionary measure because of the little demographic information available for individual species.

Finally, it was also decided to include the harvest pressure of the previous season. This was done by calculating the minimum population estimate ($N_{mín}$) of the original PBR equation and subtracting the harvest quota authorized in the previous year from this number. The resulting value was multiplied by the PBR value calculated.

The modification of the calculation for the harvest is as follows:

$$(\mathbf{N_{mín}} - \mathbf{Ta_{n-1}})\ \mathbf{PBR} = \mathbf{Ta_n}$$

where:

$\mathbf{N_{mín}}$ = Minimum population estimate
$\mathbf{Ta_{n-1}}$ = Number of individuals harvested in the previous season
PBR = Percentage of Potential Biological Removal
$\mathbf{Ta_n}$ = Harvest rate for the season

The minimum population estimate of the UMA should be made by using density, considering only the lower level of the confidence interval, estimated with the DISTANCE computer program and referring only to the forest surface conserved in the UMA.

Harvest activities

The harvest period should be determined according to the breeding pattern of each species in each region. To protect the populations, the harvest of adult specimens should never be authorized. Therefore, the harvest should target young individuals at least 5-6 weeks old, but not subadults. Each UMA should

periodically monitor its nests; based on the information obtained, its technical manager should determine the best harvest time to avoid a high mortality of individuals harvested.

The harvest should not take place in the whole UMA to make sure that the largest possible surface of natural habitats remain as conservation areas and avoid the unnecessary disturbance of nests that will not be harvested.

As mentioned before, the harvest of adult individuals should not be authorized, whether it involves nets, glue, or decoys. The recommendation is to restrict the harvest to chicks (at least 5-6 weeks old) through a direct and careful management of nests, avoiding hurting the individuals or damaging the nests in the process.

Besides, the populations should be monitored in the long term to determine the impact the harvest has caused on them. The results of the monitoring of the populations and nests of each UMA should be submitted every season. If the monitoring of local populations shows a sustained decline in the populations for more than 2 consecutive years, the harvest may be considered not viable. If so, immediate measures must be taken to encourage the recovery of the population. Special attention should also be given to nests that are no longer occupied because of reasons related to the harvest. To avoid these problems, it is recommended not to harvest the same nests continuously for more than two seasons.

Trends in the local population should be assessed on the basis of the results of the annual monitoring of nests and their populations to immediately identify changes in population trends, including breeding success. It is highly recommended to consider the possibility of reducing extractive harvest for commercial purposes; there should be a greater promotion of productive diversification, through non-extractive use and the development of activities and productive projects that do not modify the natural habitat of UMAs or their wildlife populations.

Activities carried out in UMAs should be assessed regularly and objectively so as to identify management shortcomings, activities not compatible with conservation, and actions promoting wildlife conservation, and document success stories. The assessments should be made every 3 years by the Ministry of the Environment. It is also necessary to organize regular meetings – such as this one that we were invited to – with the participation of academics involved in the study of these species to guarantee the application of current techniques and include the most recent knowledge.

It is necessary to establish and develop effective strategies to assess and regulate the activities of UMAs to prevent them from being used to launder illegal specimens. It is also key to avoid the harvest of other protected species, to control the duplication of numbered rings (it is recommended to use closed rings, which limit the possibilities of duplicating rings because they can only be placed when the birds are chicks). The General Directorate for Wildlife should establish a procedure to supply closed rings directly to large UMAs where parrots are harvested and keep a continuously updated database of authorized specimens for monitoring in coordination with PROFEPA, the Mexican law enforcement arm for wildlife protection.

Management after the harvest

The strategies used to handle captive specimens should be improved to increase their survival, by controlling the quantity and quality of food and the feeding of the chicks, their housing and transport.

Recommendation for feeding chicks:

- Use a feed made of 2 parts of corn flour and 1 part of ground dog food.
- Warm the feed to a temperature of 36-38º before feeding the chicks (Juan Cornejo, personal communication).
- Dispose of any food prepared and not used in each feeding event. Food should not be stored to reduce the incidence of infections caused by aflatoxins.
- Chicks should not be fed a second time until the crop is empty. This may take hours or minutes depending on the species, the type of food and the chick's condition.
- Everything should be very clean and hygienic – the chicks, the feeding utensils and the person in charge of feeding the chicks.
- Give the chicks fresh corn so that they can start to eat for themselves.

Recommendation for handling chicks:

- Chicks should not be taken from the nest until they are starting to fledge, preferably between the age of 5-6 weeks.
- Use thick sawdust or clean untreated wood shavings as bedding material for the chicks' boxes and change them often.
- Once the chicks have been harvested, they should be banded as soon as the rings remain in place. This is possible from the age of 3-4 weeks, although the recommendation is to harvest chicks at the age of 5-6 weeks and use only closed rings (see Table 2 for information on ring measures).
- Keep unfledged chicks near a heat source, such as an electric lamp generating a temperature of 29 to 32º C, especially in the case of chicks 25-35 days old (Reillo *et al.* 1998).
- Do not keep chicks crowded together or place chicks of different ages or species together.
- Do not house or handle parrot chicks in areas near domestic fowl or use material or equipment that has been in contact with domestic birds, unless it has previously been disinfected.

Measures should be taken to detect and prevent the spread of disease in coordination with the Health Department of the General Directorate for Wildlife, the Ministry of Agriculture and the relevant state authorities.

Table 2. Recommended ring measures for Mexican parrot species

Diameter (mm)	Commercial measure	Species
6.6	9	*Aratinga* spp.
7.16	9.5	*Aratinga* spp.
8.73	11	*Pionus senilis*

11.11	14	*Amazona finschi, A. oratrix, A. albifrons, A. autumnalis, A. auropalliata, A. farinosa*
12.7	16	*A. auropalliata, A. oratrix*
14.29	18	*Ara militaris, A. macao*

Source: L & M Bird leg bands (http://home.earthlink.net/~lmbird/sizegide.html).

D. Conclusions and recommendations

Given the status of the populations and the habitat of most parrot species in Mexico, a conservative model should be applied, with a highly cautious approach. It is important to realize that the model described here considers optimal harvest models (Runge *et al.* 2004). With such models, unless cautious modifications are made, there is a risk of overestimating certain populations of sensitive species because of the lack of information on the population dynamics of many parrots.

For this reason, we recommend considering the conservative harvest model proposed by Beissinger and Bucher (1992a, 1992b). According to the model, if the wild population is stable or growing, the implementation of management strategies to increase the species' population (artificial nests, protection of nests) can be assumed to lead to a surplus in the production of the population, which may be harvested (Beissinger and Bucher, 1992a and 1992b).

It is therefore essential to verify previously if the target population is stable and not declining through reliable samples (i.e., population surveys over several years). UMAs should also be required to establish appropriate management strategies based on current scientific knowledge to increase the breeding success of the population. At the same time, long-term studies should be conducted to determine productivity (nesting success, number of chicks per successful nest, number of chicks per breeding pair) in natural nests. The harvest can start with the chicks produced in managed nests, but the models and harvest rates should be adjusted on the basis of the results of population studies.

The harvest should be based on an approach implying the adaptive adjustment of the use of resources. When regulating the harvest of game species or live wild birds (songbirds and pet birds, including parrots) the General Directorate for Wildlife should implement an "adaptive management of natural resources" (Holling, 1978; Walters, 1986; Williams and Johnson, 1995; Johnson and Williams, 1999). This type of management explicitly recognizes that there is uncertainty about the impacts of the management of such resources and aims at providing useful information about the dynamics of the system itself over time. Uncertainty is included in the development of other management strategies different from the original one to correct errors in a timely manner. We propose adaptive management to the General Directorate as an extension of the current process used. It is mainly focused on the long-term conservation of the species harvested and actively promotes the compilation and development of biological monitoring projects to use as a basis for decision-making. Besides, it includes a discussion on the social, economic and biological challenges of the adaptive management of natural resources.

Models should be regularly adjusted according to the results of monitoring population trends, harvest rates, threats, conservation efforts and prevailing environmental conditions, among other aspects.

Because of the exceptionally sensitive nature of the subject, the assessment and possible authorization of UMAs for the purposes of harvesting parrots should be managed and administered by the General Directorate for Wildlife at the federal level instead of being decentralized to the state governments.

An independent body should be in charge of evaluating and certifying extractive UMAs and marketing the species. An evaluating council should be set up and formed by the National Institute of Ecology (INE), the General Directorate for Wildlife (DGVS), CONABIO (the National Commission for the Knowledge and Use of Biodiversity), PROFEPA (the law enforcement arm for wildlife protection) and the Subcommittees for Priority Species. This body would be in charge of making the assessment and granting an environmental responsibility certification (i.e., a "Green Label") to technicians and extensive UMAs meeting the requirements established. UMAs and technicians should be evaluated periodically (every 2-3 years) to keep their certification. We recommend reviewing the model used by the Forest Stewardship Council (http://www.fscus.org/) as an example to guide this task.

It is necessary to design and develop a Course to train Technical Managers in their task according to the criteria currently established. The Green Label certificate would only be granted once it has been proven that they are effectively implementing the management measures suggested. The Course is urgently needed to solve the technical and administrative shortcomings that affect most UMAs where these species are being managed.

The activities and sources of income of UMAs should be diversified by implementing forms of non-extractive use (e.g., bird watching or scientific tourism. As an example, see the "Manual for Training Bird Guides in Rural Communities" developed by CAPY, Yucatan www.cnf.ca/birdguide/Bird_manual_s2.pdf) and developing programs to promote environmental education and raise awareness among local communities.

Any prospective UMA must prove that the income obtained by the harvest will be shared among all the members of the community. We propose implementing schemes such as that used in the Tres Reyes UMA, in Quintana Roo, where 70% of the income goes directly to the members of the community, who participate in the project, 20% is deposited in a community fund to ensure the future of the UMA's activities, and 10% is used to pay for technical services.

The activities carried out in UMAs should be diversified, including – as we mentioned above – non-extractive use of the species (Article 47 of the General Wildlife Act). When the harvest is extractive, it is necessary to ensure the careful and biologically acceptable management of the nests, an effective and informed habitat reforestation and restoration (Sánchez *et al.*, 2005), as well as environmental education and awareness-raising activities in the UMAs themselves and their surroundings.

Information should flow between the various programs related to the conservation and sustainable use of parrots (established by bodies such as

CONAFOR, CONANP, PRODERS, PET, PROCAMPO, and CAPY, among others). This information exchange will make it possible to determine the synergies that could strengthen the development of the local human communities and the UMAs of the area.

There is a need for independent population studies (at different scales – regional and local), which can be highly valuable tools to make comparative evaluations of specific studies carried out in UMAs. This activities could include the participation of PhD students, with the support of funding from the Ministry of Agriculture/CONACYT (National Council for Science and Technology), CONABIO or the INE, among others. It is even more important to include and develop this PhD research in longer-term projects in different universities and research centers in Mexico, such as the following: Universidad Michoacana de San Nicolás de Hidalgo, Universidad Nacional Autónoma de México (UNAM), or Tecnológico de Monterrey, among others.

E. References

Distribution, abundance and habitat use by parrots

Berg, K. S. and R. R. Angel. 2006. Seasonal roosts of Red-lored Amazons in Ecuador provide information about population size and structure. *Journal of Field Ornithology,* 77: 95-103.

Bibby, C. J., N. D. Burgess, D. A. Hill and S. H. Mustoe. 2000. *Bird Census Techniques*. 2a Ed. Academic Press, London.

Buckland, S. T., D. R. Anderson, K. P. Burnham and J. L. Laake. 1993. *Distance sampling: estimating abundance of biological populations.* Chapman and Hall, London.

Casagrande, D. G. and S. R. Beissinger. 1997. Evaluation of four methods for estimating parrot population size. *Condor,* 99: 445–457.

Carreón-Arroyo, G. 2006. *Ecología y biología de la conservación de la guacamaya roja (Ara macao) en la Selva Lacandona, Chiapas, Mexico.* Tesis de Maestría. Facultad de Ciencias. UNAM. 115 p.

Carreón-Arroyo, G. 1997. *Estimación poblacional, biología reproductiva y ecología de la nidificación de la Guacamaya verde (Ara militaris) en una selva estacional del oeste de Jalisco, México*. Tesis de Licenciatura. Facultad de Ciencias. Mexico. 67p.

Collar, N.J. 1996. Priorities for parrots conservation in the New World. Cotinga 5:26-31.

Cougill S. and S. J. Marsden. 2004. Variability in roost size in an Amazona parrot: implications for roost monitoring. *Journal of Field Ornithology,* 75: 67-73.

Gilardi, J. D. and C. A. Munn. 1998. Patterns of activity, flocking, and habitat use in parrots of the Peruvian Amazon. *Condor*, 100: 641–653.

Gnam, R. S. and D. A. Burchsted. 1991. Population estimates for the Bahama Parrot on Abaco Island, Bahamas. *Journal of Field Ornithology*, 62: 139–146.

Gracida, C. A. 1998. *Elementos biológicos y socioeconómicos para el aprovechamiento de psitácidos en el Ejido Tres Reyes de la zona de cooperación de la Reserva de la Biosfera Sian Ka'an (RBSK)*. Tesis de Licenciatura. Universidad Michoacana de San Nicolás de Hidalgo. Michoacán, Mexico.

Howell, S. N. G. & S. Webb. 2001. A guide to the birds of Mexico and Northern Central America. Oxford. New York. 851 pp

Hutto, R. L., S. M. Pletschet and P. Hendricks. 1986. A fixed-radius point count method for nonbreeding and breeding season use. *Auk*, 103: 593-602

Karubian, J., J. Fabarra, D. Yunes, J. P. Jorgenson, D. Romo and T. B. Smith. 2005. Seasonal temporal and spatial variation in patterns of macaw abundance in the Ecuadorian Amazon. *Condor*, 107: 617-626.

Loza, S. C. 1997. *Patrones de abundancia, uso de hábitat y alimentación de la Guacamaya Verde (Ara militaris) en la presa Cajón de Peña, Jalisco, México.* Tesis de Licenciatura. Facultad de Ciencias. UNAM.

Marsden, S .J. 1992. The distribution, abundance and habitat preferences of the Salmon-crested Cockatoo *Cacatua moluccensis* on Seram, Indonesia. *Bird Conservation International*, 2: 7-14.

Marsden S. J. 1998. Changes in bird abundance following selective logging on Seram Indonesia. *Conservation Biology*, 12, 605-611.

Marsden, S. J. 1999. Estimation of parrot and hornbill densities using a point count distance sampling method. *Ibis*, 141: 377-390.

Marsden, S. and A. Fielding. 1999. Habitat association of parrots on the Wallacean islands of Buru, Seram and Sumba. *Journal of Biogeography*, 26: 439-446.

Marsden, S. J., M. Whiffin, L. Sadgrove and P. Guimaraes, Jr. 2000. Parrot population and habitat use in and around two lowland Atlantic forest reserves, Brazil. *Biological Conservation*, 96: 209-217.

Marsden, S. J., J. D. Pilgrim and R. Wilkinson. 2001. Status, abundance and habitat use of Blue-eyed Cockatoo *Cacatua opthalmica* on New Britain, Papua New Guinea. *Bird Conservation International*, 11: 151-160.

Marsden S. J. and J. D. Pilgrim. 2003. Factors influencing the abundance of parrots and hornbills in pristine and disturbed forests on New Britain. *Ibis*, 145: 45–53

Munn, C. A. 1992. Macaw biology and ecotourism, or ''when a bird in the bush is worth two in the hand.'' In: *New World parrots in crisis: solutions from conservation biology*. (S. R. Beissinger and N. F. R. Snyder, eds.), pp. 47–72. Smithsonian Institution Press, Washington, D.C.

Renton, K. 2002a. Seasonal variation in occurrence of macaws along a rainforest river. *Journal of Field Ornithology*, 73: 15-19.

Rivera-Milan, F. F., J. A. Collazo, C. Stahala, W. J. Moore, A. Davis, G. Herring, M. Steinkamp, R. Pagliaro, J. L. Thompson and W. Bracey. 2005. Estimation of density and population size and recommendations for monitoring trends of Bahama parrots on Great Abaco and Great Inagua. *Wildlife Society Bulletin*, 33: 823-834.

Movements and relation with resources

Carreón-Arroyo, G. 2006. *Ecología y biología de la conservación de la guacamaya roja (Ara macao) en la Selva Lacandona, Chiapas, Mexico*. Tesis de Maestría. Facultad de Ciencias. UNAM. 115 p.

Enkerlin-Hoeflich, E. C. and K. M. Hogan. 1997. Red-crowned Parrot (*Amazona viridigenalis*). *In* A. Poole and F. Gill [EDS.], *The birds of North America, No. 292*. The Academy of Natural Sciences, Philadelphia, and the American Ornithologists' Union, Washington DC.

Forshaw, J. M. 1989. *Parrots of the World*. Third (revised) edition. Lansdowne Editions, Melbourne, Australia.

Galetti, M. 1997. Seasonal abundance and feeding ecology of parrots and parakeets in a lowland Atlantic forest of Brazil. *Ararajuba*, 5: 115-126.

Leighton, M. and D. R. Leighton. 1983. Vertebrate responses to fruiting seasonality within a Bornean rain forest. Pp 181-196 in: *Tropical Rainforest:*

Ecology and Management, S.L. Sutton, T.C. Whitmore, & A.C. Chadwick (eds). Blackwell Scientific Press, Oxford.
Renton, K. 2001. Lilac-crowned Parrot diet and food resource availability: resource tracking by a parrot seed predator. *Condor*, 103:62–69
Robinet, O., V. Bretagnolle and M. Clout. 2003. Activity patterns, habitat use, foraging behaviour and food selection of the Ouvea Parakeet (*Eunymphicus cornutus uvaeensis*). *Emu*, 103 (1): 71-80.
Renton, K. and A. Salinas-Melgoza. 1999. Requerimientos de área, de hábitat y movimientos regionales de un loro continental. *Libro de resúmenes, VI Congreso de Ornitología Neotropical*. Pp.180.
Renton, K. and A. Salinas-Melgoza. 2002. Loro corona lila (*Amazona finschi* Sclater 1864). Pp 343-344 In: *Historia Natural de Chamela*. F. Álvarez-Noguera, J. H. Vega Rivera, A. García Aldrete and M. Quezada Avendaño (eds.). Instituto de Biología, UNAM.
Rubio Rocha, Y. G. 2001. Caracterización de hábitat de la guacamaya verde (Ara militaris) en Cosalá, Sinaloa, Mexico. *Reporte técnico final. Clave C-1-97/4. Fondo Mexicano paa la Conservación de la Naturaleza, A.C.*
Rowley, I. 1983. Mortality and dispersal of juvenile galahs, *Cacatua roseicapilla*, in the western Australian wheatbelt. *Australian Wildlife Research*, 10: 329-342.
Salinas-Melgoza, A. and K. Renton. In press. Post-fledging survival and development of juvenile Lilac-crowned Parrots. *Journal of Wildlife Management*.
Saunders, D. A. 1980. Food and movements of the short-billed form of the White-tailed Black Cockatoo. *Australian Wildlife Research*, 7: 257-269.
Saunders, D. A. 1990. Problems of survival in an extensively cultivated landscape: the case of the Carnaby's Cockatoo *Calyptorhynchus funereus latirostris. Biological Conservation*, 54:277–290.
Smith, G. T. and L. A. Moore. 1992. Patterns of movement in the western Long-billed Corella *Cacatua pastinator* in the south-west of western Australia. *Emu*, 92: 19–27.
Snyder, N. F. R., J. W. Wiley and C. B. Kepler. 1987. *The Parrots of Luquillo: Natural History and Conservation of the Puerto Rican Parrot*. Western Foundation of Vertebrate Zoology, Los Angeles.
Wermundsen, T. 1997. Seasonal change in the diet of the Pacific Parakeet *Aratinga strenua* in Nicaragua. *Ibis*, 139:566–568.
White, T. H., J. A. Collazo, F. J. Vilella, S. A. Guerrer. 2005. Effects of Hurricane Georges on habitat use by captive-reared Hispaniolan Parrots (*Amazona ventralis*) released in the Dominican Republic. *Ornitología Neotropical*, 16: 405-417.

Nesting behavior and reproductive productivity

Castillo, A. M. R., and J. R. Eberhard. 2006. Reproductive behavior of the Yellow-crowned Parrot (*Amazona ochrocephala*) in western Panama. *Wilson Journal of Ornithology*, 118: 225-236.
Enkerlin-Hoeflich, E. C. 1995. *Comparative ecology and reproductive biology of three species of* Amazona *parrots in northeastern Mexico*. Tesis Doctoral. Texas A&M University, USA.
Gnam, R. S. 1991. Nesting behaviour of the Bahama Parrot *Amazona leucocephala bahamensis* on Abaco Island, Bahamas. *Acta XX Congressus Internationalis Ornithologici* 2:673-680.
Gnam, R. S., and R. F. Rockwell. 1991. Reproductive potential and output of the Bahama Parrot *Amazona leucocephala bahamensis*. *Ibis*, 133: 400-405.

Lanning, D. V. 1991. Distribution and breeding biology of the Red-fronted Macaw. *Wilson Bulletin*, 103:357-365.
Lindsey, G. D., W. J. Arendt and J. Kalina. 1994. Survival and causes of mortality in juvenile Puerto Rican parrots. *Journal of Field Ornithology*, 65:76-82.
Masello, J. F. and P. Quillfeldt. 2002. Chick growth and breeding success of the Burrowing Parrot. *Condor*, 104:574-586.
Lanning, D. V. and J. T. Shiflett. 1983. Nesting ecology of Thick-billed Parrots. *Condor*, 85:66-73.
Navarro, J. L., M. B. Martella, and E. H. Bucher. 1992. Breeding season and productivity of Monk Parakeets in Cordoba, Argentina. *Wilson Bulletin*, 104:413-424.
Renton, K. 1998. *Reproductive ecology and conservation of the Lilac-crowned Parrot (Amazona finschi) in Jalisco, Mexico.* PhD dissertation. University of Kent, Canterbury, UK.
Renton, K. 2002b. Influence of environmental variability on the growth of Lilac-crowned Parrot nestlings. *Ibis* 144: 331–339.
Renton, K. 2004. Agonistic interactions of nesting and non-breeding macaws. *Condor*, 106: 354–362.
Renton, K. and A. Salinas-Melgoza. 1999. Nesting behavior of the Lilac-crowned Parrot. *Wilson Bulletin*, 111: 488-493.
Renton, K. and A. Salinas-Melgoza. 2004. Climatic variability, nest predation, and reproductive output of Lilac-crowned Parrots (*Amazona finschi*) in tropical dry forest of western Mexico. *Auk,* 121: 1214–1225.
Sanz, V. and A. Rodriguez-Ferraro. 2006. Reproductive parameters and productivity of the Yellow-shouldered Parrot on Margarita Island, Venezuela: A long-term study. *Condor*, 108: 178-192.
Saunders, D. A. 1982. The breeding behaviour and biology the short-billed form of the White-tailed Black Cockatoo *Calyptorhynchus funereus*. *Ibis*, 124:422-455.
Smith, G. T. 1991. Breeding ecology of the Western Long-billed Corella, *Cacatua pastinator pastinator*. *Wildlife Research*, 18:91-110.
Snyder, N. F. R., J. W. Wiley, and C. B. Kepler. 1987. *The parrots of Luquillo: natural history and conservation of the Puerto Rican Parrot*. Western Foundation of Vertebrate Zoology, Los Angeles.
Waltman, J. R. and S. R. Beissinger. 1992. Breeding behavior of the Green-rumped Parrotlet. *Wilson Bulletin*, 104:65-84.
Wilson, K. A., R. Field and M. H. Wilson. 1995. Successful nesting behavior of Puerto Rican Parrots. *Wilson Bulletin*, 107:518-529.

Trade, management and other issues

American Ornithologist' Union (AOU). 1998. *Check-list of North American Birds. 7 Edition*. American Ornithologist's Union, Washington, D.C.
American Ornithologists' Union (AOU). 2000. Forty-second supplement to the American Ornithologists' Union Check-List of North American Birds. *The Auk*, 117 (3): 847–858.
Banks, R. C. 1970. *Birds imported into the United States in 1970*. Special Scientific Report –Wildlife No. 136. Washington, D.C. 64 pp.
Banks, R. C. and R. B. Clapp. 1972. *Birds imported into the United States in 1969*. Special Scientific Report –Wildlife No. 148. Washington, D.C. 99 pp.
Banks, R. C., C. Cicero, J. L. Dunn, A. W. Kratter, P. C. Rasmussen, J. V. Remsen, Jr., J. D. Rising and D. F. Stotz. 2003. Forty-fourth supplement to the American Ornithologists' Union Check-List of North American Birds. *The Auk*, 120(3):923–931.
Beissinger, S. R. and E. H. Bucher. 1992a. Sustainable harvesting of parrots for

conservation. Pp. 73-116. In S. R. Beissinger and N. F. R. Snyder (eds.). *New World Parrots in Crisis: Solutions from Conservation Biology*. Smithsonian Institution Press. Washington.

Beissinger, S. R. and E. H. Bucher. 1992b. Can parrots be conserved through sustainable harvesting? *Bioscience*, 42: 164-173.

Benítez, H., C. Arizmendi and L. Marquez. 1999. *Base de Datos de las AICAS. CIPAMEX, CONABIO, FMCN and CCA*. Mexico. (http://www.conabio.gob.mx).

BirdLife International (2000). *Threatened Birds of the World*. Barcelona and Cambridge, U.K. , Lynx Editions and BirdLife International.

Bucher, E. H. 1992. Neotropical parrots as agricultural pests. Pp. 201-240. *In* S. R. Beissinger and N. F. R. Snyder (eds.). *New World Parrots in Crisis: Solutions from Conservation Biology*. Smithsonian Institution Press. Washington.

Cantú, J. C. and M. E. Sánchez. 1996. Tráfico ilegal de pericos en México. *Naturaleza y Tráfico*, Telleliz, A.C., Mexico City. Vol. 1.

Contreras-Balderas A. J., J. A. García Salas, A. Guzmán Velasco and J. I. González Rojas. 2001. Aprovechamiento de las aves cinegéticas, de ornato y canoras de Nuevo León, México. *CIENCIA UANL*, Octubre-Diciembre, 4(4): 462-469.

Diario Oficial de la Federación (DOF). 1982. *Acuerdo que establece el calendario de captura, transporte y aprovechamiento racional de las aves canoras y de ornato a la temporada 1982-1983*. Miércoles 7 de Julio de 1982. Secretaría de Desarrollo Urbano and Ecología (Dirección General de Flora y Fauna Silvestres). Talleres Gráficos de México, Mexico, D. F.

Diario Oficial de la Federación (DOF). 1983. *Acuerdo que establece el calendario de captura, transporte y aprovechamiento racional de las aves canoras y de ornato a la temporada 1983-1984.* Jueves 29 de diciembre de 1983 (Segunda Sección). Pp 24-29. Secretaría de Desarrollo Urbano y Ecología (Dirección General de Flora y Fauna Silvestres). Talleres Gráficos de México, Mexico, D. F.

Diario Oficial de la Federación (DOF). 1984. *Acuerdo que establece el calendario de captura, transporte y aprovechamiento racional de las aves canoras y de ornato correspondiente a la temporada 1984-1985*. Miércoles 1 de agosto de 1984. Pp. 8-11. Secretaría de Desarrollo Urbano y Ecología (Dirección General de Flora y Fauna Silvestres). Talleres Gráficos de México, Mexico, D. F.

Diario Oficial de la Federación (DOF). 1985. *Acuerdo que establece el calendario de captura, transporte y aprovechamiento racional de las aves canoras y de ornato correspondiente a la temporada 1985-1986.* Miércoles 24 de Julio de 1985. Pp. 9-37. Secretaría de Desarrollo Urbano y Ecología (Dirección General de Flora y Fauna Silvestres). Talleres Gráficos de México, Mexico, D. F.

Diario Oficial de la Federación (DOF). 1986. *Acuerdo que establece el calendario de captura, transporte y aprovechamiento racional de las aves canoras y de ornato correspondiente a la temporada 1986-1987*. Martes 24 de junio de 1986, Tomo 396, No. 37. Pp. 103-165. Secretaría de Desarrollo Urbano y Ecología (Dirección General de Conservación Ecológica de los Recursos Naturales). Talleres Gráficos de México, México, D. F.

Diario Oficial de la Federación (DOF). 1987. *Acuerdo que establece el calendario de captura, transporte y aprovechamiento racional de las aves canoras y de ornato correspondiente a la temporada 1987-1988*. Miércoles 1 de Julio de 1987, Tomo 406, No. 1. Pp. 2-43. Secretaría de Desarrollo Urbano y Ecología (Dirección General de Conservación Ecológica de los Recursos Naturales). Talleres Gráficos de México, México, D. F.

Diario Oficial de la Federación (DOF). 1988. *Acuerdo que establece el calendario*

de captura, transporte y aprovechamiento racional de las aves canoras y de ornato correspondiente a la temporada 1988-1989. Viernes 1 de Julio de 1988 (Tercera Sección). Pp. 61-105. Secretaría de Desarrollo Urbano y Ecología (Dirección General de Conservación Ecológica de los Recursos Naturales). Talleres Gráficos de México, México, D. F.

Diario Oficial de la Federación (DOF). 1989a. *Acuerdo que establece el calendario de captura, transporte y aprovechamiento racional de las aves canoras y de ornato correspondiente a la temporada 1989-1990*. Jueves 17 de agosto de 1989. Pp. 15-51. Secretaría de Desarrollo Urbano y Ecología (Dirección General de Conservación Ecológica de los Recursos Naturales). Talleres Gráficos de México, México, D. F.

Diario Oficial de la Federación (DOF). 1989b. *Acuerdo por el que se reforma el diverso que establece el calendario de captura, transporte y aprovechamiento racional de las aves canoras y de ornato publicado el 17 de agosto de 1989.* Lunes 30 de octubre de 1989. Pp. 7-10. Secretaría de Desarrollo Urbano y Ecología (Dirección General de Conservación Ecológica de los Recursos Naturales). Talleres Gráficos de México, México, D. F.

Diario Oficial de la Federación (DOF). 1990. *Acuerdo por el que se establece el calendario de captura, transporte y aprovechamiento racional de las aves canoras y de ornato correspondiente a la temporada 1990-1991*. Lunes 27 de agosto de 1990, Tomo 443 No. 19. Pp. 67-101. Secretaría de Desarrollo Urbano y Ecología (Dirección General de Conservación Ecológica de los Recursos Naturales). Talleres Gráficos de México, México, D. F.

Diario Oficial de la Federación (DOF). 1991. *Acuerdo por el que se establece el calendario de captura, transporte y aprovechamiento racional de las aves canoras y de ornato en la Republica Mexicana, para la temporada 1991-1992.* Martes 30 de julio de 1991. Pp. 32-66. Secretaría de Desarrollo Urbano y Ecología (Dirección General de Conservación Ecológica de los Recursos Naturales). Talleres Gráficos de México, México, D. F.

Diario Oficial de la Federación (DOF). 1992. *Acuerdo por el que se establece el calendario para la captura, transporte y aprovechamiento racional de aves canoras y de ornato, para la temporada 1992-1993*. Viernes 21 de agosto de 1992. Pp. 75-110. Secretaría de Agricultura y Recursos Hidráulicos (Dirección General de Protección Forestal y de la Fauna Silvestres). Talleres Gráficos de México, México, D. F.

Diario Oficial de la Federación (DOF). 1993. *Acuerdo por el que se establece el calendario para la captura, transporte y aprovechamiento racional de aves canoras y de ornato, para la temporada 1993-1994*. Jueves 1 de julio de 1993, Tomo 478, No. 1, (Primera Sección). Pp. 15-32, 49-56. Secretaría de Agricultura y Recursos Hidráulicos (Dirección General de Protección Forestal y de la Fauna Silvestres). Talleres Gráficos de México, México, D. F.

Diario Oficial de la Federación (DOF). 1994. *Acuerdo por el que se establece el calendario para la captura, transporte y aprovechamiento racional de aves canoras y de ornato, para la temporada 1994-1995*. Lunes 18 de julio de 1994, Tomo 4, No. 13. Pp. 10-44. Secretaría de Agricultura y Recursos Hidráulicos (Dirección General de Protección Forestal y de la Fauna Silvestres). Talleres Gráficos de México, México, D. F.

Diario Oficial de la Federación (DOF). 1995. *Acuerdo por el que se establece el calendario para la captura, transporte y aprovechamiento racional de aves canoras y de ornato, para las temporadas 1995-1996 y 1996-1997.* Jueves 27 de julio de 1995 (Primera Sección). Pp. 11-37. Secretaría de Medio Ambiente, Recursos Naturales y Pesca (Dirección General de Aprovechamiento Ecológico de los Recursos Naturales). Talleres Gráficos

de México, México, D. F.
Diario Oficial de la Federación (DOF). 1997. *Acuerdo por el que se establece el calendario para la captura, transporte y aprovechamiento racional de aves canoras y de ornato, para la temporada 1997-1998*. Viernes 18 de julio de 1997, Tomo 526, No. 14. Pp. 2-21. Secretaría de Medio Ambiente, Recursos Naturales y Pesca (Dirección General de Vida Silvestre). Talleres Gráficos de México, México, D. F.
Diario Oficial de la Federación (DOF). 1998. *Acuerdo por el que se establece el Calendario de aprovechamiento cinegético y de aves canoras y de ornato para la temporada 1998-1999*. Lunes 10 de Agosto de 1998 (Segunda Sección), Tomo 539, No. 6. Pp 1-112. Secretaría de Medio Ambiente, Recursos Naturales y Pesca (Dirección General de Vida Silvestre). Talleres Gráficos de México, México, D. F.
Diario Oficial de la Federación (DOF). 1999a. *Acuerdo por el que se crea el Comité Técnico Consultivo Nacional para la Recuperación de Especies Prioritarias*. Miércoles 23 de junio de 1999 (Primera Sección.) Pp. 20-22.
Diario Oficial de la Federación (DOF). 1999b. *Acuerdo por el que se establece el Calendario de Aprovechamiento Cinegético y de Aves Canoras y de Ornato para la temporada 1999-2000.* Lunes 26 de Julio de 1999 (Segunda Sección), Tomo DL, Nº 18. Pp. 1-112. Secretaría de Medio Ambiente, Recursos Naturales y Pesca (Dirección General de Vida Silvestre). Talleres Gráficos de México, México, D. F.
Diario Oficial de la Federación (DOF). 2000. *Ley General de Vida Silvestre*. Lunes 3 de Julio de 2000. Secretaría de Medio Ambiente, Recursos Naturales y Pesca (Dirección General de Vida Silvestre). Talleres Gráficos de México, Mexico City
Diario Oficial de la Federación (DOF). 2002. *NORMA Oficial Mexicana NOM-059-ECOL-2001, Protección ambiental-Especies nativas de México de flora y fauna silvestres-Categorías de riesgo y especificaciones para su inclusión, exclusión o cambio-Lista de especies en riesgo*. Miercoles 6 de Marzo de 2002 (Segunda Sección). Secretaría de Medio Ambiente y Recursos Naturales. Talleres Graficos de México, Mexico City www.ine.gob.mx/ueajei/norma59a.html
Escalante, P., A. Sada and J. Robles Gil. 1996. *Listado de nombres comunes de las aves de México*. Conabio and Sierra Madre, D. F., Mexico.
Ecology and Society. 1999. *Ecology and Society Special Feature: Adaptive Management.* http://www.ecologyandsociety.org/viewissue.php?sf=3
Gobbi, J., L. Sheeline, D. Rose and G. De Ferrari. 1996. *Parrot smuggling across the Texas-Mexico Border*. TRAFFIC-USA and World Wildlife Fund-US. 31pp.
Holling, C. S. 1978. *Adaptive Environmental Assessment and Management*. John Wiley and Sons, London, UK. 363pp.
Instituto Nacional de Ecología (INE). 1997. *Guía de Aves Canoras y de Ornato*. INE-SEMARNAP-CONABIO, D. F., Mexico. 177 pp.
Íñigo-Elías, E. E. 1986a. Active trade threatens Mexican avifauna. *Traffic (U.S.A.)*, Vol. 6 (4): 6-7.
Íñigo-Elías, E. E. 1986b. The trade of diurnal birds of prey in Mexico. Birds of Prey Bull. No. 3: 128-140 in: R. D. Chancellor and B. U. Meyburg. *Proceedings Western Hemisphere Meeting, World Working Group on Birds of Prey (ICBP). Based on Raptor Research Foundation International Meeting.* November 1985. Sacramento, California, USA.
Iñigo-Elias, E. E. and M. A. Ramos. 1991. The psittacine trade in Mexico. Pp. 380-392 in: J. G. Robinson and K. H. Redford (eds.). *Neotropical wildlife use and conservation*. University of Chicago Press. Chicago.
Iñigo-Elías, E. E. 1996. *Ecology and breeding biology of the Scarlet Macaw (Ara*

macao) in the Usumacinta drainage basin of Mexico and Guatemala. Unp. PhD Dissertation, University of Florida, Gainesville, Florida, USA.
Íñigo-Elías, E. E. 1999. Las guacamayas verde y escarlata en México. *Biodiversitas*, Año 5, No. 25: 7-9.
Iñigo-Elías, E. E., G. Carreón-Arroyo, R. Jiménez Cruz, I. J. March Mifsut, S. Matola and M. Claire Paiz. 2001 *Estrategia regional y plan de acción 2001-05 para la conservación de la Guacamaya Roja (Ara macao cyanoptera) en la Selva Maya Belice, Guatemala y México*. Reporte Final, Versión 1.0, Septiembre 2001. Iniciativa Trinacional Guacamayas Sin Fronteras – Belice, Guatemala and Mexico. Report for Conservation International and US Agency for International Development (AID) – Mexico Mission.
Íñigo-Elías, E. E., K. V. Rosenberg and J. V. Wells. 2002. The Danger of Beauty. *Birdscope*, 16 (3): 1, 14-15.
Johnson, F. and K. Williams. 1999. Protocol and practice in the adaptive management of waterfowl harvests. *Conservation Ecology*, 3(1):8. [online] URL: http://www.consecol.org/vol3/iss1/art8/
López Medellín, X. 2002. *Evaluación del comercio de aves canoras y de ornato en México 1970-2001*. Tesis de Licenciatura. Unpublished document. Facultad de Ciencias U.N.A.M., Mexico City.
PREP. 2000. *Proyecto para la Conservación, Manejo y Aprovechamiento Sustentable de los Psitácidos en México.* Macías Caballero, C., E. E. Iñigo-Elías and E. C. Enkerlin Hoeflich. (eds.). Secretaría de Medio Ambiente, Recursos Naturales y Pesca (SEMARNAP). Mexico City. 145 pp.
Macías Caballero, C. M. and E. C Enkerlin Hoeflich. 2003. *Evaluación del estado poblacional actual de dos especies Mexicanas de loro en peligro de extinción Parte II– loro tamaulipeco (Amazona viridigenalis).* Informe final presentado al Instituto Nacional de Ecología, SEMARNAT, Monterrey, Nuevo León, Mexico. Unpublished document.
Macías Caballero, C. M. and E. E. Iñigo-Elías. 2003. *Evaluación del estado de conservación actual de las poblaciones de loro cabeza amarilla (Amazona oratrix) en México.* Informe final del proyecto AS002. Apoyado por la Comisión Nacional para el Conocimiento y Uso de la Biodiversidad (CONABIO). Unpublished document.
NOM-059-ECOL-2001. *NORMA Oficial Mexicana NOM-059-ECOL-2001, Protección ambiental-Especies nativas de México de flora y fauna silvestres-Categorías de riesgo y especificaciones para su inclusión, exclusión o cambio-Lista de especies en riesgo*. Gobierno de la Republica Mexicana.
Pérez-Gil, R., F. Jaramillo, A. M. Muñiz and M. G. Torres. 1995. *Importancia económica de los vertebrados silvestres de México*. CONABIO, Mexico City.
Procuraduría Federal de Protección al Ambiente (PROFEPA) 2003. Sitio internet: http://www.profepa.gob.mx/default.asp?com_id=0 contiene los reportes anuales 2002 y 2003 sobre decomisos de fauna silvestre, incluyendo aves, en ciudades y aeropuertos. A lo largo de la Republica Mexicana.
Quiñones Leyva, M. and G. Castro. 1975. Aves canoras y de ornato. *Bosques y Fauna, II Época,* 12 (6): 3-9.
Ramos, M. 1982. *El comercio y la explotación de las aves vivas en México*. INIREB, Cuadernos de Divulgación No. 8. Xalapa, Veracruz, Mexico.
Reillo, P. R., K. A. McGovern, R. Myerson-McCormick and A. Coons. 1998. *A management guide for the white-bellied caique parrot (Pionites leucogaster xanthomeria).* Rare Species Conservation Foundation. Loxahatchee, FL.
Rich, T. D., C. J. Beardmore, H. Berlanga, P. J. Blancher, M. S. W. Bradstreet, G. S.

Butcher, D. Demarest, E. H. Dunn, W. C. Hunter, E. Íñigo-Elías, J. A. Kennedy, A. Martell, A. Panjabi, D. N. Pashley, K. V. Rosenberg, C. Rustay, S. Wendt and T. Will. 2004. *Partners in Flight North American Landbird Conservation Plan*. Cornell Lab of Ornithololgy. Ithaca, NY.

Ríos-Muñoz, C. A. 2002. *Caracterización geográfica de la familia psitacidae (aves) utilizando un modelo predictivo*. Tesis de licenciatura. Facultad de Ciencias. UNAM.

Rodríguez Uribe, H. 1985. México ante la explotación internacional de la Fauna Silvestre. Pp 849-860 en: *Memoria del Primer Simposium Internacional de Fauna Silvestre*, Vol II. Mexico City. May 1985., SEDUE.

Runge, M. C., W. L. Kendall and J. D. Nichols. 2004. Exploitation. Pages. 303-328 in Sutherland, W. J., I. Newton and R. E. Green (eds.): Bird *Ecology and Conservation: A handbook of techniques*. Oxford University Press. Oxford, UK.

Sauer, J. R., J. E. Hines and J. Fallon. 2003. *The North American Breeding Bird Survey, Results and Analysis 1966 - 2002*. Version 2003.1, USGS Patuxent Wildlife Research Center, Laurel, MD

Snyder N. F. R., P. McGowan, J. Gilardi and A. Grajal. 2000. *Parrots. Status Survey and Conservation Action Plan 2000-2004.* IUCN. Gland, Switzerland and Cambridge, U.K.

Thomsen, J. and A. Brautigam. 1991. Sustainable use of neotropical parrots. Pp 359-379. *In* J.G. Robinson and K.H. Redford (eds.). *Neotropical Wildlife Use and Conservation*. University of Chicago Press. Chicago & London.

Walters, Carl. 1986. Adaptive Management of Renewable Resources. Macmillan Publishing Company, New York. 374 p.

Wright, T. F., C. Toft, E. C. Enkerlin-Hoeflich, J. González-Elizondo, M. Albornoz, A. Rodríguez-Ferraro, F. Rojas-Suárez, V. Sanz, A. Trujillo, S. R. Beissinger, V. Berovides, X. Gálvez, A. T. Brice, K. Joyner, J. Eberhard, J. Gilardi, S. E. Koenig, S. Stoleson, P. Martuscelli, J. M. Meyers, K. Renton, A. M. Rodríguez, A. C. Sosa-Asanza, F. Vilella, and J. W. Wiley. 2001. Nest poaching in neotropical parrots. *Conservation Biology,* 15: 710–720.

Williams, B. K. and F. A. Johnson. 1995. Adaptive Management and the Regulation of Waterfowl Harvests. *Wildlife Society Bulletin*, 23(3): 430-436.

Additional references

Bibby, C. J., N. D. Burgess, D. A. Hill and S. H. Mustoe. 2000. *Bird Census Techniques*. 2a Ed. Academic Press, London.

Beissinger, S. R. and E. H. Bucher. 1992a. Sustainable harvesting of parrots for conservation. Pp. 73-116. *In* S.R. Beissinger and N.F.R. Snyder (eds.). *New World Parrots in Crisis: Solutions from Conservation Biology*. Smithsonian Institution Press. Washington.

Beissinger, S. R., and E. H. Bucher. 1992b. Can parrots be conserved through sustainable harvesting? *Bioscience*, 42: 164-173.

Bucher, E. H. 1992. Neotropical parrots as agricultural pests. Pp. 201-240. *In* S.R. Beissinger and N.F.R. Snyder (eds.). *New World Parrots in Crisis: Solutions from Conservation Biology.* Smithsonian Institution Press. Washington.

Buckland, S. T., D. R. Anderson, K. P. Burnham and J. L. Laake. 1993. *Distance sampling: estimating abundance of biological populations.* Chapman and Hall, London.

Ceballos, G. and F. Eccardi. 1996. *Mexican diversity of fauna*. CEMEX. Mexico

Cougill, S., and S. J. Marsden. In press. Variability in roost size of an *Amazona* parrot: implications for roost monitoring. *Journal of Field Ornithology*.

Enkerlin-Hoeflich, E. C. 1995. *Comparative ecology and reproductive biology of three species of Amazona parrots in northeastern Mexico*. PhD dissertation. Texas A&M University, USA.
Gnam, R. S. and R. F. Rockwell. 1991. Reproductive potential and output of the Bahama Parrot *Amazona leucocephala bahamensis*. *Ibis*, 133: 400-405.
Hutto, R. L., S. M. Pletschet, and P. Hendricks. 1986. A fixed-radius point count method for nonbreeding and breeding season use. *Auk*, 103: 593-602
Lindsey, G. D., W. J. Arendt and J. Kalina. 1994. Survival and causes of mortality in juvenile Puerto Rican parrots. *Journal of Field Ornithology*, 65:76-82.
Masello, J. F. and P. Quillfeldt. 2002. Chick growth and breeding success of the Burrowing Parrot. Condor 104:574-586.
Renton, K. 1998. *Reproductive ecology and conservation of the Lilac-crowned Parrot (Amazona finschi) in Jalisco, Mexico*. PhD dissertation. University of Kent, Canterbury, UK.
Renton, K. 2002a. Influence of environmental variability on the growth of Lilac-crowned Parrot nestlings. *Ibis,* 144: 331–339.
Renton, K. and A. Salinas-Melgoza. 1999. Requerimientos de área, de hábitat y movimientos regionales de un loro continental. *Libro de resúmenes, VI Congreso de Ornitología Neotropical*. Pp.180.
Renton, K. and A. Salinas-Melgoza. 2002. Loro corona lila (*Amazona finschi* Sclater 1864). Pp 343-344 En: *Historia Natural de Chamela*. F. A. Noguera, J. H. Vega Rivera, A. García Aldrete and M. Quezada Avendaño, (eds.). Instituto de Biología, UNAM.
Renton, K. and A. Salinas Melgoza. 2004. Climatic variability, nest predation, and reproductive output of Lilac-crowned Parrots (*Amazona finschi*) in tropical dry forest of western Mexico. *Auk* 121: 1214–1225.
Rubio Rocha, Y. G. 2001. *Caracterización de hábitat de la guacamaya verde (Ara militaris) en Cosalá, Sinaloa, México*. Reporte técnico final. Clave C-1-97/4. Fondo Mexicano para la Conservación de la Naturaleza, A.C.
Runge, MC, Kendall WL, Nichols JD. 2004. Exploitation. Pages. 303-328 in Sutherland WJ, Newton I, Green RE, eds. *Bird Ecology and Conservation: A handbook of techniques*. Oxford University Press. Oxford, UK.
Rowley, I. 1983. Mortality and dispersal of juvenile galahs, *Cacatua roseicapilla*, in the western Australian wheatbelt. *Australian Wildlife Research*, 10: 329-342.
Sánchez, Ó., E. Peters, R. Márquez-Huitzil, E. Vega, G. Portales, M. Valdés and D. Azuara (eds.). 2005. *Temas sobre Restauración Ecológica*. Semarnat, Instituto Nacional de Ecología, U. S. Fish & Wildlife Service and Unidos para la Conservación. México, D. F., 255+1 pp.
Salinas-Melgoza, A. and K. Renton. In press. Post-fledging survival and development of juvenile Lilac-crowned Parrots. *Journal of Wildlife Management*.
Smith, G. T. and L. A. Moore. 1992. Patterns of movement in the western Long-billed Corella *Cacatua pastinator* in the South-west of Western Australia. *Emu*, 92: 19-27.
Thomsen, J. and A. Bräutigam. 1991. Sustainable use of neotropical parrots. Pp 359-379. *In* J.G. Robinson and K.H. Redford (eds.). *Neotropical Wildlife Use and Conservation.* University of Chicago Press. Chicago and London.
Wright, T. F., Toft, C., E. Enkerlin-Hoeflich, J. Gonzalez-Elizondo, M. Albornoz, A. Rodríguez-Ferraro, F. Rojas-Suárez, V. Sanz, A. Trujillo, S. R. Beissinger, V. Berovides, X. Gálvez, A. T. Brice, K. Joyner, J. Eberhard, J. Gilardi, S. E. Koenig, S. Stoleson, P. Martuscelli, J. M. Meyers, K. Renton, A. M. Rodríguez, A. C. Sosa-Asanza, F. Vilella, and J. W. Wiley. 2001. Nest poaching in neotropical parrots. *Conservation Biology,* 15: 710–720.

Annex I. Data capture format for the monitoring of parrots in extensive UMAs

Nombre de la UMA	ID del hábitat	Hábitat	Superficie en Ha	Punto de Observación	Tiempo de observación en minutos	Número de observación	Especie	Tamaño del grupo	Distancia al ave en metros	Actividad (perchado / volando)	Coordenadas UTM del Punto (E- N)	
El Jaguar	*1*	*Selva Mediana*	*1500*	*1*	*10*	*1*	*Aratinga nana*	*2*	*55*	*perchado*	*246720.916*	*1969510.81*
	1	*Selva Mediana*	*1500*	1	10	2	*Aamzona xantholora*	*2*	*200*	*volando*		
	1			2	10	3						
	1			3	10	4						
	1			3	10	5						
	1			3	10	6						
	1			3	10	7						
	1			3	10	8						
	1			3	10	9						
	1			4	10	10						
	1			5	10	11						
	1			5	10	12						
	1			5	10	13						
	1			5	10	14						
	1			5	10	15						
	1			5	10	16						
	1			6	10	17						
	1			7	10	18						
	1			7	10	19						
	1			7	10	20						
	1			8	10	21						

Translation of the text in the table, from left to right: Name of the UMA; Habitat ID; Habitat; Surface in Ha; Observation point; Observation time in minutes; Observation number; Species; Group size; Distance to the bird in m; Activity (perched/flying); UTM coordinates of the point (E-N); semi-evergreen forest;

a) Data capture format for population monitoring. Copy the fields in an Excel sheet and send them to the DGVS in electronic format to be analyzed. Write the sampling date, the Datum and the area of the UTM coordinates on the application.

Nest or observation point	Number	Direction	Distance from the central point to the tree (m)	Species	Height (m)	DBH (cm)
		N	*10*	*Enterolobium cyclocarpum*	*15*	*58*
		S	*2*	*Ceiba pentandra*	*19*	*103*
Observation point		E	*5*	*Manilkara zapota*	*9*	*40*
	3	W	*6*	*Brosimum alicastrum*	*11*	*52*
		N				
		S				
		E				
Nest	*2*	W				
		N				
		S				
		E				
		W				
		N				
		S				
		E				
		W				

b) Data capture format for habitat monitoring. Copy the fields in an Excel sheet and send them to the DGVS in electronic format to be analyzed.

A model towards the sustainable harvest of parrots in Mexico

Author: Ariel Rojo
Presented by: Adrian Reuter

Cancun
November, 2008

Contents based on a model by Ariel Rojo and Lizardo Cruz refined in a workshop on Conservation and Sustainable Use of Wild Birds in the context of Wildlife Management Units (UMAs) in Mexico with the input of members of the Mexican Psittacine Expert Subcommittee. The complete document can be downloaded from:

http://www.ine.gob.mx/dgioece/con_eco/talleres2006.html

Background info

UMAS are the scheme Mexico has adopted to guarantee sustainable use of wildlife

Management plans are required

Parrots in Mexico are popular pets with some species facing a number of threats

It is important to develop tools to ensure harvest from the wild is done in a sustainable and responsible manner.

Relevant population aspects

- Baseline population size
- Population trends
- Area required by the population
- Nesting habitat requirements
- Population demographics
- Historic and recent impacts affecting the species or the population in the area

2 basic scales can be considered:

- Regional (habitat status, densities, regional risks)
- Local (density and specific productivity of populations)

- Considerations for **Population size** determination:
  - Time frame
  - Effort - It is recommended to use at least 100 point counts (50 point counts is acceptable if counts are made 2 or 3 times during the breeding season)
  - Samplping hours- first three hours of the morning
  - Additional data
  - Method
  - Rpresentativeness of data

- Estimating productivity in a population
  - Ideally, obtain data on productivity, mortality, age at first reproduction, and population growth rate, among others
  - In absence of resources to do this, a bibliographic review could be used to obtain productivity parameters

- Early warning of declining populations :
  - Decline in population size estimates
  - Three consecutive years of drought
  - Three consecutive years of low productivity in the population
  - Increase in the type, number and/or scope of threats to the population

- **Important habitat-related aspects for the conservation and management of a sustainable harvest**
  - a) Total surface of the UMA
  - b) Location and area covered by the various vegetation types in the UMA
  - c) Description of the characteristics of the vegetation types
- Before the harvest, it is necessary to generate reliable information about the habitat and area requirements to determine whether harvest is viable.
- UMAs planning to manage parrot species for a commercial harvest must contain the necessary natural habitat to sustain stable breeding populations. This absolutely requires an assessment of the nests in the area, identifying active nests (and potential nesting sites, even if they were not active when reviewed).

- The sustainable harvest should be determined on the basis of information of the populations and their productivity as well as of optimal habitat available for the species

- It is suggested to use a model known as PBR (Potential Biological Removal) which defines the maximum possible harvest, considering a logistic relation between carrying capacity and population density, where the maximum possible harvest is equal to half of the maximum intrinsic growth rate of a population
- An uncertainty value can be introduced; defined as the Recovery Factor (Fr), which is calculated according to the species‟ risk category.

The formula proposed by Runge *et al*. (2004) is the following:

PBR= ½ rmax Nmin Fr

- where PBR - Potential Biological Removal

  rmax - maximum value of the intrinsic growth rate

  Nmin - minimum population estimate

  Fr - recovery factor.

- The model as modified by the General Directorate for Wildlife in MX incorporates the use of data available to calculate **rmax (obtained from existing bibliography)** and their risk category in the Mexican Endangered Species List (uncertainty value Fr in the model)
- As a safeguard, harvest pressure form the previous year was decided to be included, thus turning the model into:

  (Nmín – Tan-1) PBR = Tan

  – where:

  Nmín = Minimum population estimate

  Tan-1 = Number of individuals harvested in the previous season

  PBR = Percentage of Potential Biological Removal

  Tan = Harvest rate for the season

- Additional comments
  - No harvest of adults, only chicks (at least 5-6 weeks old)
  - Trends in the local population should be assessed through annual monitorings of nests and their populations and take adaptive management measures if required.
  - Activities carried out in UMAs should be assessed regularly and objectively

- Establish strict controls to avoid illegal activities
- Husbandry techniques to handle captive specimens should be improved
- Measures should be taken to detect and prevent the spread of disease
- Promote independent population studies (at different scales – regional and local), to make comparative evaluations of specific studies carried out in UMAs.