

Ex Situ Assessment for the Integrated Conservation of National Action Plan Parrots and Grey-breasted Parakeet in Brazil

FINAL REPORT



11–14 December 2018
Foz do Iguaçu, Paraná, Brazil

**PARQUE
DAS AVES**



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Row 1: Red-spectacled Amazon (Marina Somenzari); Red-tailed Amazon (Parque das Aves);

Row 2: Grey-breasted Parakeet (Parque das Aves); Vinaceous-breasted Amazon (Parque das Aves); Blue-fronted Amazon (Blue-fronted Amazon Project); Red-browed Amazon (Red-browed Amazon Project)

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Workshop participants

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1. Workshop Summary

This workshop was convened to evaluate the potential contribution of *ex situ* activities toward the conservation of seven bird species in Brazil to complement the existing National Action Plans and support an integrated conservation approach. Such integration is best achieved through careful evaluation by both *in situ* and *ex situ* experts, based on the best available scientific knowledge and using IUCN guidelines. This report documents this evaluative process related to the *ex situ* management for conservation of these species, and presents the resulting recommendations in a transparent manner, allowing its future application. This document may help national and international institutions decide to collaborate with a higher confidence level. Decisions and actions will be monitored, reassessed and improved whenever it is possible.

The four-day workshop was facilitated by the IUCN SSC Conservation Planning Specialist Group and hosted by Parque das Aves in Foz do Iguaçu, Parana, Brazil. Fifteen species experts and *ex situ* specialists participated in the process (three remotely) to evaluate six parrot species (*Amazona aestiva*, *A. brasiliensis*, *A. farinosa*, *A. pretrei*, *A. rhodocorytha*, *A. vinacea*) and one parakeet species, *Pyrrhura griseipectus*. Participants consisted of the main specialists in parrots and grey-breasted parakeets in Brazil, with both *in situ* and *ex situ* experience, and included representatives from the Brazilian Association of Zoos and Aquariums (AZAB), National Center for Research and Conservation of Wild Birds – CEMAVE/ICMBio, and the University of Veterinary Medicine of the University of São Paulo (FMVZ – USP).

For each of the seven species, data were collected prior to the workshop on *in situ* and *ex situ* status and threats with the collaboration of many professionals and institutions. These data were compiled into species datasheets to support workshop discussions. The workshop followed the five step decision-making process of the *IUCN SSC Guidelines for the Use of Ex Situ Management for Species Conservation*, which includes: 1) status review and threat analysis; 2) identification of potential *ex situ* conservation roles; 3) discussion of program characteristics needed for each potential role; 4) evaluation of resources, risks and feasibility; and 5) recommended *ex situ* roles based on steps 1–4 (see Section 2).

After an overview of the workshop process, participants were guided in the development of a threat diagram for the six parrot species (Figure 1). Each threat (known or hypothesized) was placed in the diagram, and arrows were used to indicate the causes of the threat and the specific

impact of the threat on Amazon parrots. Many threats were common to all species, while species-specific threats were indicated where appropriate, including those relevant to the grey-breasted parakeet. This threat analysis provided the basis for discussions to identify potential ways that *ex situ* activities might improve wild parrot population viability.

Participants then considered each of the potential direct and indirect *ex situ* conservation roles (see Section 3) and determined those roles that may have relevance for the workshop species. Seven potential roles were identified for further discussion. Three potential roles – Conservation Education, Training and Research – were deemed as relevant for all species. These roles were evaluated for Amazon parrots as a group and general recommendations made, with species-specific recommendations added when necessary. Species-specific discussions were held to address the additional potential roles – Insurance, Rescue, Population Reinforcement, and Demographic Manipulation – and the suggested recommendations for implementation or dismissal. About one-half day was spent in discussion on each of the seven species. All recommendations were reviewed for all species at the end of the workshop, final revisions made, and next steps were identified with responsible parties and timelines.

This report is designed to serve as a guiding document, so that the *ex situ* management actions can be developed that best contribute to conserving these species in the wild. These recommendations are based upon best available data, logical decision making and evaluation, and through a transparent process involving both *in situ* and *ex situ* experts. It is important to highlight that a detailed plan for species management will be prepared by species specialists and other stakeholders using the information presented in this report. With that, this group has the autonomy and technical and legal legitimacy to recommend actions that are regarded as priorities for conservation of these species.

2. General Threats and Concerns Related to Workshop Species

Given the close taxonomic relationship among the workshop species, it is not surprising that these species share many of the same threats or problems in the wild. Workshop participants were asked identify threats to the viability of wild populations of these species and were guided in the development of a threat diagram for the six parrot species (Figure 1). Each threat (whether known or hypothesized) was placed in the diagram (yellow boxes), and additional boxes and arrows were used to indicate the cause(s) of each threat, as relevant, and the specific impact(s) of that threat on Amazon parrots, such as decreased survival or reproduction, loss of genetic variation, or population fragmentation (pink boxes).

Many threats were common to all species, although a few species-specific threats were identified. Three general themes emerged: 1) habitat-related threats (including food and nest availability); 2) poaching impacts related to trade; and 3) issues related to release of confiscated parrots, including disease and genetic risks to the resident wild population. This threat analysis provided the basis for subsequent discussions to identify potential ways that *ex situ* activities might improve wild parrot population viability by addressing these threats, their causes and/or their impacts.

2.1.Habitat loss

Habitat loss can lead to smaller and more fragmented populations, which can put species at risk. Other probable impacts include decreased survival and reproduction of adult birds due to the effects of habitat loss on food supply, natural predation and nesting sites.

2.2.Poaching for pets

Illegal removal of wild birds (poaching) for pets can have a direct and significant impact on wild populations by removing eggs and/or young and therefore reducing the recruitment of juveniles into the population. This can lead to population decline as older birds die and are not replaced by the next generation. A secondary impact is the large number of birds confiscated from the illegal trade and the resources needed to care for them.

2.3. Release without criteria

There is concern regarding the potential negative impacts of releasing confiscated birds without adequate criteria, especially when releasing individuals into or near existing wild populations. Risks include possible introduction of pathogens and intraspecific competition for resources, which may adversely impact the resident populations of the same or other species who share the same ecological niche. Releases do not always follow IUCN guidelines.

2.4. Emerging exotic diseases

A broadly discussed topic during the workshop was the risk of transmission of infectious agents from *ex situ* populations to wild populations, and, as a less concerning issue, the opposite direction of transmission (from wild birds to the captive populations). The current epidemics of circovirus and bornavirus that affect captive parrots in Brazil was mentioned as extremely worrying.

Recent studies monitoring the health and disease profile of wild populations of the species of this National Action Plan indicate that these wild populations are free of various viral pathogens of great importance for parrots (Vaz et al. 2017, T. F. Raso personal communication 2020). This fact, alongside the high incidence of these infectious agents in captive parrots, points to the importance of great care to minimise the risk of transmission (Vilela et al. 2019, Silva et al. 2018).

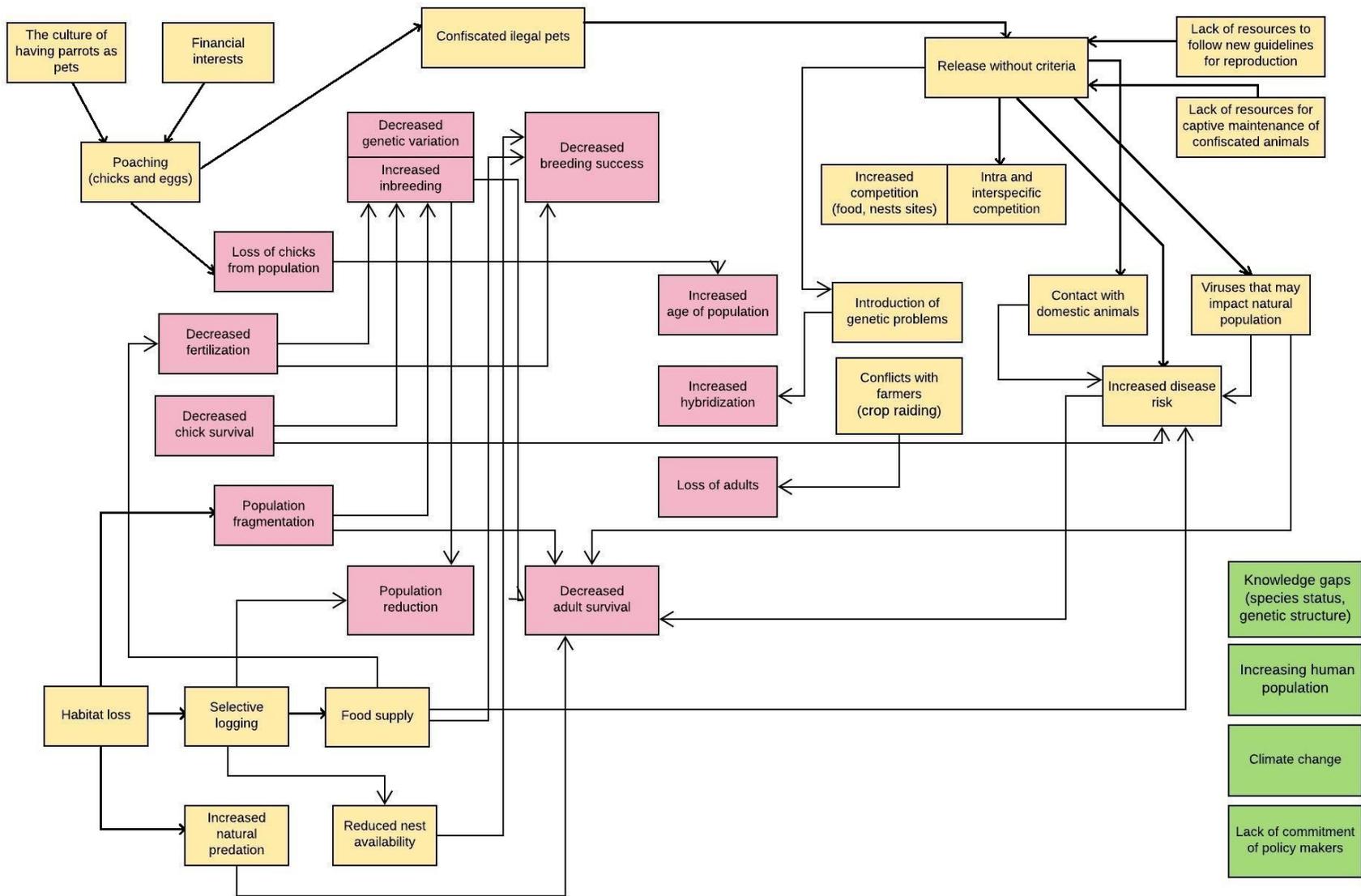


Figure 1. Species threat diagram. Yellow boxes = threats; pink boxes = impact on the species; green = major global threats not solvable with *ex situ* activities.



IUCN Species Survival Commission Guidelines on the Use of *Ex situ* Management for Species Conservation



International Union for Conservation of Nature



Download:

http://www.cbsg.org/sites/cbsg.org/files/IUCN_SSC_ex_situ_guidelines_FINAL.pdf

3. Summary of the IUCN Guidelines Decision Process for Evaluating *Ex Situ* Management for Conservation

The IUCN SSC *Guidelines for the Use of Ex situ Management for Species Conservation* (IUCN 2014) outline a process for identifying and evaluating potential ways in which *ex situ* individuals or activities may contribute to the overall conservation of a species. For these purposes, *ex situ* is defined as conditions in which individuals are spatially restricted, removed from many of their natural ecological processes, and are managed on some level by humans. In summary, *ex situ* refers to individuals (or live biological samples) that are held in artificial, human-controlled conditions, from highly artificial environments to semi-natural conditions, and whether they are held temporarily or long-term. This includes zoos, aquariums, botanical gardens, wildlife rescue or rehabilitation centers, government facilities and other facilities that hold animals or plants in *ex situ* conditions for any length of time.

Ex situ conservation has a potential for reducing or mitigating primary threats, offsetting the effects of threats, restoring wild populations, and/or preventing species extinction by buying time. Such activities can complement other conservation activities focused on *in situ* (wild) populations and conditions so that species do not disappear before suitable conditions in the wild are restored. It is essential to have integration of *in situ* and *ex situ* conservation plans to assure that, whenever appropriate, *ex situ* conservation is used to support *in situ* conservation in the best possible manner.

In some cases, the *ex situ* management will be a critical component of a species conservation strategy; in others, it will have a secondary relevance, supporting other interventions, or may have no conservation role to play. It is necessary, therefore, to consider how *ex situ* management can contribute towards the general goals of conservation established for the species, and to clearly document this. The involvement of all stakeholders and all populations of a species in developing an integrated conservation strategy is known as the One Plan Approach (Byers et al. 2013).

The IUCN guidelines outline a five-step decision process to assess the value and appropriateness of *ex situ* management as a conservation tool, described below:

1

STEP 1. Compile a status review of the species, including a threat analysis

A detailed review should be made of all relevant information on the species, both in the wild and *ex situ*, with the aim of assessing the viability of the population and to identify and understand the threats that impact the species.

2

STEP 2. Define the role(s) that the *ex situ* management may play in the overall conservation of the species

The potential *ex situ* management strategies proposed should address one or more specific threats or constraints to the viability and conservation of the species, as identified in the status review and threat analysis, and target improving its conservation status.

3

STEP 3. Determine the characteristics and dimensions of the *ex situ* population or program required to fulfill the identified conservation role(s)

The identified conservation purpose and function of the *ex situ* program will determine its required nature, scale and duration.

4

STEP 4. Define the resources and expertise needed for the *ex situ* management program to fulfill its role(s) and assess the feasibility and risks

It is not sufficient to know the potential value of an *ex situ* program designed to meet a specific conservation role. It is also critical to evaluate the required resources, the feasibility of successfully managing such a program, the likelihood of success in all steps of the program, including, if relevant, any subsequent return to the wild, and the risks, including risks to the species in the wild and to other conservation activities. These factors should be balanced against the risks of not adopting appropriate conservation measures.

The decision to include *ex situ* management in the species conservation strategy should be determined by weighing the potential benefit to the species against the likelihood of success and overall costs and risks of not only the proposed *ex situ* program but also for alternative conservation actions or inaction.

If the decision is made to implement an *ex situ* management program for conservation, then the following considerations are important in its development of this program:

- 1) formulate and implement the actions required for the program to meet its conservation goals;
- 2) develop protocols for data collection and management for adequate monitoring;
- 3) develop the *ex situ* management program according to existing national and international conservation plans, agreements, and policies;
- 4) consult throughout the process with all stakeholder groups and organizations; and
- 5) establish a timeline with clear and achievable deadlines.

There should be regular evaluation of the *ex situ* program so that its performance can be measured, and whenever necessary be adjusted and improved. This includes not only evaluation of the program's success but also its role within the overall conservation strategy for the species, which is likely to change over time. Regular reporting on *ex situ* activities is important to generate awareness and support, meet any legal requirements, and contribute to knowledge on *ex situ* management for conservation.



4. List of Potential Conservation Roles for *Ex Situ* Management

These roles describe situations in which living individuals (or their biological materials, such as a Genome Resource Bank) in the *ex situ* population play a direct conservation role. *Ex situ* management may take place either within or outside the species' geographic range, but is in a controlled or modified environment for some period of time (short term or long term) for a clearly defined conservation purpose at the population, species, or ecosystem level (see *IUCN SSC Guidelines for the Use of Ex Situ Management for Species Conservation* for more detailed explanation).

Simply keeping or breeding threatened species in captivity does not in itself equate to conservation. As part of a genuine conservation initiative, potential *ex situ* management strategies proposed should address the causes or consequences of one or more specific threats or constraints to the species' viability and conservation, as identified in a status review and threat analysis, and target improvement of its conservation status. This does not preclude these *ex situ* populations for conservation from having additional roles that are not necessarily, or only indirectly, related to conservation. Whenever an *ex situ* conservation role involves a conservation translocation (including releases of captive individuals), the *IUCN SSC Guidelines for Reintroductions and other Conservation Translocations* (IUCN/SSC 2013) also apply.

In essence, *ex situ* management can support species conservation and prevent extinction by:

- a) counteracting the impacts of primary or stochastic threats on the population, which might include reduced survival, poor reproduction and genetic isolation;

- b) addressing the causes of primary threats;
- c) gaining time in situations where threats are not under control or mitigation is not successful; and
- d) by using *ex situ* populations for population restoration or conservation introduction.

4.1.Common direct conservation roles for *ex situ* management

The roles listed below are based on a combination of the role descriptions in the *IUCN SSC Guidelines on the Use of Ex Situ Management for Species Conservation* (IUCN/SSC 2014) the *IUCN SSC Guidelines for Reintroductions and Other Conservation Translocations* (IUCN/SSC 2013), and those in Appendix I of the *Amphibian Ark Conservation Needs Assessment* (Zippel et al. 2006).

Ark

Maintenance of a long-term *ex situ* population after extinction of all known wild populations and as a preparation for reintroduction or assisted colonization, if and when feasible.

Insurance population

Maintenance of a long-term, viable *ex situ* population to prevent predicted local, regional or global species extinction and preserve options for future conservation strategies. These are typically species that are threatened and/or declining and for which it is unsure whether *in situ* threat mitigation will have the sufficient effect in a sufficient timeframe to prevent species extinction or dramatic decline in individuals, populations and/or genetic diversity. An insurance population also may be used as a source population for genetic and/or demographic supplementation or other conservation translocations as required, but these are not yet actively planned in the foreseeable future.

Rescue (temporary or long term)

Ex situ population for a species that is in imminent danger of extinction (locally or globally) and requires *ex situ* management, as part of an integrated program, to ensure its survival. The species may be in imminent danger because the threats cannot/will not be reversed in time to prevent likely species extinction, or the threats have no current remedy. The rescue may need to be long term (e.g., emerging disease, invasive species) or temporary (e.g., predicted

imminent threats that are limited in time, such as extreme weather, oil spill). This role relates to the rescue of a population and not the rescue of injured or confiscated individuals.

Demographic manipulation

Improving a demographic rate (survival or reproduction) or status (e.g. skewed sex ratio) in the wild population, often related to a particular age, sex, or life stage. Examples include head-start programs that remove eggs or young from the wild to reduce high juvenile mortality and then subsequently return individuals to the wild.

Population restoration

Source for population restoration, either to re-establish the species to part of its former range from which it has been extirpated (reintroduction), or to supplement an existing population, e.g. for demographic, behavioral or genetic purposes (reinforcement).

Ecological replacement

Introduce the species outside of its indigenous range to re-establish a lost ecological function and/or modify habitats. This may involve species that are not themselves threatened but that contribute to the conservation of other taxa through their ecological role.

Assisted colonization

Introduce the species outside of its indigenous range to avoid extinction, for example, if the species' original habitat is no longer suitable for the species.

***Ex situ* research and/or training**

Ex situ populations that are used for research and/or training that will directly benefit conservation of the species, or a similar species, in the wild (e.g., develop monitoring methods; address data gaps in life history information, nutritional requirements, or disease transmission/treatment). The research or training addresses specific questions essential for success of the overall conservation strategy for the species. This can include cases in which a non-threatened species serves as a model for threatened species, or establishing *ex situ* populations of a threatened species to gain important species-specific husbandry and breeding expertise that is likely to be needed in the future to conserve the species.

Conservation education

The *ex situ* management forms the basis for an education and awareness program that addresses specific threats or constraints to the conservation of the species or its habitat. Education should address specific human behavioral changes that are essential for the success, and are an integral part, of the overall conservation strategy for the species. This primarily involves *ex situ* locations visited by the intended human audience and requires or is greatly benefitted by *ex situ* individuals or management.

4.2. Indirect conservation roles for *ex situ* management

There are some situations where the *ex situ* community may contribute to conservation by:

- Making available its expertise, knowledge, materials, staff, funding, etc., to help implement *in situ* conservation actions; and/or
- Carrying out general awareness and conservation education activities aimed at the zoo visiting public.

Indirect contributions for the conservation may be made for a species regardless whether it is held in captivity or not.

Examples of indirect conservation roles include:

- Providing knowledge, experience or training to build capacity in veterinary care or handling of individuals in the field (e.g., application of radio-collar, transport, health assessment) or in the context of law enforcement (e.g., rescue centers, human-wildlife conflicts).
- Making available existing zoo education materials, or education and behavior change expertise to teams developing awareness programs for local communities *in situ*.
- Conduct education and awareness about the status of and threats to the species that increase interest in the species and its habitat and ecosystem.
- Networking and lobbying to influence opinions, legislation procedures, etc.
- Small-scale fundraising to contribute to high priority *in situ* projects or IUCN SSC Specialist Group activities.

4.3. Non-conservation roles for *ex situ* management

Zoos and other *ex situ* facilities may maintain species for non-conservation reasons such as general biological education, providing attractive and active exhibits, displaying species of special cultural or socio-economic interest, or for non-conservation related research. Questions related to these types of reasons include:

- Is this species required or well-suited to let institutions and staff gain experience in parrot husbandry before taking on more difficult species?
- Is the species important for research that is not conservation related (basic and applied research)?
- Is the species particularly valuable for non-conservation education (specific aspects of parrot biology)?
- Is the species colorful/distinctive/diurnal/active and particularly attractive as a zoo exhibit?
- Does the taxon have a special human cultural value (e.g., as a national or regional symbol, in a historic context, featuring in traditional stories) or economic value (e.g., traditional medicine, tourism, hunting) within its natural range or in a wider global context, and does this give the species a particular value for education or exhibit?



Parque das Aves

Workshop Recommendations for *ex situ* conservation of parrots and Grey-breasted parakeet in Brazil

5. Workshop Recommendations for *Ex Situ* Conservation

After reviewing the threats to wild populations, the workshop participants identified seven potential conservation roles for *ex situ* management for the focal species. Three of these *ex situ* conservation roles were considered to be relevant for all seven species: Conservation Education, Training and Research. These roles were evaluated for Amazon parrots as a group and general recommendations made, with species-specific recommendations added when necessary. A general recommendation for health and quarantine protocols was also made (see section 5.3). Species-specific discussions were held to address the four additional potential roles – Insurance Population, Rescue Population, Population Reinforcement, and Demographic Manipulation – and recommendations were made either for implementation or dismissal.

5.1. Conservation Education

The group defined a central conservation message that may be applied to education programs for all seven workshop species. Conservation education efforts should be coordinated by the Brazil Parrots Program team and intensified during the reproductive period of each species in the wild (these vary according to species). The following points were highlighted:

- The key message should be: *Do not purchase illegal parrots as pet birds, as they are not your best option.*

To support this message, parrot characteristics that do not make them good pets will be highlighted, as well as their social behavior. It was suggested to seek other experiences held in Brazil, such as, for instance, the campaign against wild animal hunting held by researchers in the Amazon, and cited by Professor Silvio Marchini, known as use of models to influence human behavior, where they taught chicken recipes as an alternative to the consumption of game meat, among other activities.

- Intensify the campaign/message from the second semester (July–December), which coincides with the reproductive period for most parrots and therefore when people are most likely to give parrot chicks as gifts.
- It is fundamental that conservation education is applied to birds held by zoos, highlighting the negative behaviors of these species to discourage their appeal as pets.
- Coverage area: zoos and other participating institutions located within the geographic distribution of these species, for institutions outside of the species' range, the focus

should be on parrots in general. It is important to take care not to inspire people with the desire of having parrots as pet birds.

- This campaign should be constantly assessed regarding its effectiveness and risks, and is subject to changes whenever required.
- The Brazilian Association of Zoos and Aquariums (AZAB) is responsible for spreading this program through its associated zoos.

Participants discussed the potential benefits and risks of conservation education as well as the feasibility of developing an effective program. Conservation education should be designed and implemented in a way that maximizes conservation benefits while minimizing risks. Actions and priorities will be detailed and defined after the workshop.

Benefits (conservation education)

The group considered that the implementation of a national strategy of conservation education, approaching the several issues related to parrots, would present great benefits to the conservation of these species. This includes promoting parrots as symbols in the communities that share the same area and/or surroundings of the species' distribution areas, making them a flagship species for conservation of their habitats and, as such, acting to fight off conflicts that involve the relationship of the community, mainly against the removal of chicks from nature.

Risks (conservation education)

The risk was identified of promoting the opposite effect to the desired one, i.e., increasing people's desire for purchasing a parrot as a pet. To mitigate this risk, it is important to constantly assess the effectiveness of education actions. It was also highlighted that presenting the negative features of these birds may not create much empathy with people for the species, or also may create concerns regarding the birds' well-being. There is a risk of encouraging the voluntary handover of parrots, and it is important to create a plan to deal with this issue.

Feasibility (conservation education)

The scope of the campaign is limited to the zoos' public. Participants recommended that efforts be coordinated, via AZAB, among zoos to improve the campaign's effectiveness.

5.2. Training and Research

There is a lack of information, as well as a lack of qualification for environmental surveillance agents (police officers or others) and professionals who act in this area (biologists, veterinarians, zoo technicians and others) to identify and handle confiscated birds. According to the National Action Plan for Parrot Conservation, the Parrots of Brazil Program promotes qualification at the national level for surveillance agents who have direct contact with confiscated animals. It was suggested that such qualification can be extended as a “model” and applied to professionals who have contact with the workshop’s target species. Such training could be held at zoos.

Training 1: Handling of confiscated birds

Training offered by the Parrots of Brazil Program includes the following content: a) species identification; b) proper management and containment; c) impacts of trafficking for species and for individual birds; and d) transmission risk of zoonotic diseases (e.g., psittacosis), among others. Printed materials should be generated, in the form of handbooks, to be distributed to professionals who do not attend such training sessions.

Training 2: Collection of biological samples

Another training need identified by the group, encompassing all species from this workshop, refers to the collection of biological materials from birds, for disease and genetic tests, as well as the preservation of such material (genetic). It was reported that many tests are not feasible due to improper collection, and it is important to train zoo personnel. This training shall focus on the methods of sample collection, storage and transport for health exams.

Training 3: Releases

Other training needs relate to releases, and should be directed for all institutions, breeding centers and projects that perform this activity for *Amazona* species. This training should be based upon the IUCN reintroduction guidelines, and include issues such as: presentation and checking with the TAG (Technical Advisory Group) of the Parrot National Action Plan; need for a license from the Brazilian government; partnerships between projects to optimize actions; selection of birds for release; complete health and quarantine protocols (see section 5.3); appropriateness of the releasing sites; rehabilitation for release; release procedures; post-release monitoring methods; and behavior of birds, observing differences between species.

Some of these activities may use live captive birds for training, while other training does not require live birds. It was also highlighted that whenever the release of a certain species is being considered, it is recommended that the populations which can benefit most from reinforcement be prioritized, i.e., small, isolated populations that have likely experienced substantial declines and/or are likely at risk of inbreeding depression.

Research 1: Collection and use of biomaterial

Due to discussions held on the preservation of genetic materials for future reproduction needs (e.g., artificial insemination), the group considered the need to develop research and technology for collection, storage and use of genetic material for the workshop target species. A course was held in Brazil, conducted by researchers from overseas, on collection and insemination. As such, this knowledge already exists. However, sperm currently is viable for only six hours (refrigerated), and it is not yet possible to cryopreserve it. Therefore, currently artificial insemination can only be performed with fresh sperm. Prof. Tania Raso commented on studies carried out by research groups in Brazil to evaluate the viability of freezing of wild bird tissues and gametes for possible future necessity. It is recommended to contact the institutions that are already developing these studies, to develop new partnerships and to close the existing knowledge gap on storage and feasibility of parrot genetic biomaterial. It was commented that this difficulty is shared with researchers from other countries, who are trying to improve and develop these techniques.

Research 2: Behavior related to release

There is a need for research on all of the workshop species to identify the possible behavioral features of birds that yield better success rates for release.

Research 3: Method for aging birds

Currently it is not possible to age adult birds. This would be a valuable tool to assess the potential aging of the wild population. Captive birds of known age may be valuable in developing such a method.

Benefits (training and research)

Considering that wild animal trafficking is one of the key threats for parrots, and, for this reason, the number of birds confiscated is large, the benefits of training for the management of individuals and for collection of suitable bio samples was deemed as high. Such training will

reduce the transmission risk of pathogens, will aid in the proper identification of confiscated birds, and will promote the engagement of these professionals in fighting parrot trafficking.

The training of those involved in releases tends to reduce the number of releases considered as inappropriate. It may also promote engagement and commitment, in the sense of improving efforts to optimize the use of resources and increasing the conservation benefit for the species.

Risks (training and research)

There is a risk that the knowledge acquired during the training will promote the desire to have parrots as pets or, knowing the importance of the species, that the birds will be destined to the illegal trade. This risk was considered to be low, being minimized by correctly following the norms and procedures proposed here.

Alternatively, lack of such training can lead to more cases of disease outbreaks. For example, an outbreak of psittacosis (chlamydiosis) affected 46 people involved in the management of birds newly seized from trafficking in Rio Grande do Sul due to the high number of birds and inadequate management conditions (Raso et al. 2013). Training is necessary to avoid situations like this from occurring again.

Training in releases may encourage an increase in the number of releases, and it may pose a risk to the species if specifications such as proper habitat and health protocols are not properly followed. For that, the monitoring of releasing activities is paramount, and there is a risk of not having sufficient technical personnel for this function. However, the lack of proper release capabilities will not impede continuity and may even enhance inadequate releases. In the long run, this would increase the risk of disease in wild birds caused by inappropriately unmanned and unmonitored birds.

Feasibility (training and research)

The feasibility of implementing this course is high, as this type of action is already being performed. It will be necessary to adjust and to take into account the training scope in large scale. There is a possibility that it is not possible to gather a significant number of persons who work with these species.

5.3. Health and quarantine protocol

To prevent the spread of pathogens, a strict health and quarantine protocol should be followed if establishing an *ex situ* insurance population for any of these species. It was suggested to employ a health and quarantine protocol already established under the National Action Plan for the Lear's Macaw, in order to minimize spread of diseases. It was noted that being free from specified pathogens is currently the first criterion considered when forming potential breeding pairs within the Lear's Macaw reproduction program. Also, a six-month follow-up, and strict treatments if positive for the pathogen, are applied to individuals with genetic profiles relevant to the species.

5.4. Species-specific Recommended Roles

Species-specific discussions were held to address the potential roles of insurance population, rescue population, source for population reinforcement, and source for demographic manipulation. Some of these roles were recommended while others were dismissed, depending upon the balance of benefits against risks and feasibility. Table 1 presents a summary of the seven potential *ex situ* conservation roles considered in this workshop and the group's recommendations for each species, along with a few relevant points. Some actions are common to all species, while others are species-specific actions. Detailed analyses and recommendations can be found in the species-specific sections of this report (Sections 6-12).

Table 1. Summary of discussions and potential *ex situ* management roles by species.

Role	<i>A. brasiliensis</i>	<i>A. vinacea</i>	<i>A. pretrei</i>	<i>A. rhodocorytha</i>	<i>A. farinosa</i>	<i>A. aestiva</i>	<i>P. griseipectus</i>
Insurance Population	RECOMMENDED High value; birds available, poor past reproduction; maybe link with international population	RECOMMENDED High value and feasibility; breeding depends on wild caughts	RECOMMENDED High value; breeding pop; some expertise	RECOMMENDED High value and feasibility; breeding depends on wild caughts	RECOMMENDED Important, feasible; breeding depends on wild caughts; keep two pops separated	RECOMMENDED Two insurance populations (by subspecies); high feasibility; may not need reproduction; important	RECOMMENDED Important; use confiscated or European source
Population Restoration	RECOMMENDED Available habitat; need to assess wild population; do responsibly	RECOMMENDED In progress; feasible; minimize risks	Not considered at this time	RECOMMENDED Minimize risks; reintroduction to North underway	Undecided: Not enough info to evaluate; need to consult project	RECOMMENDED Two potential sources: insurance population and rehabilitation	RECOMMENDED Reinforcement and reintroduction; extremely high value; may include demographic manipulation
Demographic Manipulation	Not considered at this time	RECOMMENDED Release juveniles to improve age structure (feasible)	Not considered at this time			RECOMMENDED Mitigate threats first or in combination	RECOMMENDED Release juveniles (see above)
Rescue Population	Not considered at this time						Not recommended Try to treat disease <i>in situ</i>

Role	<i>A. brasiliensis</i>	<i>A. vinacea</i>	<i>A. pretrei</i>	<i>A. rhodocorytha</i>	<i>A. farinosa</i>	<i>A. aestiva</i>	<i>P. griseipectus</i>
Research (all parrots)	RECOMMENDED Traits associated with release success; geographic origin of <i>ex situ</i> birds; genetic variation and kinships of <i>ex situ</i> population; way to age birds						
Research (species specific)	RECOMMENDED Improve husbandry					RECOMMENDED Survey of release info; increase collaboration	RECOMMENDED How to introduce to group; impact of telemetry and ID on birds
Training (all parrots)	RECOMMENDED *Training in species identification, management, disease risk (already happening as part of National Action Plan); training in management for release						
Training (species specific)	RECOMMENDED Husbandry for reproduction in captivity					RECOMMENDED Care in recording origin (subspecies) data	RECOMMENDED Train in different breeding strategies
Education (all parrots)	RECOMMENDED General message for all projects: No poaching, no pets						Not recommended in local areas, as risk > value; any education should <i>not</i> use live birds
Species specific concerns	Focus on Sao Paulo state			Focus on range of occurrence		Denounce poachers (Mato Grosso do Sul)	

Green = discussed and recommended; orange = discussed and not recommended; blue = discussed and deferred due to insufficient information to decide; grey = not considered to be relevant at this time (not discussed)

6. *Amazona brasiliensis* - Red-tailed Amazon Parrot

Near-threatened Species

IUCN: NT (2018)

National List (MMA): NT (2014)

Santa Catarina: CR (2011)

Paraná: VU (2018)

São Paulo: VU (2018)



Photo: *Amazona brasiliensis*

Source: Parque das Aves

IN SITU STATUS

Habitat and geographic range

This species inhabits the Atlantic Rainforest in Southeastern Brazil. Its range occupies a narrow seacoast strip, starting in Itanhaém in São Paulo and along the coast of Paraná. Its original distribution also included the extreme northeastern portion of Santa Catarina.



Range map for *A. brasiliensis*

Source: Wiki Aves, 2019

Home range

454 ha – 629 ha (N=3, Kernel) (SPVS, 2004)

Population size (wild)

9,112, per annual population census (SPVS, 2018)

State of Paraná: **7,366**; State of São Paulo: **1,746**

Population trend

State of Paraná: **increasing**; State of São Paulo: **stable**

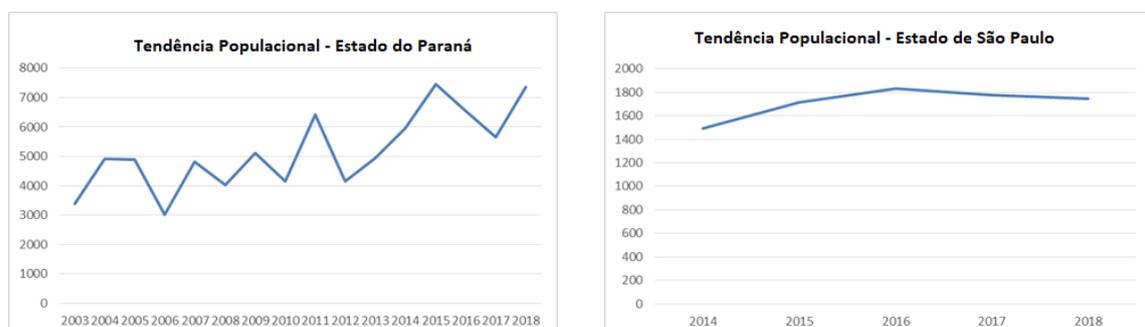


Figure 2. Annual counts of *A. brasiliensis* in (a) the state of Paraná, (b) the state of São Paulo (SPVS, 2018).

In 2018, 9,112 parrots were recorded throughout the considered region, with 80% of the population of *A. brasiliensis* found at the north coastline of the state of Parana, with 7,366 individuals. In the southern coastline of São Paulo, 1,746 individuals were recorded, distributed in the six municipalities where they occur in that state (SPVS, 2018).

In the State of Paraná, six communal roosts were recorded as used by the species: Ararapira, Ilha do Pinheiro, Ilha Rasa, Ilha do Mel, Ilha da Cotinga and Guaratuba. Some movements of birds between roosts has been observed, but overall there is loyalty to these sites. The highest concentrations occur in communal roosts in the National Park of Superagui and of the islands Rasa, do Mel and Rasa da Cotinga. The areas surrounding these roosts are heavily used by parrots during the day for foraging, mainly the plains areas of Pontal do Parana municipality, over half of the population uses this region during certain times of the year. In the communal roost located at the city of Guaratuba, extreme south of the area where the species occurs, a reduced population is being monitored. As for Santa Catarina, the most recent record was in 2010 (SPVS, 2018).

Along the southern coastline of São Paulo, during 2018, ten communal roost areas were recorded: Ariri, Maruja, Cambriu, Cananea Cidade, Cananea Norte, Ilha Comprida-Juruvaiva, Ilha Comprida-Jardim Tropical, Capoava do Mumuna, Itranhaém and Peruíbe (SPVS, 2018).

Primary threats (historical and current)

In both states (Paraná and São Paulo) the cutting of trees where parrots nest, as well as poaching and illegal trade of eggs and chicks, are significant threats for the species.

Ongoing conservation activities and research

In 1997, the Research Society for Wildlife and Environmental Education – SPVS initiated conservation education activities with residents of the Paraná state coastline, aiming at protecting *A. brasiliensis* by promoting awareness within the local society regarding the importance of conserving the species and the biodiversity of the Atlantic Rainforest. In 1998, the Conservation Project for the Red-Tailed Amazon Parrot began, expanding its activities to monitoring reproduction of the species in the islands of Paraná coastline, mainly the islands of Rasa, Gamelas, Grande and Peças, which are sites for feeding, roosting and reproduction (Sipinski & Bócon 2008). From 2003, in order to monitor the population trend of this species

in the coast of the state of Paraná, yearly censuses were initiated to be performed simultaneously at the communal roosts, where parrots gather to spend the night (Sipinski et al. 2014). Censuses are held during autumn, the season of highest concentration of parrots in the species' communal roosts throughout their distribution area.

In 2013, the project increased its scope to reach the southern coastline of the state of São Paulo, through conservation education in schools of the city's education network, and promoting the society's awareness, in monitoring the reproduction and population sites of the region. Monitoring was initiated in the cities of Ilha Comprida, Iguape and Cananéia, expanding to Pariquera-Açu, Peruíbe and Itanhaém (Sipinski et al. 2018).

The monitoring of reproduction sites is a strategy to prevent the removal of chicks from their nests related to poaching and illegal trafficking, and to deter the cutting of trees that are fundamental to the survival of *A. brasiliensis*. Local residents have been involved since the beginning of the project in the search for new nests and in protecting and monitoring them. The census is a basic tool to assess population size for *A. brasiliensis*, and to understand the success or the need for conservation efforts. Conservation education is also a very important component for the nature conservation projects, to bring society closer to the project's goals. The main focus is on the region's residents, and the project currently acts in partnership with the project School of Nature Conservation SPVS.

EX SITU STATUS

Regional and global population size

An assessment of captive *A. brasiliensis* parrots was made in 2018, estimating the existence of 150 birds in Brazil and 50 birds in international institutions. This species has a low rate of confiscations, with only two birds recorded as confiscated in 2018.

Current *ex situ* management level

There is no national studbook established for *A. brasiliensis* in Brazil.

Demographic and genetic information

For Brazil: 19 males and 6 females are known; sex is unknown or not reported for 63% of the population. Overseas population: 15 males and 12 females are known; sex is unknown for 40% of the population. No genetic data were available for this workshop.

Expertise (husbandry, reproduction, environmental requirements, veterinary issues)

Some expertise exists, but historically captive breeding success has been very low. More detailed information can be found in the text below.

EX SITU* RECOMMENDATIONS FOR *AMAZONA BRASILIENSIS

Ex situ* management roles recommended for *Amazona brasiliensis

As part of the conservation strategy for *A. brasiliensis*, the following roles were recommended for *ex situ* management: **Insurance Population, Population Reinforcement (if required), Research, Training, and Conservation Education**. Discussion details are provided below.

INSURANCE POPULATION

The priority actions for conservation of *A. brasiliensis* are *in situ*. However, an *ex situ* population may be of great importance if there is a decline in the *in situ* population. An insurance population is an *ex situ* population that is large enough and managed in such a way as to maintain a genetically diverse and healthy population as a safeguard against sudden decline or extinction in the wild.

Benefits

The establishment of an insurance population was initially considered to be a low priority for this species, but as the group delved into the issue, consensus was reached that it was a high priority measure. If the wild population of *A. brasiliensis* decreases, with special attention to the population within the State of São Paulo and Guaratuba representing the current southern frontier of distribution, the existence of an insurance population may be significant. The establishment of an insurance population for *A. brasiliensis* is associated with a potential need for population restoration in the future.

Risks

One of the risks that an insurance population may face is that pathogens may be brought in from the wild that may affect the population in captivity, as broadly discussed by the group and described under item 2.4 (emerging exotic diseases). To minimize such risk, it was recommended that established quarantine and health protocols (see section 5.3) are followed so that all birds are assessed for detection of possible pathogens.

The development of the existing captive population into an effective insurance population implies costs and, as such, the search for funding may create competition with field project initiatives and may compromise important *in situ* actions that are more relevant for the species' conservation. It was understood that making human resources available for *ex situ* actions is not currently feasible due to the costs to maintain a team, which has a priority focus on ongoing *in situ* actions.

In addition, competition may also occur for *ex situ* funding among parrot species, such as funds for constructing facilities and proper conditions for management and breeding. Therefore, priority shall be given to the species in most critical situation. The risk was discussed that institutional program partners may not commit at adequate levels for a successful program and may stop making birds available to the program. Given that participating institutions will be selected and required to commit to the program, such risk will be minimized.

A method was suggested to overcome the lack of funding: a search for new partnerships, to make the opportunity for participation available to additional institutions, even international ones, to support both *ex situ* and *in situ* actions identified in official reports, such as in the national plan for species conservation.

While there are risks and costs in establishing an insurance population, there also is a risk in not doing so. Specifically, there is a risk that a stochastic event will negatively impact wild *A. brasiliensis* populations, which have a restricted distribution. In this case there will be no resources to address the situation if no action is taken to establish an insurance population.

Feasibility

According to the assessment conducted for this workshop, there is an *ex situ* population in Brazil with at least 150 parrots. Therefore, it is possible that part of this population can be available to establish an insurance population, without the initial need to remove birds from the wild for that purpose.

In situ experience with this species, including well known information on behavior and species distribution, will contribute positively to the establishment of an insurance population. Captivity breeding efforts in the past have had a very low success rate, which presents a challenge to be overcome to ensure the viability of the insurance population.

Recommendations related to this role

As the workshop progressed, the group concluded that the priority for an insurance population for this species is high. Maintenance of an insurance population provides the basis to develop into a source population for restoration, if needed, and the actions for its establishment may occur in parallel with research and training strategies. Establishment of an *ex situ* insurance population is recommended for this species.

Initial development of the insurance population may be able to take advantage of at least some of the existing captive-held birds provided that they are healthy and of verified taxonomic origin. The use of future confiscated birds to supplement or maintain the insurance population may be limited, as there is not a large number of seizures of illegally held birds. For example, in 2018 only two birds were recorded as confiscated. It is believed that the illegal trade in this species is fairly direct, with poached birds going straight to the end consumer; this is reinforced by the *in situ* monitoring data showing high levels of raided nests. There are also reports from residents and bird breeders on the occurrence of eggs and chicks poached from the wild for international trafficking.

If the current *ex situ* populations combined with future confiscations is insufficient to establish the insurance population, another potential strategy would be the removal of some nestlings from the wild to be raised in captivity. It is well known that, in general, for a nest with 3-4 nestlings, the youngest (smallest) nestling has a low rate of survival. These youngest nestlings could be removed from nests and raised in captivity to supplement the captive population without risk of compromising the wild population.

There is a veterinary recommendation emphasizing that the *ex situ* population must be healthy, with all birds being assessed for screening of possible pathogens. It is recommended to use the quarantine protocol already established within the Lear's Macaw National Action Plan. This protocol should be applied to all new birds entering the *ex situ* population.

Given the long life and generation time of this species and the potential availability of wild-caught birds (either from confiscations and/or removal of youngest chicks), it may be possible to maintain an effective insurance population with a relatively low level of captive breeding. It is important, however, to develop better husbandry knowledge to improve captive breeding success in case captive breeding becomes more urgent in the future.

The group expressed concern related to the mating system (monogamy) of the *Amazona* genus, if and when new individuals may need to be incorporated into the insurance population to avoid inbreeding depression. This concern relates to an experience reported by the Charão Project, when it took around 8 years to establish a breeding pair in an *ex situ* breeding program. The importance of keeping the studbook updated was highlighted, in order to assess the population requirements and perform proper management. If the captive population demonstrates indications of inbreeding depression, individuals that are introduced shall be selected based on prior knowledge of their genetic profiles.

POPULATION RESTORATION

The purpose of an *ex situ* population designed for Population Restoration is to provide individuals to supplement small or declining *in situ* populations (reinforcement) or to establish new populations in suitable, unoccupied habitat (reintroduction). For restoration to be feasible, it is necessary to understand the causes that led to decline or destabilization of *in situ* populations prior to conducting releases.

For *A. brasiliensis*, it is possible that supplementation may be needed at the current southern frontier, in Guaratuba, Paraná, where the population consists of only 40 individuals, according to a census performed by the SPVS team. For the state of São Paulo, where the population still is strongly threatened by the removal of chicks and is not showing growth, there is a need to continue population monitoring and also assessment of the population status, habitat and threats prior to any population restoration initiative.

Apart from supplementing existing populations, captive birds could be reintroduced to areas where the species has been extirpated. As described above, these areas would need to be assessed with respect to their capacity to receive these individuals and to anticipated threats.

The source of birds for *in situ* restoration should be developed from the insurance population. This may require changes in *ex situ* management and reproduction to meet the requirements for this additional purpose. Issues related to the birds' behavior, state of health and origin would need to be considered.

An *ex situ* population of this species is held at the Foundation Loro Park in Spain, which could be consulted on their interest in collaborating in case the restoration strategy is approved. A recommendation was made to the group in order to follow through the next steps.

In situ restoration has already been conducted in certain cases, accomplished through the translocation of nestlings from one nest to another in nature, depositing them into nests with nestlings of a similar developmental stage. In situations in which there are confiscated nestlings with confirmed origin in the region, these chicks are placed in wild nests. In both cases, the survival rate was satisfactory.

Another important issue to be considered is the origin of the birds that will be released. It should be made clear if they may be from other regions or must solely originate from the region where they will be released. If the goal is to release into the same population of origin, then some birds may need to be captured from the wild to breed in captivity for future release. It is possible that some small *in situ* populations are already facing inbreeding, which would be increased if some birds were removed, and the release of related birds would be of less benefit.

If the restoration goal is to increase the population not only in numbers, but also in genetic diversity, then the released birds should represent new or rare genetic lineages. It was noted that a priority for research is to understand the genetic composition of both *in situ* populations, to assess if there is a significant difference between them.

Benefits

If restoration is identified as required for the conservation of this species, and assuming the completion of the required research to understand and address the causes reducing population growth, it is expected that such action benefits the species.

Risks

There is a risk that the released birds will have a low survival rate, particularly if the threats that limit population growth are not efficiently addressed.

Feasibility

It is known that the Guaratuba coastline habitat, a possible area for the eventual restoration, has available food resources; however, there are not enough data to assess if there are sufficient nesting areas. However, as this species will accept artificial nests, this may be a feasible alternative for providing nesting sites.

Recommendations related to this role

More information is needed to determine if population restoration is needed and is appropriate for this species across parts of its current and historical range. Development of a population restoration program is not recommended until appropriate assessments have been made regarding the wild population status, suitable habitat, and control of poaching and other threats. The decision whether or not to implement population restoration should be made according to the results of the research activities proposed here. The establishment of an *ex situ* insurance population for this species will provide the basis for future population restoration efforts, if deemed appropriate and of conservation value.

RESEARCH

General research needs for all *Amazona* parrot species discussed in the workshop were: 1) identification of geographic origin of captive birds; 2) analysis of genetic variation and kinships within the *ex situ* population; 3) traits associated with release success; and 4) development of a method to age birds (see Section 5.2).

Genetic studies have been done for wild birds in Parana and are needed for the São Paulo wild population. A genetic mapping study then can be performed in order to identify the origin of the birds existing in captivity. If genetic differences are found related to geographic origin, tools are available to prioritize the use of individuals that are genetically appropriate for use in restoration. Therefore, this study will serve as basis for the decisions surrounding the origin and destination of birds for restoration.

An *in situ* research need raised by the specialists is to understand the factors that limit growth of the population in São Paulo. Better understanding of these factors is needed in order to tackle possible threats that impact the wild population and increase the probability of effective restoration.

Research with the aim to improve *ex situ* husbandry and reproductive success was also identified as a species-specific research need for *A. brasiliensis*.

Benefits

Research related to increasing knowledge on *ex situ* management and *in situ* breeding behavior of the species was considered as having a medium value for the species' conservation. This topic is related to other *ex situ* management strategies deemed relevant for *A. brasiliensis*.

Regarding genetic studies in order to know the geographic origin and the kinship relationships between captive individuals, these were deemed as highly important for conservation, as these data will determine the composition of the Insurance Population.

In situ research is important to identify and address threats to the wild population and to inform effective restoration.

Risks

Resources will need to be invested in order to obtain and analyze genetic samples with known origin to establish the flock in captivity.

Feasibility

The lack of genetic samples and other data from the populations in Guaratuba, in Parana and in São Paulo may be an obstacle to perform the studies. Resources and funds will be needed to obtain and analyze genetic samples. Access to both captive and wild birds to collect samples may be challenging. A statement of commitment from participating facilities for the insurance population will promote access to those birds.

TRAINING

In addition to training activities identified as relevant to all species (i.e., species identification, management, disease risk, management for release), an additional specific training goal for *A. brasiliensis* is to increase the expertise of professionals in breeding success to address difficulties faced by Brazilian zoos in raising and breeding this species.

It may be possible to develop partnerships with national commercial breeders and with breeders who reproduce the species successfully in Europe. One possibility is to send a group of Brazilian technicians to be trained by European breeders, or alternatively to bring breeders from Europe to teach captive reproduction techniques in Brazil. This second option may be the most

practical, as a higher number of Brazilian professionals would be trained, relying on the good structure of Brazilian zoos and the possibility of requesting funding for food and lodging for the lecturers.

Benefits

The establishing of a specific training program for *A. brasiliensis* was deemed as of medium value for species conservation.

Risks

The breeding of *A. brasiliensis* may be no different than the reproduction of other species, so efforts would be made and resources spent in an unnecessary action.

Feasibility

The expertise in *ex situ* breeding for this species in Europe is a positive factor to make feasible the establishment of a training program for Brazilian professionals. Training to improve captive breeding of *A. brasiliensis* is feasible, as it is known that there is expertise in this matter at some European zoos.

CONSERVATION EDUCATION

The group determined that Conservation Education is valuable for parrot species targeted in this workshop. A campaign template applicable to all species was generated (Section 5.1).

Specific recommendations for *A. brasiliensis*

In order to reduce the pressure to capture chicks and to optimize future restoration actions, it is essential to carry out a conservation education campaign that strongly involves the communities around the release areas and promotes actions that generate the feeling of belonging and pride to shelter and protect the species.

Benefits

The benefits of this specific action for *A. brasiliensis* are the same as those pointed for all focus species of this workshop, presented under item 5.1.

Risks

No risks were identified for this activity.

Ex situ* management roles not recommended for *Amazona brasiliensis

By consensus, the group agreed that Demographic Manipulation and Rescue Population are not recommended *ex situ* management roles for *A. brasiliensis* at this time, and these roles were not discussed in detail.

7. *Amazona vinacea* – Vinaceous-breasted Parrot

Threatened Species

IUCN: EN (2018)

National List (MMA) VU (2018)

Bahia: CR (2017)

Minas Gerais: VU (2010)

Espírito Santo: CR (2005)

Rio de Janeiro: VU (2000)

São Paulo: EN (2009)

Rio Grande do Sul: EN (2002)

Paraná: VU (2018)



Photo: *Amazona vinacea*

Source: Parque das Aves

IN SITU STATUS

Habitat and geographic range

The Vinaceous-breasted Amazon Parrot, *A. vinacea* (Kuhl, 1820), occurs in Brazil, Paraguay and Northern Argentina (Forshaw 1989, Sick 1997, Bencke et al. 2003). Recent records in Argentina have been in the western central region of Misiones, between the cities of San Pedro and Bernardo de Irigoyen, and an isolated population at Campo Vieira. In Paraguay, parrots inhabit the States of Canideyú, Alto Paraná and Caaguazú (Cockle et al. 2007). In Brazil, the species is found in the south of Bahia and northeast of Minas Gerais, to Rio Grande do Sul (Forshaw 1977, Sick 1997, Bencke et al. 2003). In the state of Bahia, its occurrence is mentioned for the Diamantina Plateau, without recent records for this region (Cordeiro 2002). It was recently rediscovered in the north of the state of Espírito Santo, in the municipality of Alto Rio Novo (Carrara et al. 2008).



Fonte Biomas: IBGE

Distribution map for *A. vinacea*

Source: Wiki Aves, 2019

In Paraguay, parrots inhabit the States of Canideyú, Alto Paraná and Caaguazú (Cockle et al. 2007). In Brazil, the species is found in the south of Bahia and northeast of Minas Gerais, to Rio Grande do Sul (Forshaw 1977, Sick 1997, Bencke et al. 2003). In the state of Bahia, its occurrence is mentioned for the Diamantina Plateau, without recent records for this region (Cordeiro 2002). It was recently rediscovered in the north of the state of Espírito Santo, in the municipality of Alto Rio Novo (Carrara et al. 2008).

Historically, *A. vinacea* was very common in the state of Santa Catarina in the 1970s (no information on locations and number of individuals). There are historical records in the south and southeast regions of that state, more precisely at the cities of Urupema and São Joaquim (Sick 1997), where flocks of 120 and 210 parrots were found, in a region of sympatric distribution with *A. pretrei* (Temminck, 1830) (Prestes & Martinez 1996). The species has also

been recorded in São Joaquim and Lages (Fontana et al. 2009). In the state of Rio Grande do Sul, *A. vinacea* has few recent records, most being in conservation units, such as the National Park of Aparados da Serra, National Park of Serra Geral, State Park of the Red-spectacled Amazon Parrot, State Park of the Espigão Alto, National Forest of São Francisco de Paula, Center for Research and Conservation of Nature Pró-Mata and Environmental Preservation Area of Celulose Cambará (Bencke et al. 2003, Urben-Filho et al. 2008).

The following areas are also considered as recent occurrence in each Brazilian State.

- Bahia: National Parks of Chapada Diamantina and Monte Pascoal (Bencke et al. 2006).
- Minas Gerais: State Park of Ibitipoca, State Park of Rio Doce, State Park of Serra do Brigadeiro, RPPN Feliciano Miguel Abdala (former Biological Station of Caratinga, National Park of Carapaó and National Park of Serra da Canastra, State Park of Serra do Papagaio and Laranjal/Miracema (Bencke et al. 2006, Urben-Filho et al. 2008), city of Araçuaí, in the mid Jequitinhonha (Luiz et al. 2003) and Almenara (Luiz et al. 2004).
- Espírito Santo: the complex Pedra Azul/Forno Grande (Bencke et al. 2006) and the city of Alto Rio Novo (Carrara et al. 2008).
- Rio de Janeiro: the border of the Serra da Mantiqueira, where it suffers competition from *A. aestiva* introduced to the location (Pineschi et al. 2003).
- São Paulo: State Parks of Campos do Jordão, former Jacupiranga, Intervales, Alto Ribeira and Serra do Mar – Jacupiranga center (Urben-Filho et al. 2008), Serra da Mantiqueira, São Francisco Xavier/Monte Verde, Serra da Cantareira and forest massif of Paranapiacaba (Bencke et al. 2006).
- Paraná: State Parks Mata do São Francisco, Campinhos, Lauráceas and Rio Guarani and also at the Ecological Station of Rio dos touros (Urben-Filho et al. 2008), at the Natural Reservoir of the Serra do Itaqui, in Guaraqueçaba (Boçon et al. 2004), in the municipalities of Bituruna, General Carneiro, Palmas (MASO; MIKICH, 2004), Tijucas do Sul (KAMINSKI; CARRANO, 2004) and São João do Triunfo (LIMA *et al.*, 2004). It is also found at the metropolitan region of Curitiba (Adrianópolis, Bocaiuva do Sul, Campina Grande do Sul, Colombo, Tunas do Paraná) (ABE, 2004), Telêmaco Borba and Pinhão.
- Santa Catarina: State Biological Reservoir of Sassafrás, State Parks of Araucárias, Serra do Tabuleiro (URBEN-FILHO *et al.*, 2008), State Park of Rio Canoas (E. S. Soares, *in litti*), city of Urubici at the Canoas river basin (BISHEIMER *et al.*, 2004), Vitor Meireles at the high Itajaí (PIACENTINI *et al.*, 2004).

- Rio Grande do Sul: State Parks of Espigão Alto, Rondinha and Turvo, with records also at the National Park of Aparados da Serra and National Forest of São Francisco de Paula (URBEN-FILHO *et al.*, 2008).

For international locations, there are recent records of the species in Paraguay and Argentina, pointing to the central portion of the east of Misiones (Argentina) between São Pedro e Bernardo de Irigoyen, and a small isolated population in Campo Vieira, and in Paraguay in the departments of Canideyú, Alto Paraná and Caaguazú (COCKLE *et al.*, 2007). The populations in the neighboring countries are relatively small, totaling a minimum of 423 individuals: 203 in Argentina and 220 in Paraguay (COCKLE *et al.*, 2007). The largest population in Paraguay was found at the Natural Private Reservoir Itabó, with 167 birds, and in Argentina it was found in San Pedro-Tobuna, with 163 birds in 2005 (COCKLE *et al.*, 2007). In 2007, 203 individuals were recorded at San Pedro-Tobuna, and, in 2008, 214 in the same area. The population in Argentina probably has 250 or more birds (fewer than 300) (K. Cockle e A. Bodrati *in litt.*). Since the 1980s, *A. vinacea* is no longer found at the Iguazu National Park in Argentina (COCKLE *et al.*, 2007). The small provincial parks of Cruce Caballero and Araucaria in Argentina provide only a partial protection, as individuals feed and nest outside of the protected areas (COCKLE *et al.* 2007). In Paraguay, no population is effectively protected, including the largest population found at RNP Itabó, which has an uncertain future as the area is up for sale (A. Bodrati e K. Cockle *in litt.*).

Population size (wild)

The population size for *A. vinacea* in Brazil is unknown. Cockle *et al.* (2007) estimate the minimum size of remaining populations of *A. vinacea* at 220 individuals for Paraguay and 203 for Argentina. The species seems to regionally migrate to search for food sources (COLLAR *et al.*, 1992). Like *A. pretrei*, *A. vinacea* uses communal roosts to spend the night, with gatherings of more than 100 birds (PRESTES; MARTINEZ, 1996).

The Red-spectacled Amazon Parrot Project (Projeto Charão) is monitoring this species in areas sympatric with the distribution of *A. pretrei*. Sighting data are given in Table 2. From 2016 to 2018, the census was supported by several collaborating institutions (Table 3).

Table 2. Numbers of *Amazona vinacea* counted between 2009 and 2015.

Year	Individuals	Year	Individuals
2009	345	2013	3741
2010	2794	2014	2139
2011	1763	2015	2857
2012	2475		

Table 3. Monitoring of the *Amazona vinacea* population coordinated by the Red-spectacled Amazon Parrot Project, from 2016 to 2018. The percentages consider the total of the table, not the estimated total of the wild population.

Locais	2016			2017		2018	
	Nº de papagaios	% Brasil	% mundo	Nº de papagaios	% Brasil	Nº de papagaios	% Brasil
RS	335	9,19	8,54	409	10,08	303	6,37
SC	2324	61,86	57,52	2606	64,23	2891	60,76
PR	904	24,8	23,06	796	19,62	1025	21,54
SP	93	2,55	2,37	109	2,69	204	4,29
MG	58	1,59	1,47	135	3,33	335	7,04
ES				2	0,05		
Brasil	3714		92,9	4057	100,00	4758	100,00
Argentina	252		6,42				
Paraguai	23		0,58				
	3920						

Population trend

In spite of efforts by several institutions, the population of *A. vinacea* probably does not exceed 8,000 individuals in Brazil. The number for Argentina and Paraguay is even more discouraging, as fewer than 500 individuals were recorded in both countries. According to IUCN, the population is decreasing.

There is a special concern with the population in Sarandi, in the state of Rio Grande do Sul, which is isolated and does not show growth in the number of individuals and has been steady at 33 birds for several years. During monitoring of this population, adults are sighted but in spite of large sampling efforts, no active nests were found in the region. It is possible that the population is breeding; however due to the evidence of raided trees, experts conclude that chicks are being removed from the area.

Home range and habitat use

Knowledge of the habitat and home range for a species, and determination of core habitat distribution, are paramount to establish priority areas for its conservation. *A. vinacea* prefers environments with forests with *Araucária* and have the habit of forming large population concentrations during the time of seed production for *Araucaria angustifolia*. Once very large

in the south of Brazil, *Araucaria* forests have been reduced to small areas of tens or hundreds of hectares. This environmental change has adversely affected populations of *A. vinacea*.

Radio-telemetry was used to determine home area, seasonal habitat use, and seasonal movements. Eight *A. vinacea* chicks from three nests located within the same breeding site were monitored for six months by the Red-spectacled Amazon Parrot Project in the southeast region of Santa Catarina. One month after fledging, the chicks were about 20 km away from their natal tree. Once incorporated into the flock, daily movements from the roost were short (1.0–1.5 km). Movement when moving to another communal roost were up to 4.5 km, with one observed instance of 17 km. The fact that *A. vinacea* presents short daily movements, both from the communal roost and also between locations in succession, seems to be linked to their strategy of foraging near their roost area. Continued radio-telemetry work is needed on movement patterns as well as priority areas for foraging and breeding (MARTINEZ *et al.*, 2013).

Primary threats (historical and current)

- Reduction of coverage of forests with *Araucária* over the past decades, mainly from 1910 to 1940 for the RS, 1950 to 1970 in SC and PR
- Poaching of chicks with destruction of nests, damaging old trees and reducing the number of cavities for reproduction
- In poorer areas with social vulnerability, such as the North of MG and certain regions of SC, the poaching of chicks adds to the household income (therefore, measures to reduce poverty and generate income should be emphasized).
- Small parrot populations in most regions, which may face low gene flow due to isolation. The Red-spectacled Amazon Parrot Project is awaiting results on genetic variability testing that is being conducted by the laboratory of Prof. Dr. Renato Caparroz (University of Brasília).

Ongoing conservation activities and research

Given its broad geographic distribution, it was once believed that the situation for this species was not of concern; however, population monitoring activities noted a high rate of removal of chicks from nests in natural cavities, particularly at the edges of the distribution. Poaching from nest boxes is believed to be inhibited due to being at more protected locations under the researchers' surveillance.

To understand the species' behavior, some chicks were fitted with radio transmitters, and data show that the species starts to breed at around four years of age. Radio-telemetry monitoring has broadened the knowledge of *A. vinacea*'s diet, with 40 different plants being

consumed by the species. Average movement of individuals is about 7–12 km. More studies are needed to understand species-specific behavior.

The Red-spectacled Amazon Parrot Project conducts population monitoring for *A. vinacea* throughout its range. The project is applying conservation strategies to protect the species' natural habitat, such as increase nesting sites. Old and leafy trees, which may support breeding pairs, are becoming scarcer and this shortage of nesting sites is becoming a big problem throughout the range.

A course called Rescue of the Paran Araucaria, provided by the Red-Spectacled Amazon Parrot Project, was created as a conservation education activity to encourage teachers to work in a multi-disciplinary manner for protection of species and environments of the Red-spectacled and Vinaceous-breasted Amazon Parrots.

Release Program (data provided by the Espao Silvestre Institute, post workshop)

Birds released in the National Park of Araucrias to date include rescued birds, birds surrendered voluntarily or confiscated by authorities, and birds that hatched in captivity, and total 153 individuals released (Table 4). The release of 33 individuals was planned for March 2019.

Table 4. Number of birds released in National Park of Araucrias, SC (2011-2018).

Date of Release	Number of individuals released
January 2011	13
September 2012	30
June 2015	33
March 2016	7
June 2016	30
October 2018	40

All released birds receive pre-release training, even those that do not show habituation to humans. However, during monitoring it was noted that sometimes some birds approach rural properties. It is believed that such behavior occurs for two reasons: a) availability of food resources, as many times these properties feature orchards; b) protection against predators, as there are fewer birds of prey near households. It is also believed that release is a stressful event for the bird, given the change in routine. On the other hand, there have not been enough releases to test such hypotheses and, in addition, the history of each individual varies. For this reason, the project has also invested in training local community people near the release area. It is

therefore believed that the human factor no longer poses a threat to the species in the communities surrounding the National Park of Araucarias.

Around 20% of the birds released by the project are known to have died (Kanaan 2016) with some mortalities occurring up to three years after release (V. Kanaan, pers. comm.). This number is not directly comparable with other studies because of differences in methods, but for context, mortality rates after one year in other parrot release projects were estimated at 17% for *Amazona barbadensis* (n = 12) and 59% for *Amazona vittata* (n = 34) (White Jr. et al. 2005, Sanz & Grajal 2008).

Cause of death also varies, but predation by birds of prey is the most common. With regard to breeding, it is estimated that since the beginning of this project, 10 chicks hatched and biological samples of two individuals were collected. Currently, radio-telemetry is used to monitor some individuals (number is limited by equipment availability) for 12 to 18 months post release, with some limitations depending on location due to the unevenness of the terrain, along with visual and auditory observations and citizen science. It is believed that in this case radio-telemetry is not an effective tool.

***EX SITU* STATUS**

Regional and global population sizes (by zoos, rescue centers, etc.)

The capture rate for this species is very high, with many individuals currently held at screening centers (CETAS). For this workshop, data were gathered from national institutions, zoos, Rehabilitation Centers for Wild Animals (CRAS) and Screening Centers for Wild Animals (CETAS). The number of captive individuals of *Amazona vinacea* in Brazil is 564, and there are 84 individuals in international institutions. No further demographic or genetic information was available at the time of this workshop.

Current level of *ex situ* management

There is no national studbook for *Amazona vinacea*.

EX SITU* RECOMMENDATIONS FOR *AMAZONA VINACEA

Ex situ* management roles recommended for *Amazona vinacea

The top two threats for *Amazona vinacea* are the poaching of chicks for the illegal wild bird trade, and reduction in the number of cavities for natural nests. These issues became clear due to the high rates of occupation of nest boxes of the National Program for Conservation of the

Vinaceous-breasted Amazon Parrot, particularly for the states of Rio Grande do Sul and Santa Catarina, and with the monitoring performed by the Project, in the states of Parana and São Paulo, where all natural cavities monitored were raided.

The establishment of *ex situ* actions were considered as conservation tools to reduce or eliminate these threats, or their impacts, on the wild population, and to restore wild populations to their natural habitat.

As part of the conservation strategy for *A. vinacea*, the following roles for *ex situ* management were recommended: **Insurance Population, Population Restoration, Demographic Manipulation, Research, Training, and Conservation Education.**

INSURANCE POPULATION

Data compilation suggests that 564 individuals of this species are held by CETAS, breeders, zoos and other institutions in Brazil. Many Screening Centers do not have proper structure and welfare conditions, and in many cases birds spend long periods at these sites. A combination of these factors leads to problematic situations, such as improper releases or the death of birds in precarious situations. This means that the species may be losing an important part of its representation. As this species is already being maintained in captivity, though in a non-organized and disconnected fashion, there is an evident need to organize these actions and coordinate and manage the captive population, in order for it to become an effective insurance population for *Amazona vinacea*.

The group suggested that AZAB (Brazilian Association of Zoos and Aquariums) be responsible for coordinating actions with the institutions that work with this species. Initially the priority should be organizing the existing *ex situ* population, with captive breeding as a second stage.

Initial information required to establish the insurance population includes: collation of information on the current captive population regarding the number of individuals, sex ratio, availability of these individuals to the program, as well as information for each individual bird, including: origin (wild caught or hatched in captivity), length of time in captivity (if wild caught), age, health conditions (including reproductive aspects), and data on breeding behavior, diet, etc.

In order to help gather these data, the existing platform at the site of the Espaço Silvestre Institute (IES) was made available, through which breeders may register if they are interested in providing birds for release. This platform may be adapted to host the relevant data to organize the establishment of the Insurance Population.

The required size of the insurance population will depend on the specific objectives of the population and on the level of genetic diversity already existing (e.g., number of founding individuals). Founders may possibly be obtained through the confiscation of individuals. To be effective the insurance population must be demographically and genetically healthy. As the existing population ages, it will be necessary to consider whether sufficient new individuals are being recruited, either through continued confiscations and/or through captive breeding. Even if breeding is not a key objective of the insurance population initially, birds should have the opportunity to display reproduction behavior so that reproductive capability is not lost for when it is necessary.

Several establishments are interested in hosting confiscated birds of this species. There was consensus that population size must be controlled, so that no additional issues of excess population will arise. Initially, the establishment of an insurance population will involve only Brazilian institutions.

Benefits

The establishment of an insurance population for *A. vinacea* brings high benefits for the species' conservation and will involve a relatively low effort level, as a captive population already exists. It is only necessary to organize and coordinate management of that population.

Risks

In case of low breeding rates, or even if there is no breeding, we run the risk of not achieving the desired expertise in reproduction, and/or the birds not presenting breeding behavior anymore.

Feasibility

The breeding of *A. vinacea* does not pose great challenges to specialists, and also there is the possibility of new individuals being included, including confiscated chicks.

Recommendations related to this role

Consensus within the group was that the coordination of this program should be carried out by AZAB.

POPULATION RESTORATION

The purpose of an *ex situ* population designed for Population Restoration is to provide individuals to supplement small or declining *in situ* populations or to establish new populations in suitable, unoccupied habitat. To meet the role, releases must be done in a responsible manner that aims to benefit the wild population.

There are currently many institutions working with *A. vinacea* in captivity, which are capable of breeding the species, and may fulfill the objective of providing birds for the restoration activities. The reintroduction project for the Espaço Silvestre Institute (IES) has been contacted by many breeders and institutions interested in partnering with the project to provide birds for release.

The existence of a release project involving *A. vinacea* was reported for the region of Aiuruoca, in Minas Gerais. This project is on the Farm Caminho do Meio, in the vicinity of the State Park of Serra do Papagaio, whose owner receives confiscated birds, rehabilitates them and releases with approval from IBAMA.

Instituto Espaço Silvestre reported that the project for reintroduction of *A. vinacea* at the National Park of Araucarias follows the IUCN guidelines (IUCN/SSC, 2013, as well as the criteria suggested in the IBAMA Normative Instruction no. 23/2014.

It is known that releases of *A. vinacea* have been happening for some time, often without many defined criteria – for example failure to target releases towards priority areas where reinforcement or reintroduction is most needed.

There was consensus during the workshop that releases, when necessary, should be organized and follow procedures that assure benefits to conservation of the species and reduce risks, mainly those related to the spreading of disease from captivity to wild birds as well as possible inappropriate behaviors transferred from released birds to their chicks regarding habitation to humans.

The importance of education actions and monitoring of birds following releases was highlighted, according to an experience reported by the Espaço Silvestre Institute. The sighting of these birds in nature, even in areas used by humans, is an opportunity for engaging people in the environmental cause.

With respect to the age of birds to be released, the group suggested that priority be given to young birds, when confiscated by the authorities. Birds for which it is not possible to estimate age will not be a priority for release. For captive-hatched birds, priority should be given to birds raised by their parents. The Blue-fronted Amazon Project found that wild chicks

of confiscated parents, who have been rehabilitated and released in natural environment, learn from their parents to stay close to residential areas.

For this reason, most of the workshop participants do not recommend the release of confiscated adult birds. A contrary opinion was presented by one participant, responsible for the project to reintroduce *A. vinacea* of Espaço Silvestre Institute at PARNA Araucárias. This project rehabilitates, releases and monitors confiscated adult parrots, and the participant reported that it has been successful. However, the rest of the group felt that the information presented so far by the Project does not confirm success.

With regard to priority areas for release, the recommendation is to prioritize releases in areas with smaller and more isolated populations. The municipality of Sarandi (RS) and the northern end of the distribution of the species in Minas Gerais should be prioritized for restoration activities.

During the workshop an earlier meeting of PAN Parrots was mentioned, which took place in July 2012 and dealt with *ex situ* management and decision flow for releases and reintroductions. It was suggested that all contacts of institutions that still make or have made releases are compiled. CEMAVE/ICMBio will be responsible for this. Among the institutions already known are Lymington Foundation in São Paulo, a breeding place in the region of Panel, SC and the Fazenda Caminho do Meio, in Aiuruoca, MG.

Benefits

If properly conducted, the releases may increase the wild population. Release techniques employed for *A. vinacea* may be applied to other Amazon parrot species, with appropriate adjustments. The impact of restoration will be positive if priority is given to release young birds raised by their parents, as these birds tend to present better behavior and adaptation to the wild.

Risk

There is a risk of transmitting diseases between birds. Strong human contact influences the behavior of birds, which may cause difficulties for releases. However, these risks are minimized with the observance of the IUCN, IBAMA and ICMBio's guidelines.

Feasibility

A positive point in relation to the viability of this action is that the releases of *Amazona vinacea* have already been carried out. However, difficulties due to the cost and reliability of radio transmitters used for post-release monitoring have been reported, indicating clear limitations in

post-release monitoring. In this way, it is necessary to use other methodologies for monitoring and clear measurement if success is being achieved in the releases made.

DEMOGRAPHIC MANIPULATION

The role of Demographic Manipulation refers to *ex situ* activities that work to restore an imbalance in the wild population, often related to its age and/or sex structure. One of the main threats for *A. vinacea* is the capture of chicks from the wild, which leads to the no recruitment of juveniles into the population. Therefore, the release of young parrots may be a valid action to balance the age structure of these populations in nature.

To inform this discussion, population modeling was presented, applicable to all species of parrots discussed in this workshop, that simulated population decline due to the removal of chicks and subsequent aging of the population.

The group discussed the possibility of translocating eggs and also young chicks from one habitat into another, i.e., *in situ* population management via wild-wild translocation. However, difficulties to perform such translocation may render it unfeasible.

The recommendation of the group is to prioritize the release of young birds (as described under Population Restoration) to implement the demographic management of this species, preferably confiscated chicks and parent-raised birds hatched in captivity.

Benefits

The benefits of demographic manipulation for *A. vinacea* are increased stability and balancing of the population's age structure, the return of confiscated chicks to the wild, and increased recruitment and growth in the wild populations.

Risks

The impact of releasing young birds into wild populations is uncertain, as the age structure of the population is unknown.

Feasibility

Releases of this species are already happening, so this is a feasible action, which requires only being directed for this purpose.

RESEARCH

The following knowledge gaps were noted for the wild population of *A. vinacea*: age structure, sex ratio, age-related breeding activities, and methods to estimate the age of confiscated birds.

The group reported that results are being awaited for genetic studies that could help in decision making for *in situ* conservation actions, and that this is taking too long to be answered. Therefore, genetic research, and also research related to disease, should be intensified for this species (also see Section 5.2).

Due to chick monitoring performed by the National Program for the Conservation of the Vinaceous-breasted Amazon Parrot using radio transmitters, it was found that this species begins breeding at around four years of age. For captivity, there is no such information, so one of the demands for research is also to understand when breeding begins in captivity.

TRAINING

There is a general recommendation that all institutions, breeders and projects who work with releases of Amazon parrots discussed in this workshop should go through training that focuses on releases, using the IUCN's reintroduction guidelines as a basis. Such training shall encompass issues such as partnerships between projects, optimizing actions, selecting birds for release, health and quarantine protocols (see section 5.3), appropriateness of release sites, rehabilitation for release, methods for monitoring after release, and also issues related to the birds' behavior, adjusting as needed for each species. This suggestion integrates the training template built during this workshop for all species (Section 5.2).

During discussions for this species, it was also recommended that a training program for *ex situ* management be developed. Such training would target institutions that work with *A. vinacea*, aiming at improving management practices for releases (Section 5.2). Bio sample collection and control of disease risk would be the basis for a release protocol to be followed by these institutions. This recommendation is part of the training model that will be built for all target species of this workshop.

Benefits

Participation in training of those involved with releases of this species tends to reduce the number of improper releases. It may also promote engagement and commitment, in the sense of joining efforts to optimize the use of resources to the benefit of more assertive actions for conservation of the species.

Risks

The group discussed the risk that the participants may misuse the training, legitimizing inadequate releases. The experience of the Instituto Espaço Silvestre, which has already offered three courses on the release of wild birds, was reported. The first course was carried out at the request of IBAMA / SC and the Institute of Environment (IMA) and was directed to the professionals of these institutions. It was pointed out that in assessing the participants' perception after the course, they are much more sensitive to the issue of proper releases. For this reason, the risk that participants misuse training was considered low.

The risk of no action was also discussed. With continued improper releases, the threats considered in the threat diagram (Figure 1) may continue to affect populations indefinitely.

Feasibility

It is feasible to provide training, as it is already occurring. There is the possibility that training will not reach all of those currently involved with releases, given difficulties in logistics or even due to the lack of interest by some participants.

Ex situ management roles not recommended for *Amazona vinacea*

By consensus, the group agreed that a Rescue Population is not recommended for *A. vinacea* at this time and was not discussed in detail.

8. *Amazona pretrei* – Red-spectacled Parrot

Threatened species

IUCN: VU (2018)

National List (MMA): VU (2018)

Rio Grande do Sul: VU (2014)

Santa Catarina: EN (2011)

IN SITU STATUS

Habitat and geographic range

Recent records for *Amazona pretrei* occur in the states of Rio Grande do Sul and Santa Catarina (MARTINEZ, 1996). The boundaries for the species' occurrence, suggested by Belton (1984; 1994), are between longitudes 50°30' and 54°00'W and latitudes 28°00' and 31°00'S, which were supported by Varty *et al.* (1994). Until now, there are no records confirming occurrence of this species in the state of Paraná. There is one record for Apiaí, in the state of São Paulo, in the beginning of the 19th Century, which caused certain bibliographies to point to that state as the north border of the species' range. Yamashita *apud* Sick (1997) clarifies that in the state of São Paulo, the historical north boundary accepted for geographic range of *A. pretrei* lacks concrete evidence, being no more than a repeated uncontested error. *Amazona pretrei* occasionally reaches Argentina (CHEBEZ, 1994; BODRATI; COCKLE, 2006), but there have been only two records since the 1990s, in spite of intense studies since 2003. Apparently, this species was always rare in Argentina, with few historical records and no evidence of reproduction. It is possible that the few individuals sighted in Argentina reflect seasonal displacement from Brazil (A. Bodrati e K. Cockle *in litt*). A few individuals, occasionally, were recorded in the region of Misiones (CHEBEZ, 1994), and there is a single reference for Paraguay (LOWEN *et al.*, 1997) and no evidence over the past decades for Uruguay (COLLAR *et al.*, 1992).



Photo: *Amazona pretrei*
Source: Parque das Aves



Fonte Biomas: IBGE

Distribution map for *A. pretrei*
Source: Wiki Aves, 2019

Breeding pairs are monogamous, and reproduce in a broad variety of tree types (PRESTES *et al.*, 1997). A few months after chicks are fledged, individuals concentrate in large flocks in Araucaria forests. During winter, the most important food item for the species is the seed of these trees, which are also threatened by extinction. For the past three decades, the entire population gathers during May-June in the cities of the region of Paineal and Urupema, located in the state of Santa Catarina (MARTINEZ; PRESTES, 2008). Individuals of *A. pretrei* gather there in large communal roosts, facilitating population censusing and allowing the monitoring of the world population of this species annually since 1995 (MARTINEZ; PRESTES, 2008). Monitoring of three chicks (siblings) using radio-telemetry showed that these chicks arrived to the communal roost with groups that came from different directions, suggesting that siblings may possibly disperse into different population groups.

Population size and trend (wild)

This species shows a declining population trend, according to IUCN, with an average population of 19,000 parrots (MARTINEZ; PRESTES, 2008). Monitoring data suggest that the population has been stable since the beginning of monitoring in 1995. The population size of 19,000 parrots may seem large; however, as this species' range is limited, the population is very vulnerable to several pressure factors. During previous decades, this species was observed in high numbers in the state of Rio Grande do Sul, which is still the only state breeding occurs.

The age structure of the wild population is unknown, although the removal of chicks may have an effect. A male bias (two males: one female) in chicks has been reported. In past years, the Red-spectacled Parrot Project has monitored *in situ* nests that revealed a sex ratio of 1:1. It is uncertain if sex ratio or age structure are a problem for this species.

Natural predation is intense, with *Didelphis albiventris* being the main predator (33% of predation events). During the nesting period, predation of adult females on nests is very high, as they are more vulnerable during incubation. A genetic study was made in partnership with the Red-spectacled Parrot Project and Prof. Dr. Renato Caparroz indicated that genetic variability is high in the wild population.

Primary threats (historical and current)

The main factor in the decline of the wild population of *A. pretrei* was the vast destruction of Araucaria forests by the timber industry, which peaked in Rio Grande do Sul in the 1910s to the 1940s. Deterioration of forests, due to grazing and selective timber extraction activities, compromises the natural regeneration of these ecosystems, gradually impoverishing its

vegetative structure and reducing food resources and proper nesting cavities. There are plans to build a wind farm, with 200 wind generators, in the region of Campo dos Padres, in Santa Catarina, one of the remaining sites of Araucaria forests and a high congregation area for *A. pretrei* and *A. vinacea*. There is high potential for the implementation of this project, which is believed to pose a threat to *A. pretrei* due to the species' migratory route.

The second threat is the capture of chicks from nests for pets, a threat that still occurs in the main breeding areas for this species. There are almost no records in the international trade of trafficking of this species, but rather it is a target for more local illegal trade, mainly distributed through the regions near to their breeding sites and encompassing certain regions of the state of Rio Grande do Sul. Despite the small geographic focus, the pressure of poaching of chicks for illegal regional trade has been one of the key threats for this species. Prestes *et al.* (1997) estimated that during the past decade, between 300 to 500 *A. pretrei* chicks were poached each year in the region of the city of Lagoa Vermelha, northeast of Rio Grande do Sul. Therefore, in that region alone, many breeding pairs did not contribute offspring to the natural population, running the risk of facing a disproportional increase in old individuals. Varty *et al.* (1994) remark that the removal of chicks from the nests is typical in the cities of Santana da Boa Vista, Caçapava do Sul, Formigueiro, Fontoura Xavier, Carazinho, Soledade, Muitos Capões, Esmeralda, Bom Jesus and São Francisco de Paula. These parrots are transported to Porto Alegre, Caxias do Sul, Santa Maria, Florianópolis and other southern cities in Brazil. Bonfanti *et al.* (2008) affirm that for *A. pretrei*, the local dealers are usually persons of low economic means, former agricultural workers, currently residents in the suburbs, who know the sites and the season of parrot reproduction. Seeking additional income, these eventual dealers will go – on weekends, during the reproductive period of the species – to known parrot nesting sites, usually without the consent or knowledge of the landowners.

Ongoing conservation activities and research

The Red-spectacled Parrot Project has monitored wild populations of *Amazona pretrei* for 28 years. In 1993 it established the William Belton Center for Parrot Reproduction (CREP), located at the Passo Fundo University, and developed *ex situ* surveys to monitor population size, behavior and demographic information.

The entire known population of this species congregates within a single roost during the month of May, which is during peak production of *Araucaria angustifolia* seeds. The discovery of this site, where the largest gathering of parrots takes place, facilitates monitoring of the

different communal roosts, due to aggregation, according to their seasonal cycle. The population census for this species is performed every year in May.

It is believed that the conservation education work of nearly 30 years has obtained positive results. This species is not found in large numbers in zoos, CETAS and other *ex situ* facilities. The owners of the rural lands where they reproduce do not allow the removal of chicks to serve as pet birds anymore, which was a very common activity in the past. Some of these landowners are interested in converting part of their properties into private nature reserves (RPPNs). Only through a long-term effort can results be obtained that effectively support the species' conservation. This highlights the importance of outreach activities for different segments of society.

Since 2006 the Red-spectacled Parrot Project hosts a course titled Saving the Paraná Araucaria. The project works with the City and State Secretaries of Education in the cities where *A. pretrei* and *A. vinacea* occur. This course provides information regarding human society and the Araucaria forest ecosystem – environmental, historical and social relevance of the Brazilian pine tree; conservation activities for Araucaria forests (case studies); and the role of the Paraná Araucaria in promoting education and valuing of life. Teachers engage in these activities during one year with the schooling community, and subsequently they participate in a seminar, where each school reports its testimonies, experiences and developed activities. In addition to lectures, this work also involves campaigns using different communication channels, such as radio and television broadcasts and the printed press. These actions have and continue to contribute to raising public awareness and to bring knowledge to local communities where the species is present, benefiting *A. pretrei* conservation.

The Red-spectacled Parrot Project strongly promotes the creation of Conservation Units, particularly RPPNs, focusing on parrot conservation but benefiting several other species. Many conservation actions for this species are already occurring and more are still being developed, such as: lectures to various societal sectors, conservation actions for forests where parrots feed and reproduce, and spreading knowledge on RPPNs, among others.

***EX SITU* STATUS**

Regional and global population size

For this workshop, data were gathered from national institutions, zoos, Center for Rehabilitation of Wild Animals (CRAS and Screening Centers for Wild Animals (CETAS), and from international zoos. The number of *Amazona pretrei* held in captivity in Brazil is 251, and there

are 4 individuals at international institutions. No demographic or genetic information is available for the *ex situ* population. No data are available regarding studbooks for this species

EX SITU* RECOMMENDATIONS FOR *AMAZONA PRETREI

Ex situ* management roles recommended for *Amazona pretrei

As part of the conservation strategy for *Amazona pretrei*, the following roles for *ex situ* management were recommended: **Insurance Population, Research, Training, and Conservation Education.**

INSURANCE POPULATION

Given the potential threat of a wind farm being established at the site where the wild population gathers, the formation of an insurance population is considered to be an important action for the conservation of *A. pretrei* to serve as a safeguard against decline or extinction in the wild. Due to the low number of confiscations for this species, it is likely that this population would not be supplemented with wild-caught birds at the same frequency as the other Amazon parrot species. For this reason, it is paramount that the insurance population is reproductively active so that the population is self sustaining.

The founders of the insurance population may come from the current captive population or from the wild. The first step is to compile and analyze data on the current population held in captivity, including origin, reproductive history and behavior, as it has been reported that some captive birds do not interact with other parrots. Management of the removal of birds from the wild would contribute to genetic representation needs for this population.

The group discussed the potential method of exchanging one chick from a captive nest with one chick from a wild nest, with the objective of improving the genetic representation of the insurance population. The risk of disease transmission was discussed, considering both vertical transmissions, where pathogens are transmitted from parents to chicks, as well as horizontal transmission between the *ex situ* and *in situ* populations. The concern of pathogen transmission is greater from captivity to the wild than the reverse (wild to captive). To ensure that there is no risk of vertical transmission of disease, the parents and the environment of chicks to be exchanged would need to be negative for specified pathogens, which lowers feasibility. After a lengthy discussion about the risks and viability of the exchange of chicks between *in*

situ and *ex situ*, the group concluded that this method is of low conservation value and involves very high risks. Therefore, the recommendation is not to perform this action.

Benefits

The benefits of establishing an insurance population for *A. pretrei* were considered to be high, as there is no difficulty to reproduce the species, and a stochastic threat may decimate the entire wild population due to their social behavior of annual gathering of the entire population at a single site. While the wind farm represents one risk, there are other risks associated with the single large gathering, such as the spread of disease

Risks

Given the low rate of confiscations, as well as the knowledge that certain captive individuals do not behave socially, there is a risk that the insurance population is not self-sustaining in the medium or long run. Once an insurance population is established, there is a risk that there is not enough funding to maintain the program for the long term.

Feasibility

Feasibility to breed this species in captivity is high. Commercial breeders are already breeding this species, as mentioned by Renato Severi Costa. Also, CRED has been able to reproduce the species well since 1996. Potential collaborators for the insurance population include Renato Severi Costa, José Selmi, Gramado Zoo and Parque das Aves.

Recommendations related to this role

Following this discussion, the group decided that the establishment of an insurance population is a required action for conservation of *A. pretrei*. If the current number of appropriate *ex situ* birds is not sufficient, then it may be necessary to supplement the *ex situ* population with birds from the *in situ* population.

RESEARCH

General research needs for all *Amazona* parrot species discussed in the workshop were: 1) identification of geographic origin of captive birds; 2) analysis of genetic variation and kinships within the *ex situ* population; 3) traits associated with release success; and 4) development of a method to age birds (see Section 5.2).

Due to the lack of knowledge on the current genetic status of the *ex situ* population, the first research need with *Amazona pretrei* is to study the genetic variability of the *ex situ* population. We can affirm that the individuals confiscated and held by the legal facilities are from the state of RS, as there is no knowledge of this species reproducing in any other Brazilian states (N.P. Prestes, pers. comm.).

Another research need is to estimate the age structure of the wild population. For that, it was suggested to analyze morphological characteristics to identify the approximate age of captive birds and to extrapolate this method to the wild population.

Also, specifically for *A. pretrei*, there is a need to maintain research to develop knowledge to support restoration of this species, including release methods that are appropriate considering the congregatory behavior of this species, if a decision is made to develop restoration activities in the future.

TRAINING

There is a general recommendation across all Amazon parrot species discussed in this workshop for training activities, as relevant, regarding species identification, management, disease risk and management for release (see Section 5.2). No specific training needs were identified for *A. pretrei*.

CONSERVATION EDUCATION

The conservation educational actions for *A. pretrei* shall follow the template that is already being adopted in Santa Catarina, at the sites where this species gathers and remains for three months every year. This migration occurs due to maturation of the Araucaria. The Araucaria forest is essential for conservation of this species, and thus environmental education actions by the Red-spectacled Parrot Project strongly focus on the conservation of this habitat.

***Ex situ* management roles not recommended for *Amazona pretrei* (in Brazil)**

Population Restoration

For the population of *pretrei* in Brazil, restoration does not represent a priority action. It may be important to consider such action for wild populations in Argentina and Paraguay. This would require discussions with the specialists from these countries and was outside of the scope of this workshop.

Demographic Manipulation

As mentioned, the sex ratio (males:females) of chicks in the wild has been reported as 2:1 (MARTINEZ, 2004). Monitoring of adult sex ratio in the wild is suggested, as it may become an issue over time; however, this may be difficult to accomplish. There was a consensus that at present demographic manipulation for *A. pretrei* is not a priority for the species' conservation.

Rescue Population

There is no need to establish a rescue population for this species at this time.

9. *Amazona rhodocorytha* – Red-browed Parrot

Threatened Species

IUCN: VU (2018)

National List: VU (2018)0

Minas Gerais: CR (1998)

Rio de Janeiro: VU (1998)

IN SITU STATUS

Habitat and geographic range

Amazona rhodocorytha has a historical occurrence throughout a coastline strip of continuous Atlantic Rainforest, from the state of Alagoas to the state of Rio de Janeiro, and also in part of the state of Minas Gerais. Currently, the species occurs in the states of Minas Gerais, Rio de Janeiro, Espírito Santo and Bahia, with data gaps for the other states.

Population size (wild)

The population estimate from the IUCN Red List is 2,500–10,000 individuals; workshop experts believe this to be an overestimate of current numbers.

Between 2004 and 2006, an estimate of the population was made in the state of Espírito Santo, of 2,295 individuals (Klemann-Junior 2008). According to observations by the Red-browed Parrot Project (2016–2018), it appears that the population has declined since then. Different from the other species of the *Amazona* genus, *A. rhodocorytha* does not flock together in communal roosts, which makes counting and monitoring more difficult.

Primary threats (historical and current)

Among the main threats to this species are forest fragmentation, poaching of eggs and chicks connected to national and international illegal trade, and direct killing in retaliation for raiding of agricultural crops. Endemic to Brazil, the species occurred historically in the Southeast (Minas Gerais, Rio de Janeiro and Espírito Santo) and part of the Northeast (Bahia, Sergipe and



Photo: *Amazona rhodocorytha*
Source: Red-browed Parrot Project



Distribution map for *A. rhodocorytha*
Source: Wiki Aves, 2019

Alagoas) regions of the country. Until 2014 little was known of the species in the wild, and its current occurrence area has been updated only for the state of Espírito Santo.

The combination of these threats in northeastern Minas Gerais has possibly already decimated the populations in that region, where it also faces a new emerging threat: the practice of intentional forest burns for soil management. Often these fires become out of control, due to the type of land and local weather, and quickly reach and decimate the fragments of rainforest. As this region is also the habitat for *A. vinacea*, these threats are common to both species.

Releases of this species have occurred for decades, very frequently in Rio de Janeiro and Espírito Santo. There is a very strong trend of inappropriate releases (i.e., without criteria) of the species in the state of Alagoas. More than 100 individuals were released a few years ago in the state of Espírito Santo, coming from a seizure of approximately 400 birds (with other birds going to zoos and other institutions). This is known to have been a non-criteria release, and some parrots remained close to the research headquarters where they were released, indicating a poor result. Therefore, the release of individuals of *A. rhodocorytha* without technical criteria is a real and current threat to the species.

Ongoing conservation activities and research

In 2014, the Advisory Group for the Action Plan for Parrots Conservation (PAN Parrots) created the Red-browed Amazon Parrot Project, which is executed by Parque das Aves in partnership with the Neotrópica Foundation of Brazil. The project's goal is to contribute to species conservation by increasing the knowledge on current distribution and population status, as well as to mobilize society to combat parrot trafficking and to protect parrot habitat. Initially, the project conducted research and conservation education activities in the states of Minas Gerais and Rio de Janeiro, and in the future it intends to expand its actions to other areas where the species occurs.

The Project initiated a campaign of environmental education in 2018 in the city of Águas Formosas, in the state of Minas Gerais. This city was chosen due to the presence of a large flock in the region, apart from being a place with strong pressure of withdrawal of chicks from the nests, to feed the illegal trade, both locally and for out of the state.

Parque das Aves, as the executing institution of the Red-browed Parrot Project, seeks to host confiscated birds and/or those rescued at CETAS. The purpose of this action is to broaden the chances of pairing these individuals for breeding along with other *ex situ* contributions that may be identified during this workshop.

***EX SITU* STATUS**

Regional and global population size

For this workshop, data were gathered from the national institutions, zoos, Rehabilitation Centers for Wild Animals (CRAS), Screening Centers for Wild Animals (CETAS) and international zoos. Currently there are 322 captive birds in Brazil and 54 in international institutions, according to the Species360 ZIMS database.

There has been successful *ex situ* breeding for this species, which apparently is not difficult to breed in captivity, with breeding being recorded at national and international institutions such as the Curitiba Zoo and the Rare Species Conservatory Foundation in Florida, USA. No other demographic or genetic information is available for the *ex situ* population.

EX SITU* RECOMMENDATIONS FOR *AMAZONA RHODOCORYTHA

Ex situ* management roles recommended for *Amazona rhodocorytha

As part of the conservation strategy for *A. rhodocorytha*, the following roles were recommended for *ex situ* management: **Insurance Population, Population Reinforcement, Research, Training, and Conservation Education**. Discussion and details are provided below. The topic of improper releases was recognized as a threat from the *ex situ* to the *in situ* environment, and was considered throughout the entire *ex situ* management discussion.

INSURANCE POPULATION

An effective insurance population should be based on many founders, be large enough, and be managed in a way so as to maintain a genetically diverse and healthy population as a safeguard against sudden decline or extinction in the wild. In order to establish an insurance population for *A. rhodocorytha*, it may be possible to incorporate confiscated birds, which in theory would facilitate the development and management of the insurance population. In addition, captive breeding already occurs successfully for this species. The group commented that the situation is similar to that for *A. vinacea*, in that confiscations tend to be adult birds. While there is known to be intense poaching of chicks in both species, young birds are very seldom confiscated. However, a joint expedition by the Red-browed Amazon Parrot Project and the National Program for Conservation of the Vinaceous-breasted Amazon Parrot to the Northeast of the state of Minas Gerais found information that 54 *A. rhodocorytha* and *A.*

vinacea chicks were being held by local residents, possibly to supply local demand for the species.

The first priority will be organization of the insurance population, which will allow captive breeding and the training of institutions in breeding management. Captive breeding will not be strongly encouraged, however, until the destination of offspring is determined.

Benefits

Establishment of an insurance population for *A. rhodocorytha* potentially has a high benefit for conservation of the species, with low effort levels, as there is a large *ex situ* population already. Captive breeding is already successful for this species, only requiring some organization.

Risks

Risks are considered to be low. The only identified risk is the potential loss of natural breeding behavior if captive birds are not encouraged or allowed to breed.

Feasibility

Given that there are birds currently in captivity, and there is breeding success in captivity, the feasibility of establishing and maintaining an insurance population is deemed as high, with little required effort. Zoos may serve as source of resources and structure for this role.

Recommendations related to this role

The insurance population for this species will be organised by the coordinator of the Blue-fronted Amazon Project, Parque das Aves and Fundação Neotrópica.

POPULATION RESTORATION

The release of individuals into the wild can be a beneficial conservation tool in some circumstances and if done properly using official guidelines. An *ex situ* population that is designed and used for Population Restoration considers the threats to wild populations and provides individuals to supplement small or declining populations (reinforcement) or to establish new populations in suitable, unoccupied habitat (reintroduction). The goal is to provide conservation benefit to the species in the wild.

Improper releases that do not use appropriate criteria are occurring with this species; for example, there is a record of an individual released in Rio Claro, São Paulo, which is

geographically out of the species' natural range. Such releases may not benefit the species and may even have a negative impact.

There is a release project planned for the state of Alagoas, an area where this species is disappearing. Given the situation with releases for this species, the group agreed on the need to discuss population restoration as a potential *ex situ* management role for conservation of *A. rhodocorytha*.

Benefits

One benefit of restoration for *A. rhodocorytha* is the potential reintroduction of individuals in the Northeast region, particularly Alagoas and Sergipe, where there are no recent records of the species.

Risks

There is a risk of disease transmission among birds. Strong human contact influences the behavior of birds, which can cause difficulties in restoration. However, these risks are minimized by complying with the guidelines established by IUCN, IBAMA and ICMBio.

Feasibility

The feasibility of this action for *A. rhodocorytha* is the same as assessed for *A. vinacea*. In other words, it is difficult to monitor individuals after release for both species, due to the issues with the functioning of radio-transmitters within dense forest. For *A. rhodocorytha*, there is not yet an initiative of monitored releases, which would allow a more detailed assessment of feasibility.

Recommendations related to this role

If restoration is deemed as necessary in the northeast of Minas Gerais state, the main threats to the species in the region should first be mitigated, such as the poaching of chicks and the burning of forest in the region.

Restoration efforts should comply with the IUCN *Guidelines on Reintroductions and Other Conservation Translocations* (IUCN/SSC, 2013), in addition to the normative instructions that regulate the releasing of wild animals in Brazil. In addition, it is essential to follow the mandatory portion of the health and quarantine protocol required for establishment of a captive population.

RESEARCH

General research needs for all *Amazona* parrot species discussed in the workshop were:

1) identification of geographic origin of captive birds; 2) analysis of genetic variation and kinships within the *ex situ* population; 3) traits associated with release success; and 4) development of a method to age birds (see Section 5.2).

In addition, it is important to research, develop and monitor captive breeding efforts. Implementation and improvement of collection and storage of biological materials is also recommended.

TRAINING

The group did not identify the need for any species-specific training for *A. rhodocorytha*. All actions required are within the list of training actions common to all workshop target species (i.e., species identification, management, disease risk, management for release; see Section 5.2.).

CONSERVATION EDUCATION

Conservation education *ex situ* actions for *A. rhodocorytha* are included in the general template built for all species in the beginning of this workshop (Section 5.1). The importance of prioritizing conservation education with this species was highlighted, at the zoos located within the species' areas of natural occurrence.

***Ex situ* management roles not recommended for the species**

The group has agreed that sufficient data are not available at this time to discuss Demographic Manipulation as a strategy for conservation of this species. However, this action may be reviewed and discussed in future. There is no evidence of the need for a Rescue Population for this species at this time.

10. *Amazona farinosa* – Mealy Parrot

Near-threatened Species

IUCN: NT (2018)

National List (MMA): LC (2014)

Bahia: VU (2017)

Minas Gerais: CR (2010)

Rio de Janeiro: VU (2000)

São Paulo: CR (2018)



Photo: *Amazona farinosa*
Source: Marina Somenzari

IN SITU STATUS

Habitat and geographic range

The Mealy Parrot, *Amazona farinosa*, occurs from eastern Panama through the south and west, through Colombia, Venezuela, Guiana, Suriname, French Guiana, Ecuador, Peru, Bolivia and Brazil (DEL HOYO *et al.* 1997). Large populations of this species are believed to live in the less disturbed areas of its range. In Brazil, there are two disjointed populations: one in the Amazon region, and another in the region south of Bahia to the state of São Paulo. Limit of higher elevation: 1,500 m.



Distribution map for *A. farinosa*
Source: Wiki Aves, 2019

Population size and trend (wild)

The population size for this species has not yet been quantified. Current population trend is declining.

Primary threats (historical and current)

The key threat to this species is the increase in deforestation in the Amazon basin, as the land is being deforested for cattle ranching and soybean production, facilitated by the expansion of the roadway network (SOARES-FILHO *et al.* 2006, BIRD *et al.* 2011). It is also understood that the *A. farinosa* population in the southeast of Brazil is suffering a severe decline due to the destruction of forests, which historically is much more serious in the Atlantic Rainforest.

In addition, this species is highly hunted for food in French Guiana, and it is assumed that the pressure from trade is much more widespread, with market levels for this species described as generally moderate and heavy in certain countries (DEL HOYO *et al.* 1997). In Brazil, illegal trade is an important threat for all parrot species, though there is not a significant number of confiscated individuals of this species.

Ongoing conservation activities and research

The Mealy Parrot was incorporated into the National Action Plan for Parrot Conservation in 2018, due to the status of endangerment of the Atlantic Rainforest population, upon a formal request by the state of Bahia (INEMA/BA), which took charge of all actions contained in PAN regarding this species.

According to the IUCN Red List, recommended conservation actions are: perform research to monitor the trends for the wild population; monitor the rates of forest loss by remote sensing; and conduct awareness-raising activities to reduce hunting, capture and trade.

EX SITU STATUS

According to the pre-workshop assessment with zoos and breeders, there are 248 individuals of this species held in captivity in Brazil, and 109 birds are recorded globally in the ZIMS database managed by Species360 and representing its member zoos. No information was available for the workshop regarding the level of *ex situ* expertise and management with this species.

EX SITU RECOMMENDATIONS FOR AMAZONA FARINOSA

Ex situ management roles recommended for Amazona farinosa

Owing to the paucity of data available for *A. farinosa*, this species was initially discussed in parallel with discussions for *A. rhodocorytha*, with the decisions reviewed at the end of the workshop. The potential *ex situ* conservation role of Population Restoration was discussed for *A. farinosa* but the conclusion was undecided due to insufficient data. The *ex situ* conservation roles of **Insurance Population, Research, Training, and Conservation Education** were recommended for this species.

Regarding releases of this species, the release project being conducted in Ilhabela, north coastline of the state of São Paulo, was discussed. It is necessary to contact the persons in charge to know more about this project. It is known that many nests of the birds released within this

region are predated by hybrid tamarin individuals (*Callithrix* sp.), also originating from improper releases.

INSURANCE POPULATION

There was consensus for the establishment of an insurance population for *A. farinosa*, with the same recommended actions as discussed for *A. rhodocorytha*. Therefore, initially the priority is to document and organize the current *ex situ* population in Brazil, maintaining and/or providing the conditions required for breeding in captivity, so that reproductive behavior can be maintained in these populations. There is no knowledge about the current level of expertise on captive breeding for this species. However, breeding is considered to be a secondary priority and not necessarily initiated in the beginning of the program.

This species represents two disjointed wild populations, with one in the Atlantic Rainforest isolated from the second in the Amazon. It was recommended that the geographic origin of the birds not be considered in the initial development of the insurance population. However, birds that arrive due to confiscations or intentional collection from the wild should always be segregated according to origin in order to be added to the insurance population. If there is no information on the origin of the confiscated bird, it will not be added to the insurance population.

RESEARCH

To form the basis for the composition of the insurance population, a genetic study comparing populations from the Atlantic Rainforest and from the Amazon is an important research need. The results will inform whether there is a need to establish two captive populations, according to origin, or if it can be managed as a single population.

The general roles of research, training and conservation education were recommended for this species following the general recommendations proposed for all workshop species (Sections 5.1 & 5.2).

Recommendations for *Amazona farinosa*

The workshop specialists attempted a general *ex situ* conservation assessment for this species; however the group did not feel comfortable in making important decisions regarding this topic for the conservation of this species due to lack of knowledge. It is understood that there is a need to pursue further discussion with people who are working with this species.

11. *Amazona aestiva* – Blue-fronted Amazon

Near-threatened Species

IUCN: LC (2018)*

Brazil: NT (2018)

SP: NT (2014)

In the other states where this species is present, there is no state list of wildlife threatened by extinction. In Argentina, it is under the threat of extinction in some provinces.



Photo: *Amazona aestiva*

Source: PPV – FNB, Gláucia Seixas

**Uplisted to Near-threatened globally in 2019*

IN SITU STATUS

Habitat and geographic range

This species occurs in Brazil, Bolivia (East), Paraguay (South) and Argentina (North). In Brazil, it is found in the biomes of Caatinga, Brazilian Cerrado, Atlantic Rainforest (countryside) and Pantanal, including in the following regions: North (Tocantins and Rondonia), Northeast (Piauí, Pernambuco and Bahia), Mid-west (Goiás, Mato Grosso and Mato Grosso do Sul), Southeast (west of São Paulo and Minas Gerais) and South (northwest of Paraná).



Fonte Biomas: IBGE

Figura 2. Distribuição geográfica
Fonte: Wiki Aves, 2019

This species has been studied for 20 years in the Mato Grosso Pantanal by the Blue-fronted Amazon Parrot Project, and for this reason the biology and ecology, roosts, and reproductive and foraging behaviors are well known for that region. The species inhabits mainly open areas and is not a forest species, and it is found in the Pantanal, the Atlantic Rainforest, the Brazilian Cerrado and the Caatinga. It is a species that benefits from the initial process of human activity, broadening its range. At the same time, it is also observed to expand its distribution (e.g., to the coastal Atlantic Rainforest), which relates to the high plasticity of this generalist species.

Home range

Undetermined for wild birds at present. Radio-telemetry monitoring of released birds of this species returned to the wild by CRAS MS, in the Pantanal of Mato Grosso do Sul, recorded a home range area from <1–32 hectares (SEIXAS; MOURÃO, 2000).

Population size (wild)

Population size for this species in the wild is subject to uncertainty, because of its broad geographic range. *The following information was not available during the workshop: Combining information on population density and distribution, and assuming that the species occupies only 10% of its mapped distribution, the global population is placed in the band 1,000,000–10,000,000 mature individuals (BirdLife International, 2019).*

Population trend

Though it is a species of broad geographic range (~4,200,000 km) and classified by the IUCN Red List as Least Concern, analysts conclude that the population trends point towards a decline (IUCN, 2017). According to del Hoyo and collaborators (1997), there is evidence of population decline for this species, which could result in the species becoming listed as threatened if over-exploitation is not prevented (SEIXAS; MOURÃO, 2002). Indeed, the species was uplisted globally to Near-threatened after the workshop. Counts at communal roosts of *A. aestiva* in the Pantanal of Mato Grosso do Sul, with a median of 2,302 parrots monitored on monthly basis by the Blue-fronted Amazon Project, reports that the number of chicks who follow their parents after leaving their nests decreased from 2004 to 2009 (SEIXAS; MOURÃO 2018). This indicates issues in the yearly recruitment of juveniles into the populations.

According to Berkunsky and collaborators (2017), studies of six *A. aestiva* populations indicate that there is one stable population (Pantanal, Brazil), three with a small decline (Brazilian Cerrado, Argentinian Chaco, and Beni, in Bolivia), one with moderate decline (Chiquitania, Bolivia), and one with unknown trend (Mato Grosso do Sul, Brazil). Monitoring of population in the MS shows a decline in recruitment of chicks, particularly in areas with phyto-physiognomy of Atlantic Rainforest.

Primary threats (historical and current)

A. aestiva is collected legally or illegally (eggs and chicks) throughout its entire range to cater for the pet bird market (THOMSEN; BRAUTIGAM 1991). Among all Brazilian parrots, *A. aestiva* is under the highest pressure to fuel the illegal pet trade in birds (SEIXAS; MOURÃO,

2000; ALVES *et al.*, 2013). This is due to its reputation as a “better talker” when compared to other species, which has originated its Brazilian name “true parrot”. Since 1981, the species has been included in the Appendix II to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES 1973). During the 1980s it was traded in large numbers (~413,505 individuals), according to international records (UNEP-WCMC CITES Trade Database, January 2005).

During 1982-86, this species represented 25% of all parrot exports from Argentina (BEISSINGER; BUCHER, 1992a). It is believed that practically all parrots originating from South America are caught from the wild (YAMASHITA; VALLE 1993). In Argentina *A. aestiva* was caught in relatively small numbers until 1980, when the demand increased drastically, totaling around 204,000 individuals between 1981 and 1987 (BEISSINGER; BUCHER, 1992a). It is estimated that the actual number of birds extracted from their natural habitat exceeded the number recorded in the exports permits by two- to three-fold due to deaths during capture and handling (IÑIGO-ELÍAS; RAMOS 1991; JAMES 1992). During the 1990s, there was a reduction in the number of parrots traded in Argentina, and the official export quotas may have stabilized at around 1,000 birds per year (Traffic USA 1996, Traffic North America 1998), possibly due to the reduction in wild population size for *A. aestiva* (SAUAD *et al.* 1991b, BEISSINGER; BUCHER, 1992b).

In Mato Grosso do Sul alone, over 10,000 chicks have been confiscated by surveillance over the past 30 years, coinciding with the establishment of the Center for Rehabilitation of Wild Animals (CRAS), linked to the Environmental Institute of Mato Grosso do Sul (IMASUL) (A. P. Felício, pers. comm.). Peaks occurred in 2008 (900 chicks received) and 2015 (523 chicks confiscated). In 2017, agents intercepted around 400 chicks taken from their nests, mainly in the cities of Novo Horizonte do Sul, Batayporã, Jateí, and Ivinhema, in Mato Grosso do Sul (G. Seixas, personal observation). Apart from these, 105 chicks were confiscated in other Brazilian states (PR, GO and SP), with reports that they may have been collected from MS. Environmentalists and authorities believe that these numbers represent only a small portion of the actual number of *A. aestiva* collected from the wild (SEIXAS; MOURÃO, 2000).

In addition to the intensive capturing of individuals from this species, a major threat to *A. aestiva* is the continuous degradation and conversion of its habitat. According to Bucher & Martella (1988), *A. aestiva* is vulnerable to the loss of potential areas for reproduction. In Brazil, all ecosystems where the species occurs are under deforestation pressure to some degree. In the Pantanal, 25,750 km² (17%) of the original area of native vegetation had been lost as of 2004, with a deforestation rate of 2.4% per year (HARRIS *et al.* 2006). Practices such as the clearing

of natural vegetation and burning to establish pasture are cited as threats to wild animal populations in the Pantanal (ALHO *et al.*, 1988) and for parrots in other regions (LANNING, SHIFLETT, 1983). In the Brazilian Cerrado, for instance, the expansion of the agricultural frontier is intense, leading to habitat conversion and resulting lack of suitability for this species. Also in MS, agriculture and the sugar-cane processing mills are prevalent, with frequent use of pesticides in crops.

Destruction of nesting sites is a concern. For example, the 10,000 chicks received by CRAS/IMASUL MS mentioned above represent a minimum of 5,000 nests that were raided and left in poor condition or even lost due to cutting of nesting trees. In the Atlantic Rainforest, in the Brazilian countryside, particularly in MS, recent studies (2016–2018) indicate that around 85% of the nests monitored by the Blue-fronted Amazon Parrot Project lost chicks to poachers, who also destroyed the nests during collection, increasing even further the adverse effect on the local population.

Another major concern is the indiscriminate release of confiscated or captive birds without regard to health status, origin, taxonomy (subspecies) and other criteria. The Pantanal in particular has been used as an area for improper releases of this species with birds confiscated throughout Brazil. While releases are culturally viewed as beneficial, improper releases may have numerous negative impacts on wild populations, including, for instance, the introduction of disease or deleterious alleles, hybridization or detrimental changes in behavior (e.g., habituation to humans). In general, such releases are motivated by the high maintenance cost of these animals, or due to knowledge regarding the strictness of Brazilian legislation. However, releases to the wild without prior care and without monitoring may create problems for this and even other species occurring in the release area. This emphasizes the importance reducing the cause of this issue, which is the extraction of parrots from the wild, by submitting complaints to the surveillance bodies on who capture and trade these animals, and to support police investigation to prevent the extraction from the wild.

Ongoing conservation activities and research

The Blue-fronted Amazon Parrot Project (www.papagaioverdadeiro.org.br) has operated in the Pantanal region of Mato Grosso do Sul since 1997, generating information on the biology and ecology of the species that is used in conservation education actions. This team has three focuses: 1) technical-scientific research on handling and conservation, with actions to identify the natural environmental conditions for this species and to understand the requirements for its conservation in the wild; 2) conservation education (species and habitat) with the local

communities, targeted for different audiences, in order to encourage awareness and behavior change to benefit conservation of the species and its environment; and 3) support of public policies of institutions managing native fauna, in and outside of MS, with actions aimed at identifying the impact of parrot trafficking on wild populations and to propose protection mechanisms for nesting sites, roosts and feeding areas.

Prior to initiation of the Blue-fronted Amazon Parrot Project in 1997, all information on this species came from studies performed at Salta Province, Argentina (NUNEZ *et al.* 1991, SAUAD *et al.* 1991a e b; BANCHS *et al.* 2000). After 1997, several studies were performed, also in Argentina, by Igor Berkunsky, CONICET - *Universidad Nacional del Centro de la Provincia de Buenos Aires*.

EX SITU STATUS

Regional and global population size

For this workshop, data were gathered from national institutions, zoos, Centers for Rehabilitation of Wild Animals (CRAS) and Screening Centers for Wild Animals (CETAS), and international zoos. The number of captive *A. aestiva*, in Brazil is 7,278, while 434 captive birds are held overseas. No demographic or genetic data are available for the *ex situ* population. There is a lack of sufficient resources for proper *ex situ* management in Brazil, as well as risk of hybridization and spreading of disease in captivity. This may limit the number of parrots that are effectively fit to form an insurance population. There is no national studbook established for *A. aestiva*.

EX SITU RECOMMENDATIONS FOR AMAZONA AESTIVA

Ex situ management roles recommended for Amazona aestiva

The following *ex situ* management roles were discussed by the group and recommended for *Amazona aestiva*: **Insurance Population, Population Restoration, Demographic Manipulation, Research, Training, and Conservation Education.**

INSURANCE POPULATION

An insurance population is an *ex situ* population that is large enough and managed in such a way as to serve as a safeguard against sudden decline or extinction in the wild. In order to establish an Insurance Population for *Amazona aestiva*, it is deemed as necessary to form two

populations, one for *A. aestiva aestiva*, and one for *A. aestiva xanthopteryx*. Risks and feasibility were thought to be similar for the two populations; however, the benefits may be different for each one, which can be a decisive factor if it is necessary to choose one of them to allocate resources. At present, there is knowledge of population decline for *A. aestiva xanthopteryx*, with no data available for the other subspecies. Due to uncertainty regarding the relative benefit for establishing an insurance population for one subspecies vs the other, the recommendation is that both have the same priority level at this time.

Benefits

Given the estimated levels of extraction and habitat loss, including loss of nesting sites, and the evidence of population declines and potential for local extinction, an insurance population was identified as an important component for conservation of the species, serving as a safeguard against severe decline or extinction.

Risks

It was considered that the risk to the wild population of not establishing an insurance population is higher than the risks associated with establishing it.

There is a risk of low participation by institutions as *A. aestiva* is a common and abundant species, combined with the lack of structure to keep individuals over the long term. Also, the possibility of errors in origin may pose a problem, as the genetic analysis tool is not yet developed to a satisfactory level. Disease transmission is also a risk that can be mitigated through proper health screening and quarantine protocols (see section 5.3).

Feasibility

There is a high possibility of forming an insurance population with known origin individuals, screened from the current *ex situ* population and those confiscated subsequently. The high number of confiscated individuals would ensure the frequent influx of new wild individuals in the insurance population.

Recommendations related to this role

In order to establish the insurance population for *A. aestiva*, as well as for other parrot species, it is first necessary to diagnose the current captive population. This species poses the problem of potential hybridization due to the existence of two subspecies. It is important that only

individuals that are fit to be incorporated into the insurance population shall be used, that is, free from pathogens that may impact the individuals or the populations.

POPULATION RESTORATION

The purpose of an *ex situ* population used for Population Restoration is to provide individuals to supplement small or declining *in situ* populations (reinforcement) or to establish new populations in suitable, unoccupied habitat (reintroduction). For restoration to be effective, it is necessary to understand and mitigate the causes that led to decline or destabilization of *in situ* populations prior to conducting releases.

Given the large number of confiscations of *A. aestiva* and the concerns regarding limited *ex situ* resources driving inappropriate releases, it is advisable to develop an appropriate framework for population restoration to maximize conservation benefits and minimize potential negative impacts.

It was suggested to categorize the confiscated birds so that they can be matched with appropriate potential areas for release, with prioritization given to reintroduction in areas of historical occurrence of the species but where the species is thought to be extirpated.

In addition to the use of confiscated birds, the use of approved birds from the *ex situ* breeding program was suggested, for release within the historical range of the species (both reintroduction to historical habitat and reinforcement of existing populations). For restoration to be successful, concurrent efforts aimed at eliminating the cause for local extinction and/or decline must be made.

There is a need to identify partner institutions that can act as temporary shelter for confiscated chicks prior to their subsequent release. These institutions must ensure full compliance to the health and quarantine protocol (see section 5.3), and provide good quarantine and welfare conditions. These institutions will not necessarily hold these birds for the long term, but they will collaborate with the initial process of holding in captivity.

With that, we will be able to rely on two sources of birds for restoration: one is the insurance population itself, and the other will be chicks that are confiscated and undergo training/adaptation for release without integrating into the insurance population.

Benefits

The main benefit of restoration for *A. aestiva* is the increase in the number of individuals in the wild populations, and in the area of occupation in their natural range, as well as the reestablishment of extirpated populations. As a collateral benefit, the releases of *A. aestiva* may

serve as yet another example for reintroduction/reinforcement for other *Amazona* parrot species, as this species has the largest captive population and a large number of confiscations.

Risks

There is a risk of protocols not being fully observed, which could result in disease transmission, hybridization, or behavioral issues. It was commented that behavioral changes (habitation to humans) may be the most difficult to address. Proper adherence to protocols will mitigate these risks. There is restricted authority to make the application of protocols mandatory for the entire restoration process, as this document is only able to strongly recommend these protocols.

Feasibility

The feasibility of restoration activity is high; however, its success depends on mitigation of the main threats. This action must be well organized and coordinated.

DEMOGRAPHIC MANIPULATION

The role of Demographic Manipulation refers to *ex situ* activities that work to restore an imbalance in the wild population, often related to its age and/or sex structure. One of the main threats for *A. aestiva* is the removal of chicks from the wild, which leads to low recruitment of juveniles into the wild population. Therefore, the release of young parrots may be a beneficial action to balance the age structure of these populations in nature. The group recognized the importance and benefits of demographic manipulation; however such action will not be effective if it is applied now, while the main threat (poaching and illegal trade) is not fought.

Benefits

Releasing young parrots addresses the concern that the wild population is aging due to the high rate of chicks captured.

Risk

There is not enough demographic knowledge, so it will be inefficient if executed separately from an action to combat the main threat, which is trafficking.

Feasibility

The feasibility of demographic manipulation action is high; however, it depends on the mitigation of the main threat. This action must be well organized and coordinated. Note that if

population reinforcement is done by releasing young parrots (not necessarily chicks but juveniles or young sub-adults), this would be another way of accomplishing a similar goal of balancing the age structure of an aging population.

RESEARCH

General research needs for all *Amazona* parrot species discussed in the workshop were: 1) identification of geographic origin of captive birds; 2) analysis of genetic variation and kinships within the ex situ population; 3) traits associated with release success; and 4) development of a method to age birds (see Section 5.2). Genetic and health assessment of confiscated chicks is especially important for *A. aestiva aestiva*.

This species may be a good one to use for development of a pilot project on assisted training techniques for chicks scheduled for release to promote natural behavior of the species, in a format similar to the adoption, by wild parents, of chicks born in captivity. Any such project should follow the ICUN guidelines for release, as well as the applicable Normative Instructions.

Regarding releases without criteria, there is a need to gather data on releases in general, to enable analysis of impacts of such activities on the wild populations. These data may be compared against releases proposed by this workshop, following established protocols. It is important to establish partnerships with those institutions conducting releases in order to conduct the proposed training for all species of this workshop, aiming at improving these techniques.

Currently, the *A. aestiva* wild population is well studied in the region of the Mato Grosso Pantanal. However, for the other populations spread through the Brazilian Cerrado, Atlantic Rainforest and Caatinga there are no long-term studies. Therefore, there is a need to develop knowledge throughout the geographic range of the species. While this research is for the *in situ* population, the group believed this to be required research, as it will provide important information for the composition of the insurance population as well as for restoration efforts.

TRAINING

The group revisited actions that were discussed in a general way for all species, and it was understood that the required actions for this species are already included in this template (Section 5.2). No other specific action for *Amazona aestiva* was suggested.

CONSERVATION EDUCATION

The general recommendations for conservation education for all Amazon parrot species can be found in Section 5.1. In the Mato Grosso do Sul region, conservation education at zoos or institutions open for visitation should focus on *Amazona aestiva* and, apart from the actions discussed as a model for all species, the message to be given to the public shall focus on encouraging complaints to the authorities aiming at spotting the traffickers.

***Ex situ* management roles assessed and not recommended for the species**

All *ex situ* management roles that were assessed were recommended for *Amazona aestiva*.

12. *Pyrrhura griseipectus* – Grey-breasted Parakeet

Endangered species

IUCN: EN (2018)

National List (MMA): EN (2018)

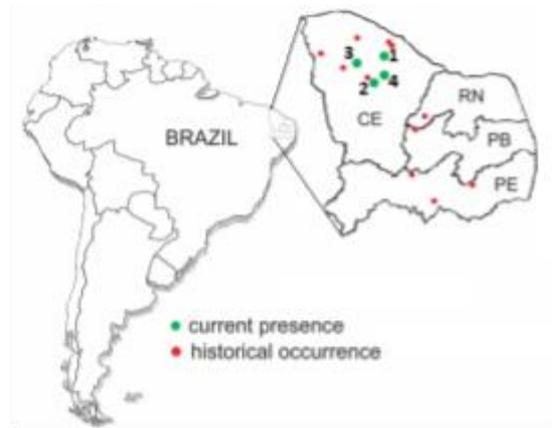
IN SITU STATUS

Habitat and geographic range

According to historical records from museums and reports from local residents, historically there were at least 16 areas in Brazil with possible occupation by wild populations of the Grey-breasted Parakeet *Pyrrhura griseipectus* (see distribution map), with only four areas remaining today, all with small populations. Certain areas of the historical range are no longer available due to deforestation, changes in the type of soil use, and in land use. However, in other areas there has been forest regrowth due to the establishment of protected areas, which are potential areas for species reintroduction.



Photo: *Pyrrhura griseipectus*
Source: Parque das Aves



Distribution map for *P. griseipectus*. Historical distribution in red. Current distribution: Area 1 Serra do Baturité; Area 2 Serra do Mel; Area 3 Serra do Parafuso; Area 4 Serra Azul.
Source: Adapted from Aquasis, 2018

Population size (wild)

There are 456 individuals in Serra do Baturite (area 1, see distribution map), 65 in Serra do Mel (area 2), 15 in the Serra do Parafuso (area 3), and 8 individuals in Serra Azul (area 4), for an estimated total of 544 parakeets.

Population trend

Only the Serra do Baturite population, which is the largest and represents approximately 84% of the wild population, shows positive population growth. The other very small populations are stable or declining, and if no population reinforcement action is taken, these populations likely will be lost. In Serra Azul, with eight individuals, the population is already regarded as non-viable; not only is this population very small, but is believed to be formed by old birds, as their

beaks are scarred, possibly due to a disease that caused the reduction in population. In 2018, a new *in situ* population was discovered at Serra do Parafuso (area 3), in an environment similar to that of other populations; however, no further information is available.

Primary threats (historical and current)

The threats identified for this species include habitat loss, particularly regarding nesting and feeding sites, and the capture of individuals, which is not restricted to chicks as it is in parrots but also includes adults.

Regarding habitat, the three smaller populations survive in areas where conditions are not ideal, but they still remain there because they nest on walls of rocky mountains, where even monkeys cannot reach the nests. There are reports from local residents that long ago the nests could be found in trees, so it is possible that this behavior of nesting on cliffs is an adaptive solution to the loss of nesting habitat.

The distribution of this species has changed greatly over the past 50 years (NUNES *et al.*, 2015), taking the species to the brink of extinction at the end of the 20th Century (WAUGH, 2007). As this species depends on humid and sub-humid forest environments, the vast deforestation both in mountains and in arboreous Caatinga and gallery forests of the wide lowland valleys have resulted in population isolation that may have disrupted a network of meta-populations, leading to local extinctions and severe population fragmentation. Also, these remaining forests have also become of great interest to humans, as they present better edaphic conditions than the Northeastern semiarid. For this reason, these environments were historically sought for human occupation and agricultural production (CAVALCANTE, 2005). The regions of Serra do Ibiapaba – CE, Serra do Martins – RN, Serra do Machado – CE, Serra de Baturité – CE, Serra de Monsenhor Tabosa – CE, Serra Azul – CE, among other areas of historical occurrence of *P. griseipectus*, have been considered in the past as agricultural areas. They went through several waves of commodity crop production, including sugarcane, banana, coffee, cotton and corn. These areas experienced several common anthropogenic processes that caused significant changes in the landscape. *P. griseipectus* is a secondary cavity nester, i.e., it does not excavate its own cavity but depends on available existing cavities. Habitat changes (deforestation and selective cutting of trees) drastically reduces the number of such resources for reproduction (SICK, 1997; CORNELIUS *et al.*, 2008), which may have contributed to the population reduction of this and other species.

In the mountain areas, Serra do Mel, Serra Azul and Serra do Parafuso, the main threats to the wild populations of *P. griseipectus* are wildfires and deforestation. Serra do Mel is inside

the Natural Monument of Quixadá's Monoliths, but there is no effective protection in this area, where intense activities of small-scale charcoal making and also hunting occur. According to reports from the owner of the farm Ouro Preto, where Serra do Mel is located, the capturing of *P. griseipectus* using nets was common until 2010. The other areas lack formal protected areas, and the few remaining forests are replaced by agriculture (corn and beans) or else they are impacted by wildfires.

Some of the historical range areas of the species remain only due to the setting up of protected areas. Serra do Baturite has the largest population of parakeets, but also is vulnerable to several imminent threats. One example is the presence of legal and illegal breeders, where there are repeated reports of animal escapes, including exotic species.

In 92% of the Ceará lands, the vegetation is formed by Caatinga, and approximately 6% of the area is linked to coastline ecosystems. *P. griseipectus* has never been found in either morphoclimatic domain. Only 2% of the area supports mountainous forest formations, where the species occurs or has occurred. These are strategic areas also for human populations, as precipitation is higher there, making them water producers.

In general terms, the type of threats impacting wild populations of *P. griseipectus* are the same as those that impact parrot species; however the parakeet is in a situation that demands more urgency. The two smaller populations are at high risk of extinction due to low numbers and the risk of stochastic events.

Ongoing conservation activities and research

In 2005, Aquasis began actions for this species' conservation, taking part in the publication of articles that verified its validity as a species, and allowed its insertion into the global lists. With the aim of effectively intervening to prevent extinction of this species, in 2006 Aquasis launched the so-called "Project Grey-breasted Parakeet", initially supported by Loro Parque, Chester Zoo and ZGAP (Zoological Society for the Conservation of Species and Populations). Among the achieved results, highlights include: 1) rediscovery, after 83 years, of a population in the state of Ceará in Quixada, in 2010; 2) discovery of populations in 2014 and 2018 in the Ceará cities of Ibaretama and Canindé; 3) recruitment of more than 1,000 birds within 10 years by installing artificial nests in Serra de Baturité, the type location; 4) two population censuses conducted at the aforementioned mountains (Serra do Baturite) in 2017 and 2018, quantifying, respectively, 314 and 456 birds; 5) mapping of two sites with evidence of previous existence of this species (Biological Reserve of the Serra Negra, in the state of Pernambuco, and Planalto da Ibiapaba, in the state of Ceara), and another 14 sites with signs of its presence; and 6) support

and setting up of four Private Reserve of Natural Heritage (RPPNs) with the presence of the species, and of the Wildlife Haven Grey-breasted Parakeet, in the APA of Serra de Baturité. These results have effectively contributed to the downlisting of the species from Critically Endangered (CR) to Endangered (EN).

With respect to the pet bird trade, it was confirmed that ICMBio will maintain their position of not recommending trade of this species as pet birds, owing to the risks involved with this commercial activity (release of individuals without monitoring or minimum health criteria, affecting the wild population, hybridization, traffic, among others).

***EX SITU* STATUS**

Regional and global population size

Regarding the *ex situ* status of this species in Brazil, many confiscated birds are at Screening Centers for Wild Animals (CETAS), held by the Brazilian government, most of them without proper conditions for good welfare. It is known that the red tape prevents proper management of these birds, and makes it difficult for them to be sent to conservation projects. In 2018, an assessment of confiscations was made, and we learned of about 20 birds held in part by commercial breeders and the other part held in CETAS. The confiscated birds are not approved by the regional environmental agencies for transfer, as they have been set up as breeding pairs (F0).

In Europe, there is an *ex situ* population of approximately 300 birds, which originated from the US in the 1980s. It is possible that this population carries alleles of populations that are already extinct in Brazil.

According to the assessment made for this workshop, there are 94 captive birds in Brazil, and 51 captive individuals in other countries in the Species360 ZIMS database. Of these, seven birds are at Parque das Aves, one of which originated from a commercial breeder, and the other six hatched at the park, consisting of two sisters and the remaining possibly related. A little time ago these birds were identified as *Pyrrhura leucotis*, and only after a review was it confirmed that they indeed are *P. griseipectus*. Such identification errors are fairly common for this species, as *P. griseipectus* use to be regarded as a subspecies of *P. leucotis*, to which it is morphologically very similar. Therefore, it is important to conduct a review in the identification of all *ex situ* individuals in Brazil and in Europe, so that these can be managed properly for conservation purposes.

Current level of *ex situ* management

There is no national studbook established for *Pyrrhura griseipectus*.

Expertise (husbandry, reproduction, diet, environmental requirements, veterinary issues)

There is success with reproduction of this species in captivity with a national breeder, and also at international zoos.

According to Rick Jordan (JORDAN, 1996), approximately one-third of the known *Pyrrhura* species are well-represented in aviculture throughout the world. Many species are held by aviculturists, but they are seldom available owing to limited reproduction results and badly conceived trade restrictions. In Jordan's view, *Pyrrhura* may be fairly prolific in captivity. The number of chicks in nests will vary, but in general there are 3–5 eggs, with some species being renowned for producing 7–8. Fertility rates are generally very high in the commonly held species.

According to reports from Richard Cusick (CUSICK, 2000), an American aviculturist, *Pyrrhura griseipectus* appeared by illegal means in the east coast of the US in the mid-1980s. According to Cusick, the only *P. griseipectus* imported legally to the country that he knows of were 12 individuals brought from Europe by Richard Furzer from California in 1991. Furzer successfully breeds *P. griseipectus* and in 2000 he held the largest collection of this bird in the US, with 30 to 40 pairs.

According to Rosemary Low (LOW, 2013), the first individuals of *P. griseipectus* imported into Europe appeared in the 1980s. The author reported that Jeff Hornsby, in the UK, gathered several individuals from European countries to establish 12 reproductive pairs. These pairs produced two nestlings per year, so from each pair he produced around 6–14 young. Therefore, *P. griseipectus* reached many breeders, not only in the UK but around the world, exported by this breeder. According to Low, Horst Mayer raised *P. griseipectus* in 2000 in Germany. One female from this breeder produced 87 young from 2003 to 2013. Loro Parque, in Tenerife, purchased six birds raised in captivity in Germany in 2002. In 2009, there were five reproductive pairs, and in 2011, 70 young were produced. For the author, some European breeders did not have much interest in this species, and for this reason they are not so numerous in Europe. This emphasizes that, from all species of *Pyrrhura* in aviculture, the Grey-breasted Parakeet must be given priority as it is one of the parrots most threatened in the Neotropics (LOW, 2013).

In Brazil, *P. griseipectus* is also reproduced in a successful manner by aviculturists and commercial breeders, with information that pairs produce several nests in a single year.

EX SITU RECOMMENDATIONS FOR PYRRHURA GRISEIPECTUS

Ex situ* management roles recommended for *Pyrrhura griseipectus

As part of the conservation strategy for *P. griseipectus*, the following roles were recommended for *ex situ* management: **Insurance Population, Population Reinforcement, Demographic Manipulation, Research, Training, and Conservation Education**. Discussion details are provided below.

INSURANCE POPULATION

The definition of an insurance population is the maintenance of a long-term, viable *ex situ* population to prevent predicted local, regional or global species extinction and preserve options for future conservation strategies. These are typically species that are threatened and/or declining and for which it is unsure whether *in situ* threat mitigation will have the sufficient effect in a sufficient timeframe to prevent species extinction or dramatic decline in individuals, populations and/or genetic diversity.

The known *ex situ* population in Brazil for this species is 94 individuals, distributed among zoos, breeders and CETAS, and 51 individuals distributed in other zoos around the world (Species360). Fabio Nunes has noted that from this list, many of these are commercial breeders and in principle would not be available to help establish an Insurance Population.

The number of *P. griseipectus* confiscations is relatively low when compared to parrots, due to the low number of birds in the wild. There are accounts of 20 birds confiscated in 2018, but given the concerns regarding lack of proper structures and animal welfare, there is no confirmation that all of these birds are still alive. The group discussed why these birds have not been forwarded to an institution with proper maintenance conditions, such as Parque das Aves. Parque das Aves explained that administrative issues, regarding legislation and documentation, prevent the transfer of the birds, which has been negotiated for about one year now. As this is an interstate transfer, involving IBAMA, the process is slow. Since the birds are in CETAS and are not registered in SISFAUNA, the procedure is difficult. The latest suggestion was the creation of a temporary SISFAUNA for the CETAS where the birds are located, to allow them to be transferred; however, such negotiation still did not progress. An example was given of the yellow cardinals (*Gubernatrix cristata*), which were not registered in SISFAUNA but were transferred.

The *ex situ* population in Europe was identified as *P. leucotis* until the 1980s, and the commercial breeders often selected for mutations to favor certain morphological features. There

are chances of identification issues, apart from high rates of hybridization and selection in these birds. Thus, many of them may not be fit to be incorporated into the insurance population. There is a specialist group working with this species, promoting the exchange of information among institutions such as the Parque das Aves, Chester Zoo, Loro Parque and ZGAP. However, the species still does not have a studbook.

There are four options for sources of birds to develop the insurance population: birds captured directly from the wild; birds from breeders in Brazil; birds from Europe; and confiscated birds. Considering the risk that the breeders' birds have been domesticated and possibly hybridized, the recommendation is that, initially, the founders should not come from commercial breeders. However, it is important not to discard this option, as it may be considered in the future.

It was suggested to consider organizing two insurance populations, one in Brazil and a second in Europe. There could be occasional exchanges in the future between these two populations, so that the genetics of birds present in Europe could be added to the birds in Brazil. The big issue is how to proceed to achieve this goal, as there are red tape challenges in exporting, and also there is a risk of hybrid birds, which shall be avoided. A study is underway by Prof. Camila Ribas to assess if the gene pool of lost populations is represented in the European birds. This study is ongoing, but there are no results available yet.

Concerns over the number of founders required and the institution in charge of organizing the insurance population were discussed. It is important to realize that an insurance population does not need to start with the ideal number of founders, i.e., the program can start with only a few, and as individuals become available, they can be added to the population.

Benefits

This species has significantly smaller and more fragmented wild populations than the other species (Amazon parrots) discussed in this workshop, and continues to be threatened by habitat loss and poaching for the pet trade. Given this situation, an insurance population has important conservation value to provide a backup in the event that the species goes extinct in the wild due to continued threats, stochastic events and/or disease, and to provide options for population restoration when threats can be controlled.

Risks

There is a risk that captive management may select for domesticated behaviors and/or weak genetics. This risk can be mitigated through proper husbandry and scientifically managed

breeding strategies. Disease transmission was also identified as a risk, both from wild to captivity and from captive birds to the wild. This risk can be mitigated through adherence to recommended health and quarantine protocols (see section 5.3).

Feasibility

There are potential sources of birds for the insurance population, but there are also challenges with each of these sources. There is no studbook for this species to inform the development of the insurance population, requiring more investigation of birds and their origin and genetic background. Difficulties in accessing the birds are anticipated, as they are seen as a source of income by commercial breeders, and there are also difficulties regarding Brazilian legislation red tape. There also is a lack of funding and staff.

Recommendations related to this role

Upon discussion, and considering the risks, benefits and feasibility, it was decided to establish an insurance population for *P. griseipectus*, which was considered a high priority for the species. The first step is to establish what is required to create the population and then to establish the order and priority for actions.

The group highlighted the importance of following the health and quarantine protocols (see section 5.3), so that the insurance population can remain free of disease and to reduce the risk of accidental transmission to the wild populations. These protocols may also apply to the wild populations, with some adjustments, to reduce spread of pathogens. A recommendation was made for the environmental agency to assess the breeders regarding the quarantine issue. The insurance population should only work with birds from secure sources, and should consider the social behavior and hierarchy within the flocks.

There is a need to start this action with utmost urgency as compared to the other species previously discussed, as this species is in a very critical situation in the wild.

POPULATION RESTORATION

The purpose of Population Restoration is to provide individuals to supplement small or declining *in situ* populations (reinforcement) or to establish new populations in suitable, unoccupied habitat (reintroduction). For restoration to be effective, it is necessary to understand and mitigate the causes that led to decline or destabilization of *in situ* populations prior to conducting releases. The source of individuals for restoration can be from other wild populations (i.e., wild-to-wild) or from captivity (i.e., captive-to-wild).

Two strategies were proposed for population restoration for this species: population reinforcement for the smaller populations, and reintroduction in protected areas within the historical range. The birds used for translocation and reintroduction could originate from other wild populations or hatched in captivity. If there is an option, the preference would be to release young birds, which does not exclude the possibility of considering birds of other ages.

Initially, the proposal was to translocate individuals between the three small populations, specifically from area 2 (Quixada) to area 4 (Ibaretama), which have similar habitats and therefore the same availability of food, and same type of substrate for nests. For reintroduction to the historical range, where the species is currently locally extinct, a possible translocation was proposed from area 1 (Serra de Baturité) to the Serra da Aratanha (red spot on the map to the north of Baturite, without numbering). One suggestion for wild-wild translocation is to close the nest boxes with the birds inside at around 4:00 am., transport them to the release areas (about 90 minutes), and reopen the boxes at the pre-determined release site.

Overall the group was supportive of population restoration for this species, but it was unclear if the best strategy would be to use other wild populations or the *ex situ* population or both as a source for birds to translocate. For example, the group debated the likelihood and capability that translocated wild birds might attempt to return to their previous habitat, perhaps flying until exhaustion seeking their original location. Removal of birds from a small wild source population might jeopardize its own viability. If population restoration becomes a role for the *ex situ* population, this role would be dependent upon establishment of the insurance population.

Further details of release procedures and proposals were not discussed, as it will be important to consult and follow the IUCN *Guidelines for Reintroductions and other Conservation Translocations* (IUCN/SSC, 2013) in a more detailed discussion.

Benefits

Population restoration is deemed to be of very high value to the conservation of *P. griseipectus* in the following ways:

- Increase the number of subpopulations;
- Increase the geographic representation of the species and its range; and
- Promote the umbrella effect

Using the *ex situ* population as the source for restoration will reduce the risks of translocating birds from one habitat to another.

Risks

In situ translocations from one population to another may have a high risk of disease transmission and problems related to the adaptation of birds to the new environment, since some pathogens may be present in one environment but not in another. Pathogens carried by introduced birds likewise can pose a threat to the local recipient population that has not yet had contact with them. This risk can be reduced by the use of *ex situ* birds for population reinforcement, provided that they have been approved following the use of the proper health protocol. Prior knowledge of the health status of the two populations concerned can also reduce the risk of disease transmission

There is a risk that the reintroductions of birds into new unoccupied habitat would catch the attention of poachers. This risk may be minimized by conservation education activities.

The specialist reported his concern that, if the restoration actions do not succeed, and there are negative repercussions with the local communities, this may jeopardize the project's credibility, which may also impact actions for other species.

Feasibility

The feasibility of using the *ex situ* population for population restoration will depend on the establishment of the insurance population, which consequently depends on working with the Brazilian legislation and fundraising. It was suggested that the *ex situ* population in Europe can be financially supported by European institutions.

It was mentioned that the European Association of Zoos and Aquaria (EAZA) conducts several conservation campaigns that raise funds to support field conservation activities and conservation education. Maybe it would be interesting to think of something similar to that, for the Brazilian zoos to promote actions for the species.

DEMOGRAPHIC MANIPULATION

Actions of demographic manipulation would focus on the three smaller populations, as these populations are known to have lower juvenile recruitment, based on nest box monitoring, and are aging, based on known morphological and reproductive features. This is particularly true in Serra Azul (area 4), where it is possible to observe the pairs. The largest population in Serra do Baturite (area 1) consists mostly of young individuals. Demographic manipulation could be accomplished as part of a population reinforcement program using *ex situ* birds but emphasizing the release of young birds.

Benefits

Improvement in demographics and, possibly, in the genetic variability of the population.

Risks

No risks were pointed out for this action.

Feasibility

The natural nests in these areas are still inaccessible. Therefore, young birds would need to be released at an age after which they would have left the nest.

Recommendations

Prioritize the translocation of young ones to the smaller populations.

RESEARCH

A few research demands were raised during the workshop and are compiled below:

- a) Perform a genetic analysis of the *ex situ* population, owing to the possibility of hybridization and misidentification of the species;
- b) Assess if the lost alleles from the Brazilian extirpated populations are present in the European *ex situ* population. If they are, investigate how to include them into the Brazilian insurance population;
- c) If possible, identify the geographic origin of the individuals currently held in captivity. It is believed that the current *ex situ* Brazilian population is basically entirely originated from the Serra do Baturite. The origin of the current European population is old, so there is a possibility that they preserve some alleles from other populations that are no longer represented in Brazil;
- d) Assess the adaptation or acceptance of the flock to new individuals that are released, regarding the number of individuals and age and/or sex; and
- e) Assess the carrying capacity at the release areas.

There was an identified research need to compare the different strategies for *ex situ* reproduction of the *Pyrrhura* individuals in a flock vs separating them into pairs. However, this topic was relocated to be debated under Training, as it was a consensus that while both methods result in reproduction, separating pairs may result in a higher number of chicks, while flock management maintains the group's social behavior.

Benefits

Possibility of genetic improvements for the insurance population, and promote more effective population restoration if *ex situ* birds are used.

Risks

No risks were pointed out to perform research.

Feasibility

The genetic study with the European population is ongoing. The results are not yet obtained, but we know that these data will soon be accessible. All topics approached as a research need for this species were considered as having a high level of importance. However, the feasibility of the actions was not discussed in details.

Recommendations

Regarding the priority to initiate research actions, Fabio Nunes has established that all research actions recommended for this species have the same importance level.

***Ex situ* management roles assessed and not recommended for this species.**

The following *ex situ* management roles were assessed for their conservation value, feasibility and risks. Based on these discussions, there was a group consensus that Training, Rescue Population, and Conservation Education are not recommended for *P. griseipectus* at this time. Details of these assessments are given below.

TRAINING

Once the insurance population in Brazil is established, it may be used for training of breeding strategies and to identify the birds' roles for different *ex situ* purposes. Below are the topics raised regarding training with *ex situ* birds:

1. Compare the different reproduction strategies for *P. griseipectus*, separating pairs or keeping them in flocks. We know that in both situations reproduction occurs; however, there is a need to test both strategies. Generally, separating pairs increases the number of chicks produced, and keeping breeding birds in a group preserves their natural behavior. The strategy

has to be adjusted according to the demand established for the insurance population, prioritizing birds raised in groups for releases, so that this behavior can be kept in the *in situ* populations.

It was suggested that groups could be used for: a) observing the social behavior of the flock regarding the introduction of new individuals, assessing the welcoming regarding the age and sex of the parakeets introduced to the flock; and b) receive eggs from separated pairs, to increase the flock size and to keep the behavior of raising the chicks with the aid of other adults.

2. Test, in the *ex situ* birds, the equipment for training in telemetry and techniques of individual identification in long ranges, such as the use of colored medallions. Test how the birds deal with the equipment, how they behave, the influence of the equipment in their welfare, etc. It was reminded that for this type of training, hybrid birds that will not be released may be used.

3. Promote the exchange of experiences between commercial breeders who successfully raise and reproduce the birds, and the institutions that will maintain the insurance population, as difficulties were reported by some of the institutions in pairing the birds.

Benefits

Increase the knowledge on the reproduction behavior of the species, to apply to the insurance population.

Risks

There is a possibility that the captive conditions change reproductive behavior. Prof. Nêmora remarked that in an experience with this species in captivity, when forming flocks for pairing, they ended up fighting. Even though this is a very sociable species, adults were seen attacking young birds.

Feasibility

The feasibility of this action was not commented upon.

RESCUE

An *ex situ* rescue population for a species is one established for a population that is in imminent danger of extinction (locally or globally). For *P. griseipectus*, this was considered for the smaller wild populations, in which all birds would be captured and their destination could be to reinforce the largest wild population or the *ex situ* insurance population, aiming at reproduction. The removal and translocation of these populations, whether for restoration or for other

conservation purposes, is the only alternative to the imminent extinction threat. It was noted that if only a few birds were removed from these small populations, which are already declining, the situation of the remaining birds could worsen even further, speeding up local extinctions.

Some questions arose regarding for how long these populations have been declining, the current number of individuals, and whether there is genetic analysis that may indicate that they are isolated for a sufficiently long time to have caused speciation. Fabio Nunes explained that blood samples were collected from three of the remaining four isolated populations (Serra do Mel, Serra Azul and Serra de Baturité) and research conducted by Dr. Camila Ribas and Dr. Péricles Sena may confirm genetic variations and even the time during which these birds were separated in each location. Preliminary information suggests that there are small haplotype variations between the populations of Serra do Mel and Serra de Baturité, but these are still the same species. As this is a forest bird, it is believed that these population isolations were mainly caused by anthropogenic changes, as a good portion of the Northeastern forest coverage was decimated by small-scale agriculture and indiscriminate use of fire. This information is corroborated by the model of vegetation produced by Araújo & Mariano (2015) (Figure 3), which points towards an arboreal connection in the areas where *P. griseipectus* occurs. However, the current situation, according to Hansen et al. (2013), is one of intense forest fragmentation in the species' range. This anthropogenic process, along with poaching, may have fragmented a network of meta-populations, causing local extinctions.

The discussion regarding the Serra de Baturité was resumed, where the wild population (which is the largest, with more than 400 individuals) may be threatened by an *ex situ* breeder, which in practice also functions as a private zoo, located near the protected area. The recommendation to deal with this issue was to intensify the surveillance of that area, in the sense that this institution should produce health reports about their birds.

Some concerns were raised about the presence of disease in the smallest population. In the past Aquasis wanted to capture the remaining individuals from the smallest population, because there were morphological evidences that these birds were sick, and that this disease was the cause for the population's decline. Prof. Tânia Raso explained that the birds had scarring in the nostril resulting from some previous infectious process. However, when the birds of this population were captured for evaluation and sample collection, none of them presented lesions or had a significant result in laboratory tests, suggesting that the pathogen may not be present in the population at present. However, the pathogen may be present in the environment, and also be related to the animal's health status.

Estimativa de área com vegetação arbórea, segundo o modelo

Remanescente de vegetação arbórea, obtido de Hansen e colaboradores

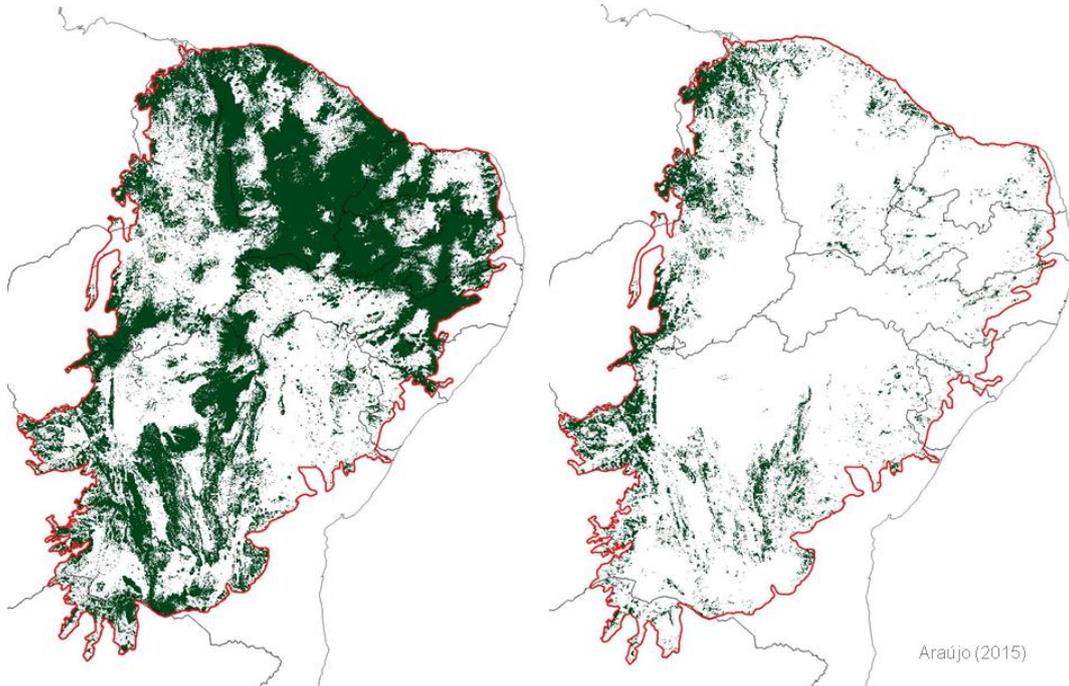


Figure 3. Model of vegetation with the original vegetation connections in the range of *Pyrrhura griseipectus*. Source: Araújo & Mariano 2015

There was a discussion on the presence of the pathogen in the natural environment, the susceptibility of populations to the disease and the resistance of these birds in this small population as an adaptive response. There is a risk that the pathogen is still circulating within the population. Therefore, if the decision is made to capture this population, strict fulfillment of health and quarantine protocols (see section 5.3) will identify this risk.

Benefits

No benefits were pointed out for this *ex situ* management role.

Risks

The smallest population may still carry the disease.

Feasibility

Investments for rescue are very high.

Recommendations

Fabio Nunes affirmed that the rescue is no longer an option, due to the investment required in human and financial capital. The initial idea was to capture all birds, treat the disease and then return them to the wild, but as currently the birds do not present signs of the disease, the investment in this action is no longer a priority. Therefore, the decision was not to employ rescue for *P. griseipectus* populations at this time.

CONSERVATION EDUCATION

In principle, the conservation education template developed for all Amazon parrot species of this workshop would also apply to the Grey-breasted Parakeet. However, regarding actions with birds in their ranges, Fabio Nunes was concerned due to the conditions and structure of the only zoo in that region, such as the lack of proper conditions, there is a risk that the message is wrongly interpreted by the audience, generating interest in capturing the birds.

For these actions, it would not be necessary to use pure and wild birds, as the hybrid ones, and the birds that are unfit for the insurance population may fulfill the environmental education role.

It was suggested that, within the species' range, we develop a visitation program to Aquasis, to raise the public awareness with tools such as, for instance, virtual reality – exhibition of videos from the birds in their natural environment, prior to flying, and visitation to structures of the different stages of rehabilitation for release – apart from promoting field outings that could allow sighting of the birds in their natural habitat.

Benefits

No benefits were pointed out for this action.

Risks

Encouraging the public to adopt the animal as mascot.

Feasibility

There is a single zoo throughout the species' range, where these actions could be implemented, which does not have proper structure.

Recommendations

After discussing this topic, the group understood that in this case the risks exceed the benefits, and a conservation education campaign would not be an *ex situ* management role to be employed for this species.

13. Responsible Parties for Promoting Recommendations

Many of the following commitments were made at the workshop. Some of the responsibilities, particularly those regarding studbooks, were developing following the workshop.

13.1. Conservation Education, Training and Research

Conservation Education activities regarding all species are a responsibility of the Brazilian Association of Zoos and Aquariums (AZAB), supported by the Parrots of Brazil Program. Parque das Aves and the Neotrópica Foundation of Brazil will be in charge of all actions related to *Amazona aestiva* and *Amazona rhodocorytha*, and will be supported by AZAB.

IES will contribute with Training activities for release and for Conservation Education, in addition to aiding in the contact with institutions who work with *Amazona vinacea* to organize the Insurance Population for that species. This institution also has made itself available to aid in preparing the protocols for collection of biological samples for research on genetics, health and behaviour. Existing protocols will be shared and can be adapted as needed for each species. It was suggested that contacts from UFSC might be available to collaborate with the studbook keeper for *A. vinacea*, and the participants will be in contact with them.

Parque das Aves may help in preparing the protocols, particularly with technical knowledge regarding behavior and wellbeing of animals. It was suggested to keep an open communication channel between the participants of this workshop, using electronic means so that materials can be shared, to facilitate the implementation of these actions.

Currently, there are ongoing actions related to training for surveillance agents and environmental managers, executed within the Parrots of Brazil Program. CEMEAVE/ICMBio has been coordinating these actions, and this training will be maintained on schedule. Drawing on lessons learned during this workshop, improvements will be made, and information on integrated conservation will be incorporated into the training materials.

The results of this workshop shall be brought to the review meeting of the National Action Plan for Parrot Conservation. It is suggested to add to the PAN an action that is related to this workshop: “Integrating *ex situ* planning with *in situ* initiatives”. The suggestion is that *ex situ* management actions follow the recommendations of this workshop.

13.2. Insurance Populations and Studbooks

In order for the actions of establishment of Insurance Populations to be effectively implemented, it will be necessary to create studbooks for each of the seven species. For that to be accomplished, the institutions must commit to provide all required information, as this was one of the key difficulties faced by the current studbook keepers for other species, as they did not have access to data on the individuals of the species of interest.

One of the difficulties faced previously that compromised the effective management of populations was that captive populations were managed as isolated initiatives, with little institutional strength to access data and make recommendations for the species on a population level, particularly when it related to “more closed” zoos or institutions that did not provide access to their information. In order to minimize such problems, AZAB will host a training for studbook keepers with the persons who already registered, and it also has a contract with the participants’ institutions to guarantee that all of them make their data available.

Access to data is a common problem faced by other zoos throughout the world, due to cultural issues and lack of understanding. For this reason, AZAB’s initiative, in partnership with ICMBio, is paramount to strengthen credibility and for the effective running and functioning of the *ex situ* program for these species. AZAB undertook the coordination for creation of a studbook for 25 species, in a partnership with ICMBio. To be in charge of a species’ studbook, a contract is signed between the person and the institution to which it belongs, and AZAB/ICMBio. In this way, the commitment is made that all management and procedures required to maintain an insurance population will be carried out with the individual birds inside the institution, as well as the sharing of all necessary information. If these requirements are not fulfilled by the institution, it will no longer be part of the program.

In order to integrate the seven species of this workshop into this cooperation agreement, it was explained that they could be supported by AZAB in a simplified manner (as has happened with the megafauna program), but not within the official program. No new official meeting will be required with the AZAB institutions to communicate the decisions of this workshop, as it can be made via an e-mail notification. Those interested in keeping the studbook for these species do not necessarily need to be associated with AZAB, because these species are not part of the agreement between AZAB and ICMBio/MMA, and nor do they need to be employed by a zoo or institution that keeps the species.

It was suggested that at this initial step, one specialist be responsible for each species, to aid in developing the studbooks. Specialists from the Red-tailed Amazon Project, Red-

spectacled Parrot Project and Blue-fronted Amazon Project were proposed as the initial points of contact for *Amazona brasiliensis*, *A. pretrei* and *A. rhodocorytha*, respectively.

For both *Amazona farinosa* and *Amazona vinacea*, no specialists were put in charge at the time of the workshop. As follow-up for *A. farinosa*, the group will contact a release project in Ilhabela, SP, and will also contact the Bahia Zoo. The board of Parque das Aves also will be consulted, as this is an Atlantic Rainforest endangered species, and if they are interested, a name will be appointed. For *A. vinacea*, the group will contact researchers who are involved with that species and who have already displayed interest in collaborating, as previously pointed out. Aquasis will be in charge of actions for *Pyrrhura griseipectus*.

The AZAB training for studbook keepers will be held between March and April 2019, and it is important that the representatives for each species attend in person.

14. Appendix: Workshop Participant List

Name	Position, Institution/Project	E-mail address
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Ligia Rigoletto Oliva	Veterinarian, Parque das Aves	ligia@parquedasaves.com.br
Marina Somenzari	Biologist, parrot specialist and member of CEMAVE - National Center for Research and Conservation of Wild Birds ICMBio / MMA	masomenzari@gmail.com
Nêmora Pauletti Prestes	Biologist, parrot specialist and manager of Vinaceous-breasted and Red-Spectacled Parrot Projects	prestes@upf.br
Paloma Bosso	Veterinarian, Technical Director at Parque das Aves	paloma@parquedasaves.com.br
Patrícia P. Serafini	Veterinarian, Coordinator of PAN Papagaios - environmental analyst of CEMAVE - Birds National Center of Research and Conservation of ICMBio/MMA	patricia.serafini@icmbio.gov.br
Tania F. Raso	Veterinarian, specialist in avian infectious diseases and veterinary medicine for conservation. Instructor at FMVZ – USP	tfraso@usp.br
Vanessa T. Kanaan	Founder and responsible for the reintroduction project of the Vinaceous-breasted Amazon in the Araucarias National Park, Santa Catarina	vanessakanaan@gmail.com

Remote participation

Name	Position, Institution/Project	E-mail address
Cristina Miyaki	Biologist, Specialist in conservation genetics of neotropical birds	cymiyaki@ib.usp.br
Jaime Martinez	Biologist, Parrot specialist and manager of Vinaceous-breasted and Red-Spectacled Parrot Projects	martinez@upf.br
Pedro Scherer Neto	Biologist, Parrot specialist with expertise with most of the six species	pedroschererneto@yahoo.com.br

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Amazona brasiliensis
Photo: Parque das Aves

