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Distribution of the Orange-winged Parrot *Amazona amazonica* (Linnaeus, 1766) (Aves, Psittacidae) in the coastal region of the State of Paraíba, Brazil

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ABSTRACT. Fifty-six villages along the coast of the State of Paraíba, Brazil, were visited to determine and map the occurrence of *Amazona amazonica* (Linnaeus, 1766). Search was conducted with binoculars and the residents of each locality were interviewed using a questionnaire to obtain information about the occurrence and species´s biological data. Reports of recent and old occurrences, absence and feeding areas were registered. The food items mentioned were fruits, such as cashew, cashew nuts, palm oil, and agricultural products, such as corn. The reproductive period occurred between November and December. Breeding sites were mangrove areas and coconut trees, with nests being made in tree hollows. Questionnaires helped to elaborate a distribution map of the species, in which the actual distribution was based on visual records, whilst the potential distribution of the species was based on the questionnaire answers. Furthermore, they provided an overview of the biology of the species in agreement with that reported in the literature. Current data may be used in future studies on the conservation of the species in the State of Paraíba.

Keywords: conservation, curica, distribution map, questionnaires, reproduction.

Distribuição do papagaio-do-mangue *Amazona amazonica* (Linnaeus, 1766) (Aves, Psittacidae) na região costeira do Estado da Paraíba, Brasil

RESUMO. Cinquenta e seis localidades foram visitadas ao longo da região costeira da Paraíba visando conhecer a distribuição de papagaio-do-mangue (Linnaeus, 1766) nessa região do Estado. Foram realizadas buscas ativas com auxílio de binóculos e aplicado um questionário aos moradores de cada localidade com perguntas sobre a ocorrência e dados biológicos da espécie. Foram discriminados relatos de ocorrência recente, antiga, ausência e áreas de alimentação. Os itens alimentares citados foram frutas como caju, castanha do caju, dendê, e produtos agrícolas como o milho verde. A época reprodutiva foi descrita entre os meses de novembro e dezembro. Locais de reprodução foram áreas de manguezal e coqueirais, com os ninhos sendo feitos em ocos de árvores. Os questionários possibilitaram a elaboração de um mapa de distribuição da espécie, com a distribuição real sendo aquela baseada em registros visuais e a distribuição potencial da espécie aquela baseada nos relatos; assim como a formação de um panorama geral da biologia da espécie, estando estes de acordo com a literatura. Os dados obtidos neste trabalho podem servir de subsídio para futuros trabalhos conservacionistas com a espécie no Estado.

Palavras-chave: conservação, curica, mapa de distribuição, questionários, reprodução.

Introduction

Brazil ranks first in harboring the greatest diversity of Psittacids in the world (SICK, 1997). Most Psittacids are gregarious (JUNIPER; PARR, 1998), living in flocks formed by two or even hundreds of specimens (ROCHA et al., 1988). Psittacids are facing threats worldwide especially due to the illegal pet trade and habitat loss, considered the main factors that increase parrots´ danger of extinction (JUNIPER; PARR, 1998; SICK, 1997). Further, parrots also present low reproductive rates, low survival rate of nestlings and fledglings, and late sexual maturity (WRIGHT et al., 2001).

The reproductive cycle and the availability of resources are also factors that contribute towards variations in the size and in the composition of groups such as the genus *Amazona* throughout the year (JUNIPER; PARR, 1998; PIZO, 2002). *Amazona amazonica* feeds on various types of fruits, e.g. the fruits from the urucurana tree (*Sloanea sp.*), and on flowers, e.g. *Erythrina* sp. (DEL HOYO et al., 1994; SICK, 1997; JUNIPER; PARR, 1998). The species occurs in lowlands, primarily in floodplain forests, gallery forest, edges of rainforests and mangroves (DEL HOYO et al., 1994). They also inhabit flooded islands in large rivers, where they generally roost on the forest canopy (SICK, 1997). According to Saiki et al. (2009), parrots are the main Pscittacines widely hunted for the illegal pet trade. *Amazona amazonica*, for example, ranks fourth on the list of parrots seized by IBAMA (Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis) (PAGANO et al., 2009). Their place on this list also reflects their similarity to *Amazona aestiva* (Linneaus, 1758). The species is smaller (31 versus 37 cm) and presents an orange-colored area on its wings, which differs from the red patch on the wings of *A. aestiva* (SICK, 1997). In the illegal trade they are considered the same species with the same vocalization skills as the former.

There are few known records of *A. amazonica* in the State of Paraíba in spite of its listing in a book on the birds of Paraíba by Schulz-Neto (1995) and its register at the Reserva Biológica Guaribas in the area known as SEMA 2 in the town of Mamanguape (ALMEIDA; TEIXEIRA, 2010). The species lacks studies and its situation in the state of Paraíba remains unknown. Current study maps the geographic distribution of *A. amazonica* on the coastal region of the State of Paraíba by using questionnaires and visual records. It also aims at obtaining information on the bird´s population fluctuations in the investigated municipalities and its biological information, such as reproduction and feeding data, by the above-mentioned interviews.

Material and methods

The State of Paraíba (7º14'S; 36º46'W) lies in the northeastern region of Brazil (MOREIRA, 1985). Current study was conducted on the coast area of the state, characterized by a predominantly hot and humid climate. Average annual temperatures range between 24 and 27°C, with average rainfall between 900 and 1,800 mm year^{-1} and relative humidity at 80%. The humid conditions prevailing in this region foster a diverse array of vegetation types, such as floodplain fields, mangroves, salt marshes, savannas and beaches (LIMA; MELO, 1985). These conditions characterize one of the forest types present on the coast region of the State of Paraíba, or rather, the Atlantic Rain Forest, basically represented by the Semidecidual Seasonal Forest (IBGE 1992).

Seven expeditions, covering 56 locations and comprising interviews with questionnaires, were undertaken from September 2010 to June 2011 to map the occurrence of the species on the coast area of the State of Paraíba. Interviews were conducted with randomly chosen residents in each location. Preference was given to people living for a long time in the locality, to whom were applied the same pre-established questionnaire with 32 closed and open-ended questions. The questionnaire covered specific questions on the studied species, with special reference to its occurrence (recent, old or no record), the fluctuation of the species population over the years and possible causes of the variation, as well as questions about its biology, regarding feeding areas, food items and reproduction.

So that residents' reports on the occurrence of *A. amazonica* could be authenticated, pictures and vocalizations of two parrot species (*A. amazonica* and *Diopsittaca nobilis* (Linnaeus, 1758) were presented to the interviewees. The species *D. nobilis* was chosen during the interviews because it is a common parrot in the region and easily confused with the target species of current study. Thus, the authors were able to assess reliability reports and validate species-specific information obtained during the interviews.

Random and casual visual observations of populations of *A. amazonica* were endeavored during the expeditions in the proximities of the places where the interviews were held. The authors used 8 x 40 mm and 10 x 50 mm binoculars during the visual observations. Observations were conducted from 4:00 to 5:30pm, when the specimens commonly move toward the roosting areas.

Geographical coordinates by Garmin GPS were assigned to the places reported by the interviewees as well as to the places where *A. amazonica* was observed. ArcGIS 10.1 was employed to construct the species´s map of occurrence within the study area, using actual records obtained through visual observations and potential records obtained through questionnaires on the areas of probable occurrence of the species.

Results

In general, 90% of the records obtained through interviews were characterized as old and recent reports. The remaining 10% of records were visual. The interviews conducted along the coast region of Paraíba, together with the visual observations, made it possible to elaborate a map of the occurrence and feeding areas of *A. amazonica* on the coast area of the State of Paraíba (Figure 1).

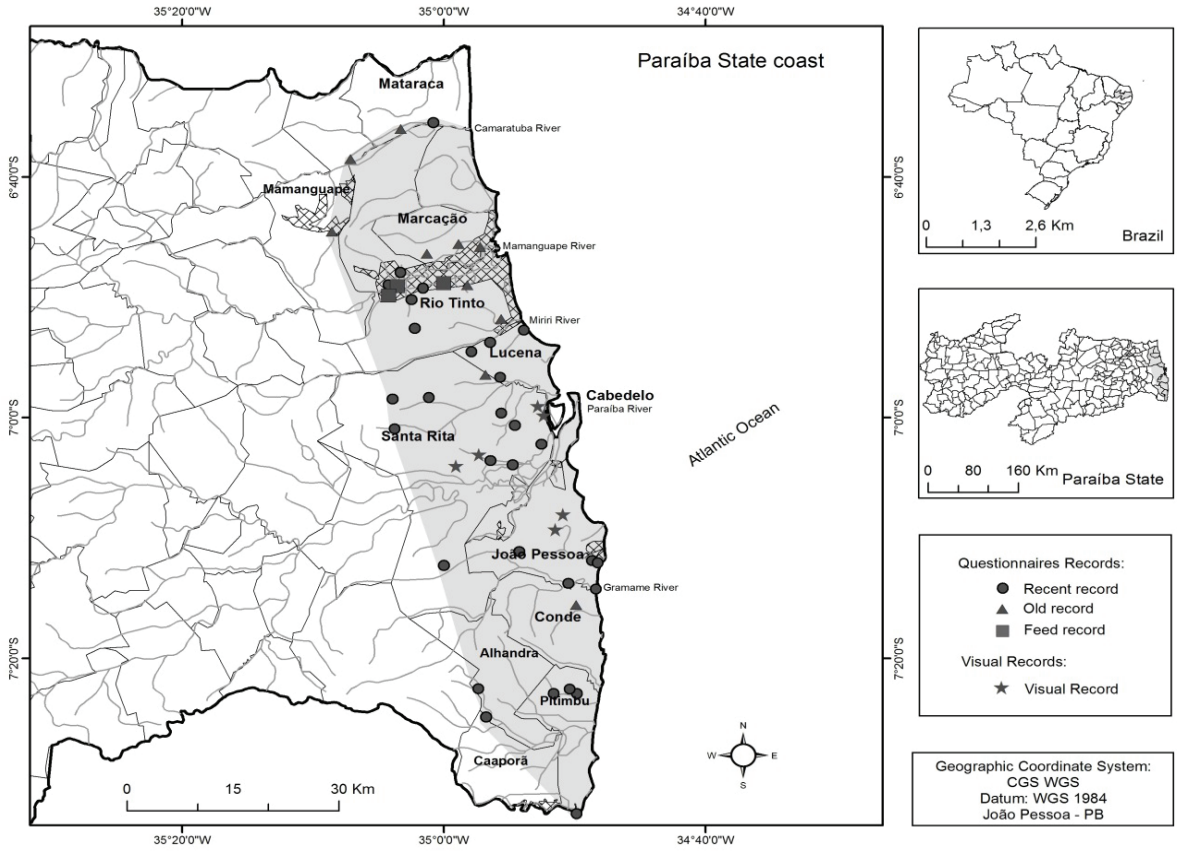

Figure 1. Distribution map of *Amazona amazonica* on the coast region of the State of Paraiba. The records are divided into records reported in questionnaires (recent, old and feeding areas) and visual records obtained by the authors. Grid areas represent conservation units.

Eighty-seven interviews were conducted along the coast region of the State of Paraíba. The localities with the highest numbers of interviews were Barra de Gramame, Cravaçú, Taberaba, Guaxinduba and Brejinho (24% of questionnaires). Most records (74%) were recent reports in which respondents had seen the parrot from up to one year previously until a few hours prior to the actual interview. Reports from old records (20%) were considered those that occurred at least two or more years before. Interviewees reported that the occurrence of this species had decreased over time due to deforestation (90%) and hunting (10%). The localities where there were no reports of the species represented 6%, while those with reports of feeding activity represented 5%.

The localities with old records were Barra de Mamanguape, Tavares, Praia de Campina, Aldeia Três Rios, Reserva Biológica Guaribas, Camaratuba, Brejinho, Mataraca, Guaxinduba and Aldeia Jaraguá. Localities with no records were Saco, Tanques, Campo Verde and Tambaba. The feeding areas reported were Taberaba, Caraúba and Aritingui.

Records of feeding areas referred to places where interviewees observed specimens feeding on various items. The main food items cited by local residents were unripe corn (*Zea mays*), with 22%; followed by maturi (non-mature cashew) (*Anacardium occidentale*) and dendê (*Elaeis guineensis*), with 15% each; cashew (regular, mature) (*Anacardium occidentale*), especially the nut, with 10%. Other items registered were canoe seed (mangrove fruit) (*Avicennia schaueriana*) and guava (*Psidium guajava*), with 7%; green beans (*Vigna unguiculata*), murici (*Byrsonima crassifolia*), banana (*Musa paradisiaca*), oiti (*Licania tomentosa*), embiriba (*Eschweilera ovata*), araçá (*Psidium cattleyanum*), pitomba (*Talisia esculenta*), mango (*Mangifera indica*) and soursop (*Annona muricata*), each representing 3% of the reports.

Most interviewees did not consider the species as a crop pest since they had never found many specimens feeding at the same time. According to interviewees, *A. amazonica* breeds during November and December. The residents also characterized this period as the cashew and corn season. The localities related by the residents as breeding areas were mangrove and coconut areas, with roosts made in tree holes.

Visual observations occurred, mainly spontaneously, as the interviews were taking place. Visual records of parrots were reported in the town of Santa Rita, in a mangrove region surrounded by sugar cane plantations; APA de Mamanguape (town of Caraúba), near the village of Taberaba; at Forte Velho, in the town of Santa Rita; and near the campus of the Universidade Federal da Paraíba and Mata do Buraquinho, both in the capital city of João Pessoa. The largest number of individuals occurred in the region of Santa Rita, where 758 specimens flying in groups were registered. In the other regions, groups up to 10 specimens were registered.

Discussion

Although most reports came from recent observations of the species, they were enriched by the opinion of the interviewees on the local decrease in parrot populations in the last 10 years. Decrease may be related to advancing deforestation, a fact that has already been related in the case of many animal and vegetal groups in the Atlantic Rain Forest (BERNARD et al., 2011; SILVA; TABARELLI, 2000). The process may cause a further decrease or even regional extinction of the species in the region (JUNIPER; PARR, 1998; SICK, 1997). Other factors that may decrease these populations are the illegal pet trade, deterioration of habitats caused by fire and selective felling of trees, illegal agricultural practices and even urbanization (BACON et al., 1979).

Wild animal trade is considered a major reason for the decline in some bird populations, although this factor has a lesser impact than deforestation and degradation of habitats (RIBEIRO; SILVA, 2007). Among the factors mentioned, the increasing deforestation caused by sugar cane plantations is the main condition in the region under analysis (BERNARD et al., 2011). Deforestation may have contributed not only to habitat loss, but has also caused the decrease in populations. Further research is necessary to estimate the impact of these factors on populations. According to Ribeiro and Silva (2007), the Psittacidae family, especially *A. amazonica* and *A. aestiva,* have always attracted the interest in people as pets due to their ability to mimic human speech. Reports of poaching abound in regions visited in this study, which may be another reason for the declining population in the State of Paraíba.

Food items described by the interviewees are similar to those reported in the literature. Sick (1997) described fruits and food mainly from crops, which were corroborated by the identification of items like cashew and corn. The intake of wild fruits may indicate that the species taking advantage of agricultural areas, deforestation and anthropic sites, still finds natural food resources. The fact that residents do not consider the species a pest may be considered a positive fact since they see no need in hunting parrots to eliminate an unwelcome visitor, as reported for Trinidad and Tobago at Nariva Swamp (BONADIE; BACON, 2000). This fact may be related to the low number of specimens in the populations of the species in most of the municipalities where the interviews and observations were conducted. A smaller population may consume and disturb less. The main exception may be the village of Santa Rita where a larger population was registered. *A. amazonica* populations are probably finding their food resources in forest fragments in the region and surviving far from the more urbanized areas. This keeps them away from being characterized as a pest. The mangrove in Santa Rita may be considered a resting area of the populations in the adjacent regions, where individuals of different populations gather in the evening and fly to the adjacent fragments when the sun rises. However, more studies are necessary to confirm the actual status of the populations, their size and characterization as a pest and the identification of other possible resting areas on the coastal region of the State of Paraíba.

According to Sick (1997) and Martinez and Prestes (2002), the reproductive period of parrots in Brazil occurs between August and May. Moura et al. (2010) confirmed this period for *A. amazonica* in the state of Pará, Brazil. These data corroborate current study and the reports obtained from interviewees (90%) that the breeding period occurs between November and December. Birds generally restrict their reproductive activities to periods of the year when the environmental conditions are favorable (DAWSON et al., 2001). The breeding area related by the residents agrees with that of the literature (MOURA et al., 2010; SICK, 1997). One of the most important factors that determines the reproductive season is the availability of food for the nestlings (SCHEUERLEIN; GWINNER, 2002). Parrots in Brazil breed according to the rainy season, which is a period of great food abundance (SICK, 1997), mainly fleshy fruits that is an important food resource to parrots. The rainy season varies according to different regions in Brazil, with special reference to the period between April and August in the northeastern Brazil (LIMA; MELO, 1985).

Bonadie and Bacon (2000) recommend the protection of the swamps in Trinidad and Tobago from deforestation. The establishment of agricultural areas would generate a great impact on

the *A. amazonica* population that uses these swamps as living area. Similarly in the State of Paraíba, the mangroves of the village of Santa Rita are surrounded by sugar cane plantations (FIALHO; GONÇALVES, 2008) and are certainly affected by human impact with negative consequences for the species´s habitat. Mangroves are protected in Brazil by a 1965 Forest Law and are considered important and heterogeneous systems, featuring several ecological functions (LANA, 2004). Nevertheless, mangroves are threatened by increasing deforestation due to the advance of sugar cane plantations in the region (BERNARD et al., 2011). Conservation activities and a more effective control are necessary for maintaining mangroves in Paraíba. These initiatives will not merely benefit the studied species but other species using the same habitat.

Conclusion

Interviews may have indicated that populations of *A. amazonica* on the coastal regions of the state of Paraíba, Brazil, could be in possible decline due to reasons such as the illegal animal trade and deforestation. These factors require further investigation to confirm the threats and to adopt conservation activities.

The identification of the real impacts on *A. amazonica* and an efficient control on the effects of illegal commerce and the expansion of agricultural areas where the species may inhabit are priorities for understanding the threatened status of the species in the state. Identifying roosts in the area is highly recommended to obtain important information on the species, such as birth rates, nesting and reproductive success and access to data on the fluctuation of the populations.

More studies are needed for appropriate information on the Psittacines in the state, especially parrots and mainly *A. amazonica*. The map provided an initial basis for the better understanding of the species´s distribution on the coastal region of the state, as well as an overview of the biology of the species, in agreement with reports in the literature. The data obtained and described in this paper are a starting point and the information may be used in further studies, especially biological (e.g. feeding and reproduction), and on those related to changes in population to achieve locally the conservation status of the species.

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