



**POPULATION DIAGNOSIS AND CONSERVATION STRATEGIES
OF THE BLACK AND CHESTNUT EAGLE (*Spizaetus isidori*), IN
THE COLOMBIAN LOA ANDES AMAZÓNICOS**

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POPULATION DIAGNOSIS AND CONSERVATION STRATEGIES OF Black and chestnut eagle (*Spizaetus isidori*), IN THE COLOMBIAN AMAZON ANDES

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RESUMEN

This study focuses on making a diagnosis of the Black and Chestnut Eagle (*Spizaetus isidori*) in the Andes Mountain range, in the Amazon basin of Colombia. We determine the existing populations, habitats, mating areas, foraging, nesting and migration routes; in turn, we detected the 3 main threats posed by this eagle, of anthropogenic origin: (i) destruction of habitats through deforestation of forests for agricultural activities and illegal mining; (ii) Poaching: this eagle is hunted indiscriminately by indigenous Kamsá because this bird is considered a threat to poultry, who usually hunt them for food. (iii) Climate change: this species of eagle performs migrations guided by temperatures; climate change generates anticipated migrations, in seasons where food is scarce and eagles die of starvation.

To protect the species, we propose 5 strategies: educational, for the training of the Kamsá indigenous community, living with the eagle. Conservation, with the creation of protected natural areas in mating, foraging and nesting sites, to promote population growth. Sustainability, with the creation of a regional conservation office for the protection of the eagle, led by young indigenous Kamsá. Monitoring, with the supervision of areas with high threat of poaching and elimination of deforestation as a platform for agriculture and livestock. Communication, with the information to personnel related to conservation, that is, ecotourists, forest tourists, outdoor enthusiasts and bird watchers, to promote activities with sustainable development that increase the economic income of the communities of the region.

Keywords: Black-and-chestnut Eagle (*Spizaetus isidori*), poaching, Kamsá indigenous people, climate change, extinction.



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**IUCN RED LIST CATEGORY AND
CRITERIA: Endangered C2a(i)**

This species has lost 60.6% of its habitat historically and in 10 years it lost 6.8% of its habitat. In addition to this loss, a very strong threat is hunting pressure, since these eagles and especially immature ones are very prone to hunting poultry, which is why they are easily eliminated by farmers. *Spizaetus isidori* is a very long-lived species, it is estimated that 3 generations are equivalent to about 55.5 years. The combined effect of the destruction and fragmentation of forests with hunting pressure has reduced the population of the species probably by more than 50% in three generations and this trend will continue in the future although it is not foreseeable what will happen in half a century.



ECOLOGY

The Crested Eagle is distributed throughout the Andes from northeastern Colombia to northern Argentina (Ferguson-Lees and Christie 2001). It inhabits large moist forests in the mountains between 150 and 3300 m (Flórez et al. 2004, Blake 1977, Strewe 1999). Although it has been recorded in intervened areas such as coffee plantations (Espinosa et al. 2009) and open areas, these records correspond to individuals passing through (Brown and Amadon 1989; Salaman 1994; Strewe 1999).

Thiollay (1996) estimates that the species occupies between 12 and 24% of the extension of western Colombia. It is found in the Andean area of the country, with recent records in towns such as Sisavita (Norte de Santander), Villarrica (Tolima), Neira (Caldas) (Córdoba-Córdoba et al. 2008), Salento (Quindío) (JS Granada com. pers.), the Otún river basin (LM Renjifo pers. com.), Jardín (Antioquia) (S. Ocampo pers. com.), Campohermoso (Boyacá) (Márquez and Delgado 2010) and recently in the Guayabetal area (Cundinamarca) where a juvenile was observed in April 2012 (S. Chaparro, A. Sua, N. Diaz pers. Comm.); however, in places where it was previously observed, it has not been found again (Márquez and Renjifo 2002).

It is a species considered rare and local throughout its entire distribution (Brown and Amadon 1989; Ferguson-Lees and Christie 2001) and Except for the breeding season, it is observed alone (Thiollay 1989; Ferguson-Lees and Christie 2001). Their diet is made up of squirrels (*Sciurus* sp.), Sloths, turkeys (*Chamaepetes goudotii*) and paujiles (Lehmann 1959, 1961; Freile and Chaves 2004), guacharacas (*Ortalis* sp.), Churucos (*Lagothrix lagotricha*) (Márquez and Renjifo 2002 ; Valdez and Osborn 2004), occasionally poultry (E. Constantino in Márquez and Renjifo 2002, Márquez and Delgado 2010), and in the Quindío area a sloth was observed as prey (L. M. Renjifo obs. pers in Márquez and Renjifo 2002). They hunt with close-range overflights of the canopy while searching for their different prey (Hilty and Brown 1986). Nests on emergent trees in well-preserved forests (Lehmann 1959; Fjeldså and Krabbe 1990; Ferguson-Lees and Christie 2001; Vargas 2008). The nest is made up of thick branches in the upper part of the trees (Márquez and Renjifo 2002). Throughout its



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distribution, active nests have been found in the months from March to July (Venezuela), August (Bolivia), April (Ecuador), February to March (Colombia: Huila), May (Colombia: Quindío and Nariño) and from January to April (Colombia: Boyacá) (Fjeldså and Krabbe 1990 ; Lehmann 1959; Márquez and Renjifo 2002; Vargas 2008, Márquez and Delgado 2010). Current records document the laying of a single egg (Bierregaard 1994; Ferguson-Lees and Christie 2001).



POPULATION

Throughout its entire distribution, Ferguson-Lees and Christie (2001) estimate one pair for every 50 km², the estimated distance between nests along the nearly 6000 km of the Andes and associated mountain ranges, which yields a total population probable of 240 adult individuals for South America. Based on similar estimates, BirdLife International (2011) estimates for Colombia a few hundred individuals and a total population between 1000 and 2499 adult individuals. Márquez and Renjifo (2002) estimated a possible population of 740 and 1480 individuals, indicating it as a very probable overestimation if the entire potential area was occupied by this species and there was no hunting pressure.

This species has an extensive but narrow and altitudinally restricted linear distribution on the coastal ranges of north-central Venezuela (Carabobo and Aragua) and north-eastern

Colombia (Santa Marta Mountains), and from the subtropical slopes of the Andes from Venezuela (Mérida and Perijá Mountains) through Colombia, Ecuador and Peru to west-central Bolivia and north-western Argentina (Fjeldså and Krabbe 1990, Thiollay 1994, Roesler et al. 2008, Aráoz et al. in press). It is thought to be rare and patchily distributed but its status is very poorly known (Thiollay 1994, Ferguson-Lees and Christie 2001). The total population is precautionarily estimated to include fewer than 1,000 mature individuals (Ferguson-Lees and Christie 2001, C. Márquez in litt. 2014), with no more than 250 mature individuals in each sub-population.

The population in Venezuela has been estimated in the low hundreds or perhaps 200 mature individuals (C. J. Sharpe in litt. 2003, 2015), with probably fewer than 250 mature individuals in Bolivia (S. K. Herzog in litt. 2013). The population in Argentina may be small (Ferguson-Lees and Christie 2001), and whilst there is an unquantified number in Peru, it remains rare. Opinions on the population in Colombia vary, with one population alone, in a large stretch of suitable habitat on the eastern slopes of the Andes in Colombia, from Huila to Meta department, thought to support a few hundred individuals (T. Donegan in litt. 2010), compared with an estimate of fewer than 100 adults in the country's total population (C. Márquez in litt. 2012, 2014). The species appears to be common in the Santa Marta mountains and on the western slope of the Los Nevados National Park and around Ucumari and Monterredondo (C. Downing in litt. 2013), although this species is mobile, with the same birds probably recorded multiple times in a single day (C. Márquez in litt. 2014). The population in Ecuador is thought to consist of a maximum of 200 mature individuals (Ridgely and Greenfield 2001). The global



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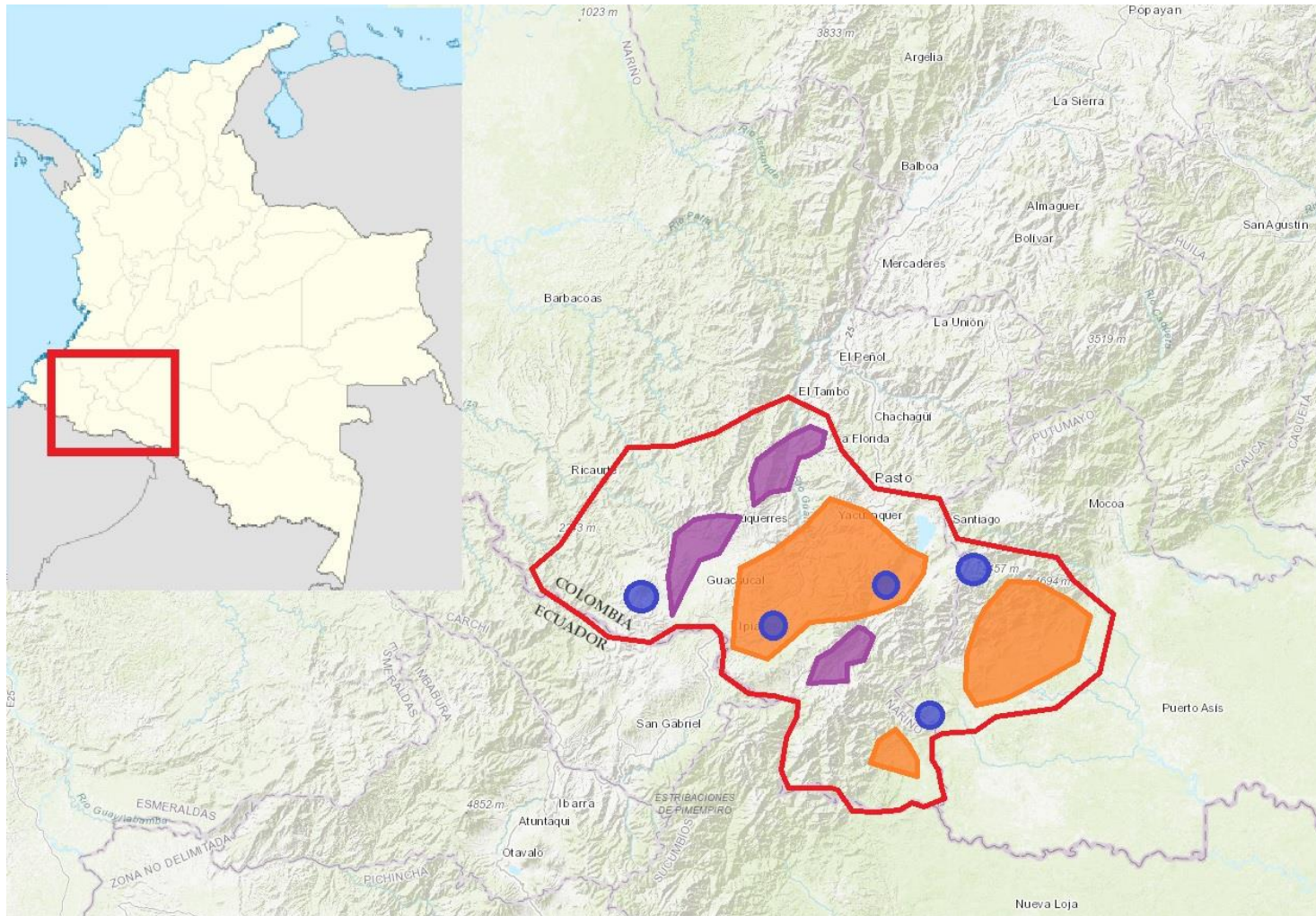
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PROJECT AREA



PROJECT AREA

CONVENTIONS

	Project area
	Foraging and mating areas
	High poaching threat
	Kamsá indigenous communities

GEOGRAPHICAL POSITION

1. **Departments:** Sucre, Bolívar, Magdalena, Guajira

2. **Country:** Colombia

3. **Geographical coordinates**

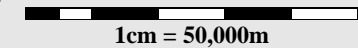
From the Ciénaga de Magdalena:

11°01'10.0"N 74°39'08.5"W;

To Punto Guamachito:

11°24'32.6"N 73°08'16.9"W

SCALE



SOURCE:

- COLOMBIA WILD CORPORATION
- IMAP: geographic data bank of biodiversity of Colombia.
- Google Maps.



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population has been variously estimated at more than 1,000 individuals (T. Donegan in litt. 2010, Y. Molina in litt. 2010) or fewer than this (H. Vargas in litt. 2012, C. Márquez in litt. 2014). It is therefore precautionarily placed in the band for 250-999 mature individuals, with no more than 250 mature individuals in each sub-population. Based on this, there are assumed to be c.370-1,500 individuals in total. However, a complete survey of this species throughout its range is needed to accurately quantify its global population.



Trend Justification: This species is thought to prefer primary forests (C. J. Sharpe in litt. 2003, T. Donegan in litt. 2010), although it may persist in mosaics of primary and secondary forest with open areas (C. Márquez in litt. 2012). Given habitat loss (Thiollay 1994) and persecution by humans (H. Vargas in litt. 2012) throughout its range, the population is considered to be declining. It has been reported, however, that there has been no discernible decline in records in Risaralda and Magdalena, Colombia, over the past 13-18 years (C. Downing in litt. 2013), thus detailed monitoring is required to quantify the overall population trend.

THREATS

In the department of Nariño a considerable loss is estimated of habitat suitable for *S. isidori*

due to the extension of areas of crops, pastures and illicit crops. In some of the areas where this eagle could nest, such as the Reserva Forestal de los Indios Awa, there is no legal protection (Márquez and Renjifo 2002). It is illegally hunted with some frequency by peasants, as it is considered a threat to poultry (Guerrero et al. 2004; Ballesteros et al. 2005; Córdoba-Córdoba et al. 2008; C. Navarro; J. Alzate and Vega com. pers.). Márquez and Delgado (2010) report eight eagles hunted in the last 5 years in Campohermoso (Boyacá) and the panorama could be similar in San José del Palmar (Chocó) where, according to the peasants, in previous years there was a greater conflict with the species due to the loss of poultry, which has been recently diminished, perhaps due to the low density of the eagle in the area (S. Zuluaga pers. obs.).

It also appears to be affected by high voltage transmission lines (Guerrero et al. 2004). Thiollay (1989, 1996) estimates that habitat loss constitutes the greatest threat to this species, with a requirement of around 10,000 ha per pair; only two pairs were found along an altitudinal gradient from the eastern plains to the mountains of Mérida (Venezuela).

This species has been uplisted to Endangered on the basis that its declining population is estimated to be very small, with fewer mature individuals than previously thought. The destruction of its montane forest habitat, as well as direct human persecution, are inferred to be driving a continuing decline. Further research is required to elucidate threatening processes and quantify their resulting effects on population trends.

It apparently requires at least part of its home range to include undisturbed primary forest, which has been subject to huge losses in many parts of its extensive range, primarily owing to conversion for agriculture (Ferguson-Lees and Christie 2001). In Ecuador, montane forests



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are threatened by logging and mining (G. Buitron in litt. 2014). Persecution has been recorded in Colombia and Ecuador in response to predation of chickens (Márquez and Delgado 2010, Y. Molina in litt. 2010, C. Márquez in litt. 2012, 2014). It is not known how serious a threat this is, but in one Colombian study, eight cases of eagle persecution and killing were noted (Márquez and Delgado 2010). This conflict appears to be increasing (C. Márquez in litt. 2014), and as larger extensions of forest are colonised, eagles may come into more frequent contact with humans and livestock (C. Márquez in litt. 2012, H. Vargas in litt. 2012, Aráoz et al. in press).



CONSERVATION MEASURES TAKEN

Found in national parks and reserves like Munchique (Negret 1991), Cueva de los Guácharos (Lehmann 1961), Puracé (Franco and Bravo 2005), SNSM (Strewe and Navarro 2003), Macuira, RN Tambito, El Pangán, La Planada, Cuchilla de San Lorenzo, Alto Quindío Acaime and Quindío Canyon. This species It is part of the group of priority birds and conservation objects in the SFF Otún-Quimbaya (Guerrero et al. 2004) and the parks Nationals of Los Nevados (Loterio-Echeverri et al. 2006) and Tatamá (Ballesteros et al. 2005). In an area where this species has recently been found (Campohermoso, Boyacá) a campaign

against hunting was carried out (Márquez and Delgado 2010). There is a need to carry out work with these communities to know their perception and identify possible solutions to the conflict. This species continues within Appendix II of Cites (under the nomenclature of *Oroaetus isidori*).

**SUGGESTION CONSERVATION
ACTIONS:**

- In-place research and monitoring
- Action Recovery Plan
- Systematic monitoring scheme
- In-place land / water protection

- Conservation sites identified
- Occurs in at least one protected area
- Invasive species control or prevention
- In-place species management

- Successfully reintroduced or introduced benignly
- Subject to ex-situ conservation
- In-place education

- Subject to recent education and awareness programs
- Included in international legislation
- Subject to any international management / trade controls

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Main objective of the Plan. Improve the conservation status of the Black-and-chestnut Eagle (*Spizaetus isidori*), in the Amazon river basin through its study, protection and management of habitats. Policies, actions, activities and actors. For the proposed action plan, a vital point is the definition of the roles



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of the actors who will be involved in supporting the policies, actions and activities of the proposal.



bigger problem. In coordinating these actions, the success of conservation can lie. In general, and with the intention of reaching the ideal situation for the species through the guiding objective of this plan, four policies were developed that are articulated by the participation of the aforementioned actors, which are accompanied by their respective actions, activities, and also for the priorities they have in time for compliance.

Currently, the actors are located on different levels from which their possibilities of effective participation are defined. It can be said that the community in general, through the development of its subsistence activities in the field, can be support in terms of the application of the different actions that, from the local level, have a direct impact on the regional conservation status of the species. Some landowners on which the species is found simply strive to make their land productive, sometimes causing damage to areas of interest to the Macaw. However, its possibilities for action are very wide, and could become the articulating axis of local change processes.

On the other hand, official Organizations, and non-governmental organizations, take actions to solve some problems that make up the



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The first policy, Development of an information system for monitoring the population states of the species (see Table 1), responds fundamentally to the need to complete and maintain knowledge levels of the species in Amazon River basin, in relation to the possibilities that they have, through

Policy 1. Development of an information system for monitoring the population states of the species			
Action	Activities	stakeholder	Timeplace
Consolidate a foundation of data updateable in SIG, about the records distribution and ecological notes of the species.	Base Development data.	Universidad de La Guajira, ONG, CAR Universidad de La Guajira, ONG, CAR	short term
	Establishment of GIS project.		
Assess the status of populations of the Species in the Department	Evaluation project of sizes and states populational	Universidad de La Guajira, ONG, CAR	short term
	Analysis project population viability		
Develop studies on the ways of use of habitat by species and its distribution in the Department	Follow-up project of populations with satellite telemetry	Universidad de La Guajira, ONG, CAR	short term
	Prediction project ecological habitat for La Guajira		
Develop a protocol, within a frame inter-institutional and arranged with communities for the monitoring of populations.	Principles development and Methodologies for species monitoring in the department.	Universidad de La Guajira, ONG, CAR	short term
	Development of indicators for state assessment populations in the Department.		

knowledge, for their conservation. In addition, it wants to implement a model that allows the species and its threats to be monitored over time.

Table 1. Summary table of Policy 1: Development of an information system to monitor the population states of the species.

The definition of the second policy, establishment of an education program Environmental to increase information on the existence and threats of the species in the Department (see Table 12), aims to respond to conservation effective of the species, from the extension of the basic knowledge necessary to build a conception of respect and understanding for the species and its current ecological



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realities. It also aims to structure processes of cognitive in which the community is linked from their knowledge and understanding of the specific realities of the areas, in the investigation and monitoring of the populations of the Macaw.

Table 2. Summary table of Policy 2: Establishment of a program of environmental education to increase information on the existence and threats of the species in the Department.

Policy 2. Establishment of an environmental education program for increase information on the existence and threats of the species in the Department.			
Action	Activities	stakeholder	Timeplace
Provide communities present in the areas of current distribution and probable knowledge about the species and the importance of your presence in the area	Conduct workshops awareness in communities with presence of the macaw on the Ecological importance and species aesthetics Also about their threats.	Universidad de La Guajira, ONG, CAR	short term
	Create and distribute Information Practice (posters) in the which is the species and the plan to the community.		
	Disseminate the status of the species and the action plan in Massive media		
Extend information about the species and its limiting resources, in higher levels influence on making decisions (owners land and administrators) in areas with presence of these.	Develop close-ups of awareness in union sectors of agriculture and livestock	Universidad de La Guajira, ONG, CAR	short term
Establish schemes immersed training in formal education, in the municipal order and departmental, for the recognition of the kind of like a Need to conservation	Incorporate module threatened species in PRAES Create in institutions study groups in wild life threatened Train teachers in life conservation wild to give continuity to institutional processes	Universidad de La Guajira, ONG, CAR	short term

Through the third policy, conservation of the Amazon eagle through population and in-situ and ex-situ management (see Table 3), we want to generate practical tools to conserve the species in the



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department, to through the protection and improvement of their habitats and limiting resources. It is also sought with this, to give continuity to the development of ex-situ conservation, which are connected with the maintenance of the state of the populations of the department.

Policy 3. Conservation of the Amazon eagle through the protection and on-site and ex-site management.

Action	Activities	stakeholder	Timeplace
Determination and prioritization of areas keys to conservation of species.	Status study conservation of areas with the presence of macaws	Universidad de La Guajira, ONG, CAR	short term
	Identification of areas key to conservation of kind in the Department		
	Structuring of priority schemes for conservation in areas of interest		
Development of criteria Conservation and management of habitats.	Establishment of mechanisms and lines of action for conservation of natural areas of interest to the species.	Universidad de La Guajira, ONG, CAR	short term
	Development of criteria conservation and management of limiting resources in production systems		
Protocol development individual management confiscated.	Establishment of manuals for the treatment of individuals confiscated	Universidad de La Guajira, ONG, CAR	short term
Protocol development captive breeding and reintroduction of individuals.	Development of a manual captive breeding the species for	Universidad de La Guajira, ONG, CAR	short term



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	Zoos		
	Experiments in reintroduction of individuals in between natural (including restored media		
Programs of restoration of habitat and resources limitations in areas of interest.	Proyecto de nidos artificiales	Universidad de La Guajira, ONG, CAR	short term
	Repoblación vegetal con especies		

The fourth policy, strengthening institutional capacity for the development of the action plan (see Table 4), ultimately seeks to provide and develop spaces in which institutional actors can pool their efforts, according to its possibilities, to effectively advance the action plan for the conservation of *Spizaetus isidori* throughout the department.

Table 4. Summary table of Policy 4: Capacity building institutional for the development of the action plan.

Policy 4. Capacity building institutional for the development of the action plan.			
Action	Activities	stakeholder	Timeplace
Development of agreements interagency for developing actions conservation and flat study specific plan action	Project development sets in handling habitats	Universidad de La Guajira, ONG, CAR	short term
	Regulation and agreement on forms of intervention in the habitats		
	Joint programs dissemination, monitoring and implementation of the plan		



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<p>Organization of a network Inter-institutional of monitoring the plan action for the species.</p>	<p>Establishment and improvement of indicator system Development of a system monitoring and self-assessment of development of the plan action, focused on feedback and adjust policies, actions and strategies.</p>	<p>Universidad de La Guajira, ONG, CAR</p>	<p>short term</p>
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CONCLUSIONS AND RECOMMENDATIONS

The Amazon eagle, in the RFP, is threatened under the category IUCN Regional; EN b1ab (iii) (In danger for presenting an extension of presence less than 5000 km², with severely fragmented populations and with a loss of extension and habitat quality continuous in the time that must to the interventions of the territory).

The distribution of the Amazon eagle (*Spizaetus isidori*) in the RFP Montes de Oca, depends on the supply and distribution of the resources it requires, specifically palm stumps to establish their nests and food sources. The presence of the species in wooded areas was associated with the areas that Palm stumps and food sources were present. Limiting resources for the species are extremely located and isolated, causing populations of the species to keep fragmented. The fragmentation, isolation and specific location of the population increases the possibility of aggravating its conservation status due to interspecific interactions, illegal hunting and trade.

The main cause of problems that define threats to the species are inadequate cultural practices in the intervention of the territory. The strongest threat that the species has in the department is the fragmentation of their populations, caused among others, by interactions inter-specific, hunting and trade, and habitat loss.

Lack of knowledge about the species, its threats and ecological importance, can increase the levels of threat that the species has in the present.

The methodology used in this study was adequate to comply with the objectives formulated. The conservation of the Amazon eagle depends on the will to cooperate in the multiple actors that make or will be part of the extinction processes or conservation of the species. The methodological protocol proposed in this study is open to other Subsequent information that may feed into the results obtained. The execution of the



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conservation plan for the Amazon eagle (*Spizaetus isidori*) is a priority in the department of La Guajira. Work at local levels is a way of intervening in the instances national or global, which is shown as a convenient approach to resolution of environmental problems from management proposals.

RECOMMENDATIONS

In-depth research into relationships is required ecological, habitat use and distribution of the species in the department. It is important to extend the limits of this study in your regional context, to better understand the realities of the species and define a conservation status at the eco-region level.

For the conservation of the species in the department, it is proposed as urgent, defining meeting points between the different actors who have to do with the development of the action plan. The constitution of a working group on regionally threatened species, It will be a very important space for the redefinition of threat levels and the establishment of conservation plans for unknown and rare species. Extending programs is recommended as a priority for conservation environmental education, training and mass dissemination about the ecological goods and services offered by the Macaw. It is recommended to include the Macaw, as a priority species for institutional conservation actions in the department.

It is necessary to strengthen the work of dissemination and collection of information through of environmental institutions and different actors of the Department, such as the Umatas, the NGOs, the Universities among others. The captive breeding research programs of the species, in order to be able to advance in natural repopulation programs and reintroduction. A good way to extend the scope

of the regional conservation program of species, is through inter-institutional cooperation agreements with research centers, conservation organizations, groups community and universities. The comprehensive conservation of the Amazon eagle it depends on the way in which, in a single practical vision, the different disciplines that make up conservation science.

The University of La Guajira, through its Environmental Engineering programs, Social Work and Biology, must commit to the development of projects specific in the processes of investigation and management of threatened species and especially of the Amazon eagle .

It is pertinent to establish a management group for the conservation of the biodiversity at the University of La Guajira, in which new approaches to address the conservation of threatened species contexts local, regional and national. A very effective way to sensitize the community to the importance to conserve the species and its habitats, is to develop an ecotourism program that has as its destination, the observation of macaws in their environments natural.

It is recommended as a priority, that awareness campaigns and education, develop on proposals for mass dissemination such as posters, mass media and surveys. It is recommended to extend the vision of regional work to other disciplines that, from their specific work, they can help intervene problems established in levels more general.

Given the acceptance of the project and the current conditions of conservation of the forests of the Montes de Oca Protected Forest Reserve, can be defined this area as a suitable



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site for developing short-term actions research, closely linked to conservation activities through community and civil society organizations.

Sampling and event logging should continue, not only in the study area but expand to other areas to have a real balance of the status of populations in the department and migratory activities. It is recommended to do a stool study to find out if the psittacines may have a seed dispersal role for some plant species. Point that can be taken into account for reforestation plans.

It was imperative to identify among the birds eating the juveniles, to know when they start to feed themselves and even when they accompany the parents to feed.

BIBLIOGRAPHY

- Arenas, D. (2011) Aporte al conocimiento de la biología reproductiva del Periquito Aliamarillo (*Pyrrhura calliptera*) en los bosques altoandinos de Mundo Nuevo, La Calera, Colombia. *Conservación Colombiana* 14: 58–70.
- Arndt, T. (2008) Anmerkungen zu einigen *Pyrrhura*-Formen mit der Beschreibung einer neuen Art und zweier neuer Unterarten. *Papageien* 8: 278–286.
- AVHRR Global Land Cover Facility (2000) Global Land Survey. Downloaded from <http://glcf.umiacs.umd.edu/data/landcover/>
- Bejarano–Bonilla, D.A. (2009) Uso de saladeros artificiales por el Lorito Cadillero (*Bolborhynchus ferrugineifrons*) en los Andes colombianos. *Ornitología Neotropical* 20: 1–5.
- Bejarano–Bonilla, D.A. & Jiménez–Bonilla, A.M. (2009) Primer registro de sitio dormidero para una colonia de Lorito Cadillero, *Bolborhynchus ferrugineifrons*, y algunas observaciones ecológicas y comportamentales. *Revista de la Academia Colombiana de Ciencias XXXIII*: 297–302.
- BioMap (2006) Base de datos Darwin–Hernández Proyecto BioMap: base de datos



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- de distribución de la avifauna Colombiana. Disponible en <http://www.biomap.net> [descargado el 3 de diciembre de 2009].
- BirdLife International (2009a) Species factsheet: *Ara ambiguus*. Disponible en <http://www.birdlife.org> [descargado el 27 de noviembre de 2009].
 - BirdLife International (2009b) Species factsheet: *Ara militaris*. Disponible en <http://www.birdlife.org> [descargado el 27 de noviembre de 2009].
 - BirdLife International (2009c) Species factsheet: *Bolborhynchus ferrugineifrons*. Disponible en <http://www.birdlife.org> [descargado el 21 de octubre de 2009].
 - BirdLife International (2009d) Species factsheet: *Hapalopsittaca amazonina*. Disponible en <http://www.birdlife.org> [descargado el 16 de octubre de 2009].
 - BirdLife International (2009e) Species factsheet: *Hapalopsittaca fuertesi*. Disponible en <http://www.birdlife.org> [descargado el 16 de octubre de 2009].
 - BirdLife International (2009f) Species factsheet: *Leptosittaca branickii*. Disponible en <http://www.birdlife.org> [descargado el 19 de octubre de 2009].
 - BirdLife International (2009g) Species factsheet: *Ognorhynchus icterotis*. Disponible en <http://www.birdlife.org> [descargado el 19 de octubre de 2009].
 - BirdLife International (2009h) Species factsheet: *Pyrrhura picta*. Disponible en <http://www.birdlife.org> [descargado el 19 de octubre de 2009].
 - BirdLife International (2009i) Species factsheet: *Pyrrhura calliptera*. Disponible en <http://www.birdlife.org> [descargado el 19 de octubre de 2009].
 - BirdLife International (2009j) Species factsheet: *Pyrrhura melanura*. Disponible en <http://www.birdlife.org> [descargado el 19 de octubre de 2009].
 - BirdLife International (2009k) Species factsheet: *Pyrrhura viridicata*. Disponible en <http://www.birdlife.org> [descargado el 19 de octubre de 2009].
 - BirdLife International (2009l) Species factsheet: *Pyrrhura pulchra*. Disponible en <http://www.birdlife.org> [descargado el 19 de octubre de 2009].
 - BirdLife International (2009m) Species factsheet: *Pyrrhura pyrrhura*. Disponible en <http://www.birdlife.org> [descargado el 19 de octubre de 2009].



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June 01, 2020

- BirdLife International (2009n) Species factsheet: Touit stictopterus. Disponible en <http://www.birdlife.org> [descargado el 19 de octubre de 2009].
- Botero–Delgadillo, E., Verhelst, J.C. & Páez, C. A. (2010) Ecología de forrajeo del Periquito de Santa Marta (*Pyrrhura viridicata*) en la cuchilla de San Lorenzo, Sierra Nevada de Santa Marta. *Ornitología Neotropical* 21: 463-477.
- Botero–Delgadillo, E. & Verhelst, J.C. (2011a) Caracterización del hábitat del Periquito de Santa Marta (*Pyrrhura viridicata*): Una aproximación a la vegetación de la Reserva Natural El Dorado. *Conservación Colombiana* 14: 28–37.
- Botero–Delgadillo, E. & Verhelst, J.C. (2011b) Uso de hábitat del Periquito de Santa Marta (*Pyrrhura viridicata*) y sus variaciones espacio–temporales en la cuchilla de San Lorenzo, Sierra Nevada de Santa Marta. *Conservación Colombiana* 14: 17–27.
- Botero–Delgadillo, E. & Calos Andrés Paéz. (2011c) Estado actual del conocimiento y conservación de los loros amenazados en Colombia. *Conservación Colombiana* 14: 86-151.
- Chapman, A.D. (2005) Principles of data quality, version 1.0. Report of the Global Biodiversity Information Facility. Copenhagen.
- Cuervo, A.M. & Toro, J.L. (2002) *Pionopsitta pyralia*. Págs. 221–225 en Renjifo, L.M., Franco–Maya, A.M., Amaya–Espinel, J.D., Kattan, G.H. & López–Lanús, B. (eds.) Libro rojo de aves de Colombia. Instituto de Investigación de Recursos Biológicos Alexander von Humboldt & Ministerio del Medio Ambiente. Bogotá.
- DatAves (2006) Base de datos. RNOA, cedida por la SAO, modificada al RRBB. Colombia – IAvH – SIB. 2005. Disponible en <http://www.rnoa.org/dataves> [Descargado el 3 de diciembre de 2009].
- De La Zerda, S. & Rosselli, L. (2002) *Pyrrhura viridicata*. Págs. 187–191 en Renjifo, L.M., Franco–Maya, A.M., Amaya–Espinel, J.D., Kattan, G.H. & López–Lanús, B. (eds.) Libro rojo de aves de Colombia. Instituto de Investigación de Recursos Biológicos Alexander von Humboldt & Ministerio del Medio Ambiente. Bogotá.
- Donegan, T.M. & Huertas, B. (eds.) (2005) Threatened Species of Serranía de Los Yariquíes: Final Report. Colombian EBA Project Report Series 5. Informe interno, Fundación ProAves. Bogotá.



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June 01, 2020

- Donegan, T.M., Avendaño, J.E., Briceño, E.R. & Huertas, B.C. (2007) Bird range extensions with taxonomic and ecological notes from Serranía de Los Yariguíes, Colombia's new National Park. *Bulletin of the British Ornithologists' Club* 127: 172–213.
- Dugand, A. (1945) Notas ornitológicas colombianas I. *Caldasia* 3: 337–341.
Espinosa, R. (2006) Ecología del Lorito Cadillero *Bolborhynchus ferrugineifrons* en el Parque Nacional Natural Los Nevados y zonas aledañas. Tesis de pregrado. Universidad de Caldas. Manizales.
- ESRI (2008) ArcGIS Version 9.3 for Windows. Environmental Systems Research Institute. Redlands.
- Franco, A.M. & Bravo, G. (2005) Áreas importantes para la conservación de las aves en Colombia. Págs. 117–281 en *Áreas de Importancia para la Conservación de las Aves en los Andes Tropicales: Sitios Prioritarios para la Conservación de la Biodiversidad*. Serie de conservación de BirdLife No. 14. BirdLife International. Quito.
- Forshaw, J.M. (1978) *Parrots of the world*, Second Edition. Lansdowne Press. Melbourne
- Graves, G.R. & Giraldo, J.A. (1987) Population status of the Rufous-fronted Eagle (*Bolborhynchus ferrugineifrons*), a Colombian endemic. *LeGerfaut* 77: 89–92.
- Hijmans, R.J., Schreuder, M., De la Cruz, J. & Guarino, L. (1999). Using GIS to check co-ordinates of genebank accessions. *Genetic resources and crop evolution* 46: 261–296.
- Hijmans, R.J., Cameron, S.E., Parra, J.L., Jones, P. & Jarvis, A. (2005) Very high resolution interpolated climate surfaces for global land areas. *International Journal of Climatology* 25: 1965–1978.
- Hijmans, R.J., Cruz, M.E. & Guarino, L. (2006) DIVA-GIS (version 5.4). Free mapping Program. Disponible en <http://www.diva-gis.org> [descargado el 18 de marzo de 2009].
- Hilty, S.L. & Brown, W. (1986) *A Guide to the Birds of Colombia*. Princeton University Press. New Jersey.
- Joseph, L. & Stockwell, D. (2002) Climatic modeling of the distribution of some *Pyrrhura* eagle s of Northwestern South America with notes on their systematics and special reference to *Pyrrhura caeruleiceps* Todd, 1947. *Ornitología Neotropical* 13: 1–8.



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June 01, 2020

- Krabbe, N., Flórez, P., Suárez, G., Castaño, J., Arango, J.D. & Duque, A. (2006) The birds of Páramo Frontino, West Andes of Colombia. *Ornitología Colombiana* 4: 39–50.
- Juniper, T. & Parr, M. (1998) *Parrots: A guide to the Parrots of the World*. Pica Press. Sussex.
- López-Lanús, B. & Salaman, P.G.W. (2002) *Ognorhynchus icterotis*. Págs. 198–202 en Renjifo, L.M., Franco–Maya, A.M., Amaya–Espinell, J.D., Kattan, G.H. & López-Lanús, B. (eds.) *Libro rojo de aves de Colombia*. Instituto de Investigación de Recursos Biológicos Alexander von Humboldt & Ministerio del Medio Ambiente. Bogotá.
- Monge, G., Chassot, O., Cháves, H., Rodríguez, J.E., Gutiérrez–Espeleta, G., Traylor–Holzer, K. & Matamoros, Y. (eds.) (2009) *Taller de Conservación de la Guacamaya Verde (Ara ambiguus): Evaluación de Viabilidad Poblacional y de Hábitat (PHVA)*. Informe Final, 22 al 26 de septiembre de 2008. Estación Biológica La Selva Heredia, Costa Rica. *Memorias del Taller de conservación de la Guacamaya Verde (Ara ambiguus)*.
- Murcia–Nova, M.A., Beltrán–Alvarado, D. & Carvajal–Rojas, L. (2009) Un nuevo registro del Loro Orejiamarillo (*Ognorhynchus icterotis*: Psittacidae) en la cordillera Oriental colombiana. *Ornitología Colombiana* 8: 94–99.
- Quevedo–Gil, A. (2006) Plan de acción nacional para los loros amenazados de Colombia: una iniciativa para garantizar la conservación de nuestros loros. *Conservación Colombiana* 1: 58–66.
- Pearson, R.G., Raxworthy, C.J., Nakamura, M. & Peterson, A.T. (2007). Predicting species distributions from small numbers of occurrence records: a test case using cryptic geckos in Madagascar. *Journal of Biogeography* 34: 102–117.
- Phillips, S.J., Anderson, R.P. & Schapire, R.E. (2006) Maximum entropy modeling of species geographic distributions. *Ecological Modelling* 190: 231–259.
- Phillips, S.J. & Dudik, M. (2008) Modeling of species distributions with Maxent: new extensions and a comprehensive evaluation. *Ecography* 31: 161–175.
- Remsen Jr., J.V., Cadena, C.D., Jaramillo, A., Nores, M., Pacheco, J.F., Robbins, M.B., Schulenberg, T.S., Stiles, F.G., Stotz, D.F. & Zimmer, K.J. (2009) A classification of the bird species of South America. American Ornithologists' Union. Disponible en http://www.museum.lsu.edu/~Remsen/SA_CCBaseline.html [descargado el 19 de octubre de 2009].



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June 01, 2020

- Renjifo, L.M. (2002a) *Hapalopsittaca amazonina*. Págs. 226–229 en Renjifo, L.M., Franco–Maya, A.M., Amaya–Espinel, J.D., Kattan, G.H. & López–Lanús, B. (eds.) Libro rojo de aves de Colombia. Instituto de Investigación de Recursos Biológicos Alexander von Humboldt & Ministerio del Medio Ambiente. Bogotá.
- Renjifo, L.M. (2002b) *Hapalopsittaca fuertesi*. Págs. 226–229 en Renjifo, L.M., Franco–Maya, A.M., Amaya–Espinel, J.D., Kattan, G.H. & López–Lanús, B. (eds.) Libro rojo de aves de Colombia. Instituto de Investigación de Recursos Biológicos Alexander von Humboldt & Ministerio del Medio Ambiente. Bogotá.
- Renjifo, L.M., Franco–Maya, A.M., Álvarez, H., Álvarez, M., Borja, R., Botero, J.E., Córdoba, S., De la Zerda, S., Didier, G., Estela, F., Kattan, G., Londoño, E., Márquez, C., Montenegro, M.I., Murcia, C., Rodríguez–Mahecha, J.V., Samper, C. & Weber, W.H. (2001) Estrategia para la Conservación de las Aves de Colombia. Instituto de Investigación de Recursos Biológicos Alexander von Humboldt. Bogotá.
- Renjifo, L.M., Franco–Maya, A.M., Amaya–Espinel, J.D., Kattan, G.H. & López–Lanús, B. (eds.) (2002) Libro rojo de aves de Colombia. Instituto de Investigación de Recursos Biológicos Alexander von Humboldt & Ministerio del Medio Ambiente. Bogotá.
- Renjifo, L.M., Arango–Caro, S. & Gómez, M.F. (2002b) *Leptosittaca branickii*. Págs. 192–197 en Renjifo, L.M., Franco–Maya, A.M., Amaya–Espinel, J.D., Kattan, G.H. & López–Lanús, B. (eds.) Libro rojo de aves de Colombia. Instituto de Investigación de Recursos Biológicos Alexander von Humboldt & Ministerio del Medio Ambiente. Bogotá.
- Restall, R., Rodner, C. & Lentino M. (2006) *Birds of Northern South America: An Identification Guide*. Yale University Press. New Haven.
- Restrepo Calle Sebastian, 2004. *Conservación Integral de la Guacamaya cariseca (Ara castaneifrons) en le valle del Cauca*. Tesis de grado, Programa de admon ambiental y ciencias básicas, Universidad Autónoma de Occidente. Cali. 106 p.
- Ricketts, T.H., Dinerstein, E., Brooks, T.M., Butchart, H.M., Hoffman, M., Lamoreux, J., Morrison, J., Parr, M., Pilgrim, J.D., Rodrigues, A.S.L., Sechrest, W.,



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June 01, 2020

- Wallace, G.E., Berlin, K., Bielby, J., Burgess, N.D., Church, D.R., Cox, N., Knox, D., Loucks, C., Luck, G.W., Master, L.L., Moore, R., Naidoo, R., Ridgely, R., Schatz, G.E., Shire, G., Strand, H., Wettengel, W. & Wikramanayake, E. E. (2005) Pinpointing and preventing imminent extinctions. *Proceedings of the National Academy of Sciences* 51:18497–18501.
- Ridgely, R. S. & Greenfield, P.J. (2001) *The Birds of Ecuador, Vol. 2: Status, Distribution and Taxonomy*. Cornell University Press. New York.
 - Rodrigues, S.L., Andelman, S.J., Bakarr, M.I., Boitani, L., Brooks, T., Cowling, R.M., Fishpool, L.D.C., da Fonseca, G.A.B., Gaston, K.J., Hoffman, M., Long, J., Marquet, P.A., Pilgrim, J.D., Pressey, R.L., Schipper, J., Sechrest, W., Stuart, S.N., Underhill, L.G., Waller, R.W., Watts, M.E.J., Yan, X. (2003) *Global Gap Analysis: Towards a Representative Network of Protected Areas*. *Advances in Applied Biodiversity Science* No. 5. Conservation International. Washington D.C.
 - Rodríguez–Mahecha, J.V. (2002a) *Ara ambiguus*. Págs. 207–209 en Renjifo, L.M., Franco–Maya, A.M., Amaya–Espinell, J.D., Kattan, G.H. & López–Lanús, B. (eds.) *Libro rojo de aves de Colombia*. Instituto de Investigación de Recursos Biológicos Alexander von Humboldt & Ministerio del Medio Ambiente. Bogotá.
 - Rodríguez–Mahecha, J.V. (2002b) *Ara militaris*. Págs. 203–206 en Renjifo, L.M., Franco–Maya, A.M., Amaya–Espinell, J.D., Kattan, G.H. & López–Lanús, B. (eds.) *Libro rojo de aves de Colombia*. Instituto de Investigación de Recursos Biológicos Alexander von Humboldt & Ministerio del Medio Ambiente. Bogotá.
 - Rodríguez–Mahecha, J.V. & Hernández–Camacho, J.I. (2002) *Loros de Colombia*. Conservación Internacional. Bogotá.
 - Rodríguez–Mahecha, J.V. & Renjifo, L.M. (2002) *Pyrrhura viridicata*. Págs. 184–186 en Renjifo, L.M., Franco–Maya, A.M., Amaya–Espinell, J.D., Kattan, G.H. & López–Lanús, B. (eds.) *Libro rojo de aves de Colombia*. Instituto de Investigación de Recursos Biológicos Alexander von Humboldt y Ministerio del Medio Ambiente. Bogotá.
 - Rodríguez–Mahecha, J.V. & Renjifo, L.M. (2002b) *Touit stictopterus*. Págs. 218–220 en Renjifo, L.M., Franco–Maya, A.M., Amaya–Espinell, J.D., Kattan, G.H. & López–Lanús, B. (eds.) *Libro rojo de aves de Colombia*. Instituto de Investigación de Recursos Biológicos Alexander von Humboldt & Ministerio del Medio Ambiente. Bogotá.



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June 01, 2020

- Salaman, P.G.W. & Donegan, T.M. (eds.) (2001) Presenting the first biological assessment of Serrania de San Lucas, 1999–2001. Colombian EBA Project Report Series 3. Informe interno, Fundación ProAves. Bogotá.
- Salaman, P., Quevedo, A. & Verhelst, J.C. (2007) Proyecto Loro Orejiamarillo: una iniciativa de conservación. *Conservación Colombiana* 2: 7–11.
- Stattersfield, J.A., Crosby, M.J., Long, A.J. & Wege, D.C. (1998) *Endemic Bird Areas of the World: Priorities for Biodiversity Conservation*. The Burlington Press Ltd. Cambridge.
- Stiles, F.G. (1998) Las aves endémicas de Colombia. Págs. 378–385 y 428–432 en Chaves, M.E. & Arango, N. (eds.). Informe Nacional sobre el Estado de la Diversidad Colombia 1997. Instituto de Investigación de Recursos Biológicos Alexander von Humboldt, PNUMA, Ministerio del Medio Ambiente. Bogotá.
- Tovar, A.E. (2006) *Biología reproductiva del Loro Coroniazul *Hapalopsittaca fuertesi* (Chapman, 1912) en los bosques altoandinos del municipio de Génova, Quindío–Colombia*. Tesis de Pregrado, U. Distrital Francisco José de Caldas, Bogotá.
- Tovar–Martínez, A.E. (2009a) Crecimiento y desarrollo del plumaje en pichones de la Cotorra Aliazul (*Hapalopsittaca fuertesi*) en la cordillera Central colombiana. *Ornitología Colombiana* 8: 5–18.
- Tovar–Martínez, A.E. (2009b) Parámetros reproductivos y anidación de la Cotorra Aliazul (*Hapalopsittaca fuertesi*) en cavidades artificiales. *Ornitología Neotropical* 20: 557–568.
- Vaughan, I.P. & Ormerod, S.J. (2005). The continuing challenges of testing species distribution models. *Journal of Applied Ecology* 42: 720–730.
- Velázquez–Tibatá, J.I. & Salaman, P (eds.) (2003) Proyecto Loro Multicolor: a one year journey. Informe interno, Fundación ProAves. Bogotá.
- Velázquez–Tibatá, J. I., Espinosa, R., Mayorquín, A., Mora, J., Osorno, N., Quimbayo, M.I., Quevedo, A. & Silva, N. (2003) Proyecto *Hapalopsittaca*: The study and conservation of two endangered parrots in the Oak forests of Colombian Andes. Informe interno, Fundación ProAves. Bogotá.
- Velásquez–Tibatá, J.I. & López–Arévalo, H.F. (2006) Análisis de omisiones y prioridades de conservación para loros amenazados de Colombia. *Conservación Colombiana* 1: 58–66.



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Version 3

June 01, 2020

- Verhelst, J.C., Pfeifer, A.M., Orrego, O. & Botero, J.E. (2002) Observaciones sobre la ecología del Periquito Frentirrufo *Bolborhynchus ferrugineifrons* en las zonas cercanas a la Laguna del Otún. *Cotinga* 18:66–70.
- Verhelst, J.C. & Renjifo, L.M. (2002) *Bolborhynchus ferrugineifrons*. Págs. 210–217 en Renjifo, L.M., Franco–Maya, A.M., Amaya–Espinel, J.D., Kattan, G.H. & López–Lanús, B. (eds.) Libro rojo de aves de Colombia. Instituto de Investigación de Recursos Biológicos Alexander von Humboldt & Ministerio del Medio Ambiente.