

# INTERNATIONAL ACTION PLAN For conservation of Critically Endangered birds on São Tomé

2014-2018



DWARF OLIVE IBIS (*BOSTRYCHIA BOCAGEI*)

SÃO TOMÉ FISCAL (*LANIUS NEWTONI*)

SÃO TOMÉ GROSBEAK (*NEOSPIZA CONCOLOR*)



AAGE V. JENSEN CHARITY FOUNDATION



**International Species Action Plan  
for the Conservation of Critically Endangered birds on São  
Tomé**

Dwarf Olive Ibis *Bostrychia bocagei*

São Tomé Fiscal *Lanius newtoni*

São Tomé Grosbeak *Neospiza concolor*

2014

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**Review:**

This plan should be reviewed and updated every five years. An emergency review will be undertaken if there is a significant change to the species' status before the next scheduled review.

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## **LIST OF ACRONYMS**

**ABS** - Associação dos Biólogos Santomenses (Santomean Biologists Association)

**ASMM** – The association of loggers and timber traders

**DF** -- Direcção da Floresta (Forest Directory)

**DG Agr** - Direcção-Geral da Agricultura (General-Directory for the Agriculture)

**DG Amb** - Direcção-Geral do Ambiente (General-Directory for the Environment)

**DGT** – Direcção-Geral do Turismo (General Directory for Tourism)

**ECOFAC** - Ecosystemes Forestiers d'Afrique Centrale, the EU sponsored Programme for Conservation and Rational Utilization of Forest Ecosystems in Central Africa

**IUCN** – the International Union for Conservation of Nature

**MARAPA** - Mar, Ambiente e Pesca Artesanal (Sea, Environment and Artisanal Fisheries)

**Min Agr** – Ministry of Agriculture

**PNO** - Parque Natural do Obô (Obô Natural Park)

**RSPB** – The Royal Society for the Protection of Birds (BirdLife Partner in the UK)

**SPEA** - Sociedade Portuguesa para o Estudo das Aves / Portuguese Society for the Study of Birds (BirdLife Partner in Portugal)

## PREFACE

According to the data of geological history, the islands of S. Tomé and Príncipe are part of a small number of areas that escaped the great events of glaciation during the "Pleistocene", which allowed the site to become an important refuge for a number of species, which developed their own characteristics and led to the emergence of a large number of endemic species with particular reference to birds.

However, during the economic development of the country, certain unsustainable practices have threatened and have exerted great pressure on the biodiversity, and in particular on some sensitive endemic species. As a result some of them, including the Dwarf-olive ibis *Bostrychia bocagei*, the São Tomé Grosbeak *Neospiza concolor* and the São Tomé Fiscal *Lanius newtoni*, are now classified as Critically Endangered species in the IUCN Red List.

The national authorities, aware of the responsibilities placed on them regarding the need to protect the country's biodiversity and in particular the most threatened species, have been creating some laws regarding biodiversity protection and conservation.] In this context it is worthwhile to highlight the decree 40 040 dating back to January 20, 1955. This decree introduced a system of protection to the soil, flora and fauna, thus acknowledging the interaction and interdependence existing between the soil, its vegetation cover and wildlife.

The latest decree, nº 11/99, on the Conservation of Fauna, Flora and Protected Areas is another manifestation of national concern. It considers that the conservation of animal and plant species and of biodiversity in general requires a set of technical and legal measures allowing the natural evolution of populations and their genetic pools – which are our national and global heritage – and the sustainable use of these natural resources from a socio-economic perspective.

However, the existence of legal instruments for protection and conservation of species will not produce satisfactory results if not accompanied by technical and scientific work in the field, in order to determine the current status of the species, the threats they face, and how they have been responding to them.

The International Action Plan for the Conservation of Critically Endangered Species in S. Tomé and Príncipe for the period 2014-2018 was drawn up with the cooperation of international institutions including BirdLife International, the RSPB, SPEA, the Aage V. Jensen Charity Foundation and national institutions such as the Directorate General of Environment, the Obo National Park of São Tomé and the Association of Biologists of STP. It makes a deep analysis of the situation of the three species mentioned above, all critically endangered, by analysing their population sizes, their distribution, their habitats and breeding dynamics, and includes a set of priority activities to be materialized. This should be the fundamental direction of a long road that we must walk to save these species, thus ensuring future generations the possibility to live with them. They are part of the national as well as international heritage of biodiversity.

To finish, I would like to express, on behalf of the environmental authorities of S. Tomé and Príncipe, sincere thanks to the international organizations described above and their researchers, who have spared no effort to work in S. Tomé and Príncipe and explore areas of extremely difficult access areas to provide a scientific document of this kind, in order to suggest the best options to protect these endemic species that give immeasurable value to Santomean biodiversity.

Arlindo Ceita de Carvalho - *Director General of Environment*

## EXECUTIVE SUMMARY

This International Action Plan is designed for the conservation of the three Critically Endangered bird species, endemic to the island of São Tomé in the Gulf of Guinea, off the western equatorial coast of Central Africa: the Dwarf Olive Ibis *Bostrychia bocagei*, the São Tomé Fiscal *Lanius newtoni* and the São Tomé Grosbeak *Neospiza concolor*.

Previous surveys have not been able to provide actual population estimates for each the three species. However, population estimates used in the current IUCN Red List assessments suggest that each of the species have extremely small and declining populations: the Dwarf Olive Ibis is placed in the band of 50-249 mature individuals, while the São Tomé Grosbeak and São Tomé Fiscal are each assumed to have tiny populations of fewer than 50 mature individuals, given the limited area of suitable habitat.

Very little is known about any of these three species, including actual population size, distribution, ecology and the drivers of the decline. Therefore, research, together with habitat protection is an urgent and very high priority action in order to halt loss and initiate the recovery and continued existence of the species.

The best available information suggests that the key threats to the three species include (1) habitat loss driven by forest clearance for large-scale agricultural investments and wood logging (2) habitat degradation driven by alien invasive species, palm wine extraction, (3) human disturbance, especially by wood loggers, tourists, hunters, palm wine harvesters and snail gatherers, and (4) local hunting, especially in the case of the Dwarf Olive Ibis. The other possible threat, likely to affect mostly the Ibis is predation by introduced species, including monkeys and cobras.

The overall goal of this five-year (2014-2018) plan is to guide the improvement of the conservation status and knowledge on the ecology and distribution of the three Critically Endangered bird species. This will be achieved through undertaking a set of actions that contribute to each of the following objectives: (1) Habitat degradation and human disturbance reduced in the species' areas of occurrence; (2) Increased understanding of ecology, population size and distribution of the respective species; (3) Hunting of the Dwarf Olive Ibis is stopped; and (4) Priority areas of forest habitat are preserved.

## 1.0 BACKGROUND INFORMATION

### 1.1. *Geographical context of the action plan*

This action plan addresses the conservation needs of São Tomé's three Critically Endangered bird species (0°25'N - 0°01'S, 6°28'E - 6°45'E). São Tomé (857 km<sup>2</sup>) and Príncipe (139 km<sup>2</sup>) are oceanic islands, that form the Democratic Republic of São Tomé and Príncipe. The islands lie 255 km and 220 km respectively off the west coast of Gabon (Figure 1). The climate, vegetation and bird habitats of São Tomé and Príncipe are described in detail by Jones & Tye (2006). Vegetation and topographic maps for São Tomé are included in Figure 2a & b.

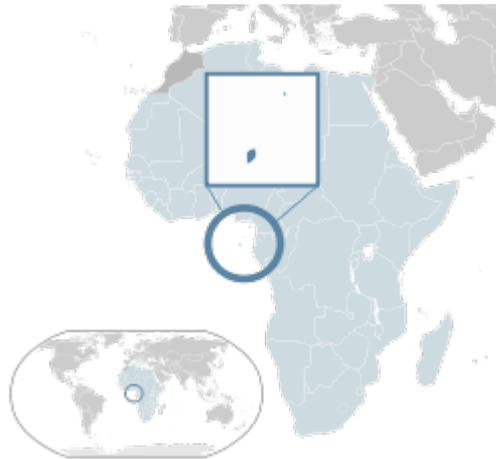


Figure 1. São Tomé geographic context

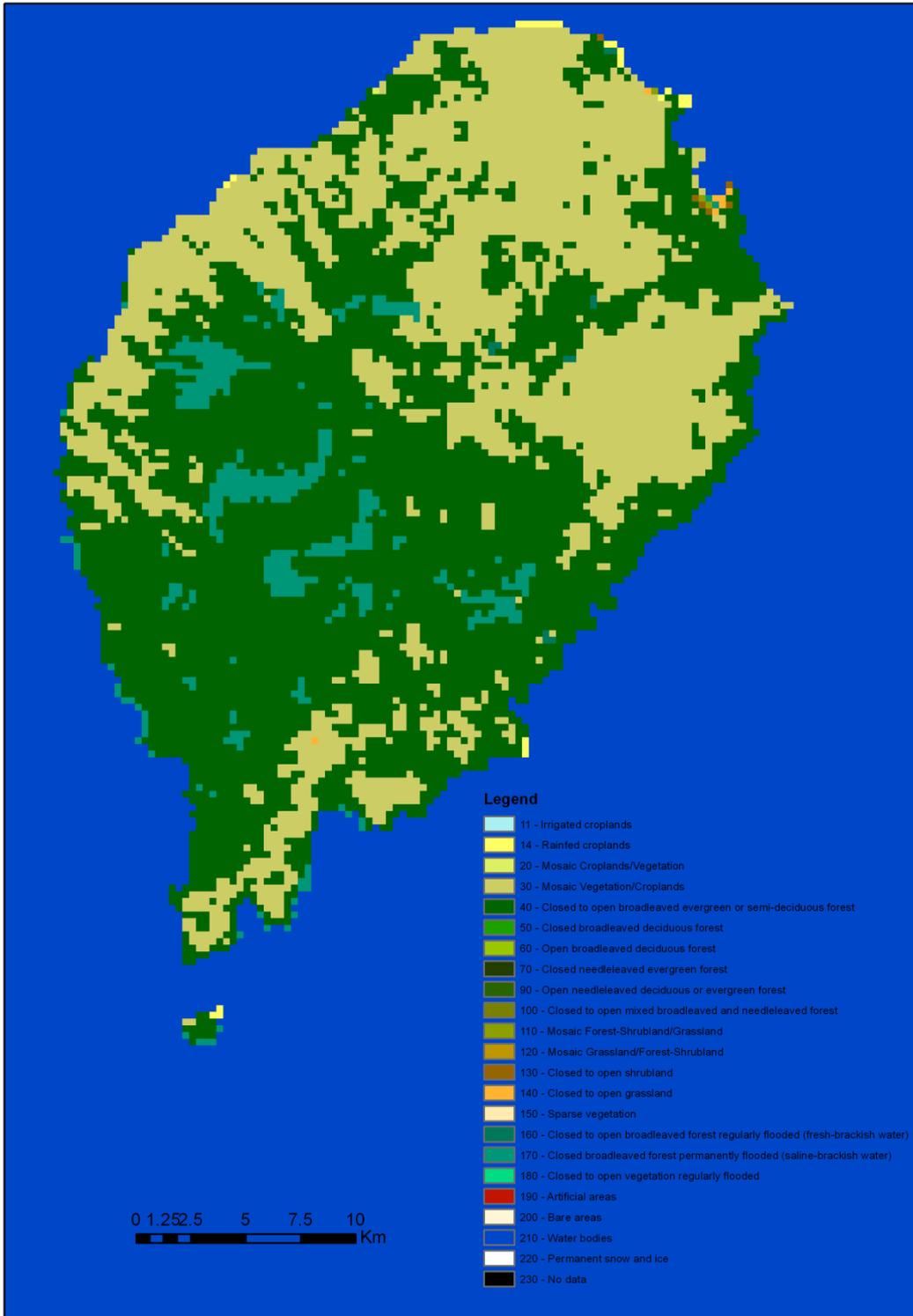


Figure 2a: Land cover map of São Tomé. Source: globcover 2009 (<http://due.esrin.esa.int/globcover/>)

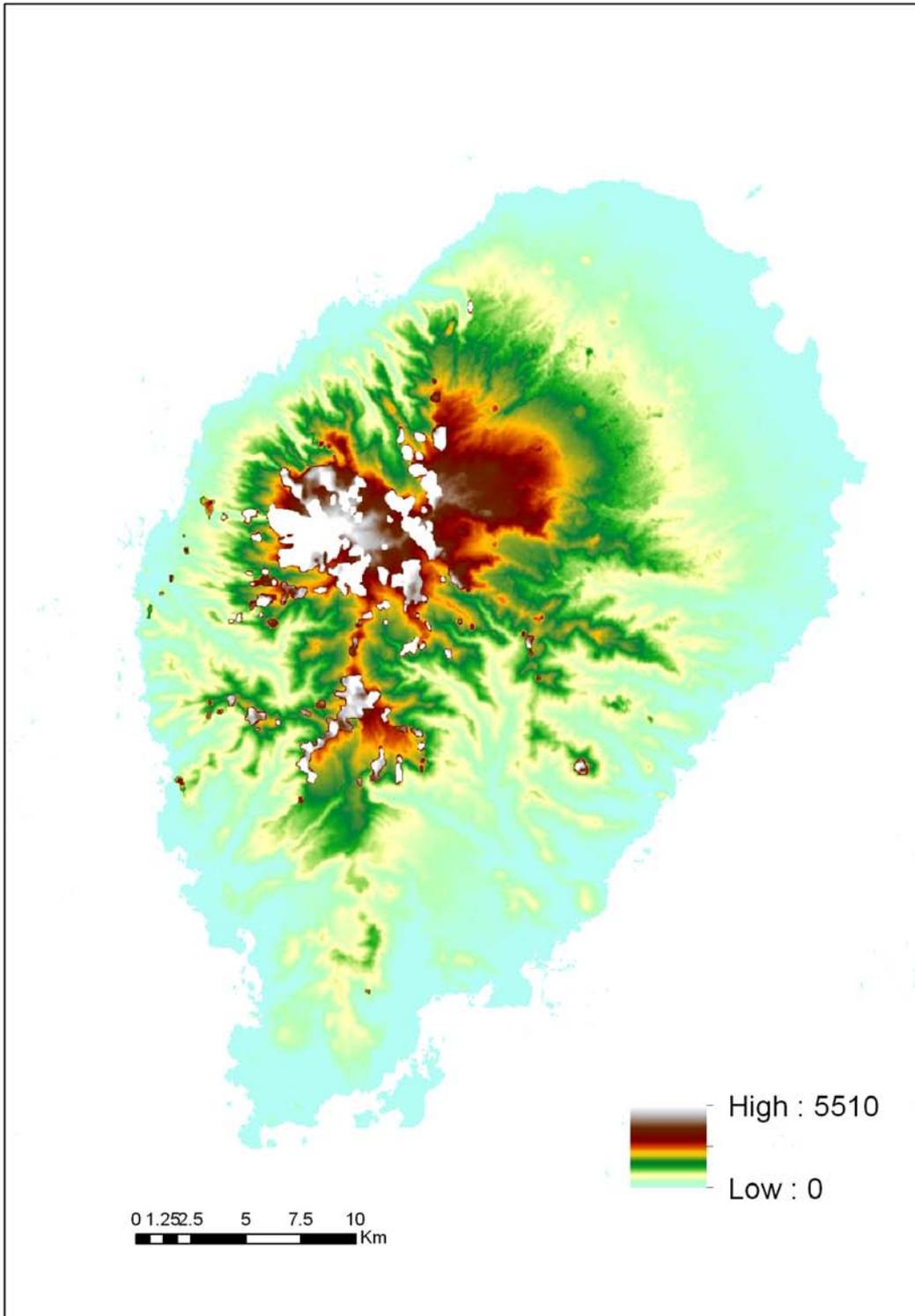


Figure 2b: Topography of São Tomé

## 2.0 BIOLOGICAL ASSESSMENT

Information included for these assessments is mostly based on that provided in the BirdLife International Datazone (<http://www.birdlife.org/datazone/>) on factsheets for the respective species and the Important Bird Areas (IBAs) in São Tomé (BirdLife International 2014).

### 2.1 Dwarf Olive Ibis

#### 2.1.1 Taxonomy

The Dwarf Olive Ibis *Bostrychia bocagei* of São Tomé is recognised as a species by BirdLife, following Collar and Stuart (1985), having been split from the African Olive Ibis *Bostrychia olivacea* (Sibley and Monroe 1990, 1993). It differs from *B. olivacea* of West and Central Africa in size, bill colour and coloration of upperparts. There is good support for treating it as a distinct, endemic, species (i.e. Chapin 1923, Amadon 1953, de Naurois 1973).

#### 2.1.2 Population size and trend

Surveys undertaken between 2008 and 2010 by ABS were not able to provide actual population estimates for the species. However, based on expert advice used in the current IUCN Red listing, the species is placed in the band 50-249 mature individuals, with an extremely small and declining population. It is therefore classified as Critically Endangered in the IUCN Red List.

#### 2.1.3 Distribution throughout the annual cycle

Described for science in late 19<sup>th</sup> century, there are very few historical records of this species, and anecdotal evidence from hunters (e.g. Collar & Stuart 1985, Jones & Tye 2006). After Correia's collection of a juvenile in 1928, it was only rediscovered in 1990 in the valley of the Rio Ana Chaves (Atkinson *et al.* 1991). Other records followed: birds were seen in 1996; two pairs, an individual and two nests were seen near the basins of the Rios Ió Grande (200 m a.s.l.) and Martim Mendes (100 m a.s.l.) in May 1997 in an area where hunters reported killing 16 of the birds 6 months previously (S. d'Assis Lima *in litt.* 1998); and during survey work in Ribeira Peixe in 2007 (Olmos and Turshak 2007). Recent fieldwork has resulted in 57 observations, including two nests with brooding females, in old-growth forest in the Monte Carmo area (Maia and Gascoigne *in litt.* 2010). It is apparently relatively widely, if thinly, distributed in the south. There is one historical record from the north of the island, but no suitable habitat remains there (Christy and Clarke 1998). The species is apparently confined to the catchments of the São Miguel, Xufexufe and possibly the Quija rivers in the south-west, but has its stronghold is apparently restricted to the Ió Grande and Ana Chaves rivers in the centre of the island. Species distribution models confirm this, as they infer a distribution restricted to the eastern third of this range (Buchanan *et al.* unpublished). The distributional records for this and the two other Critically Endangered bird species in São Tomé are illustrated in Figure 3.

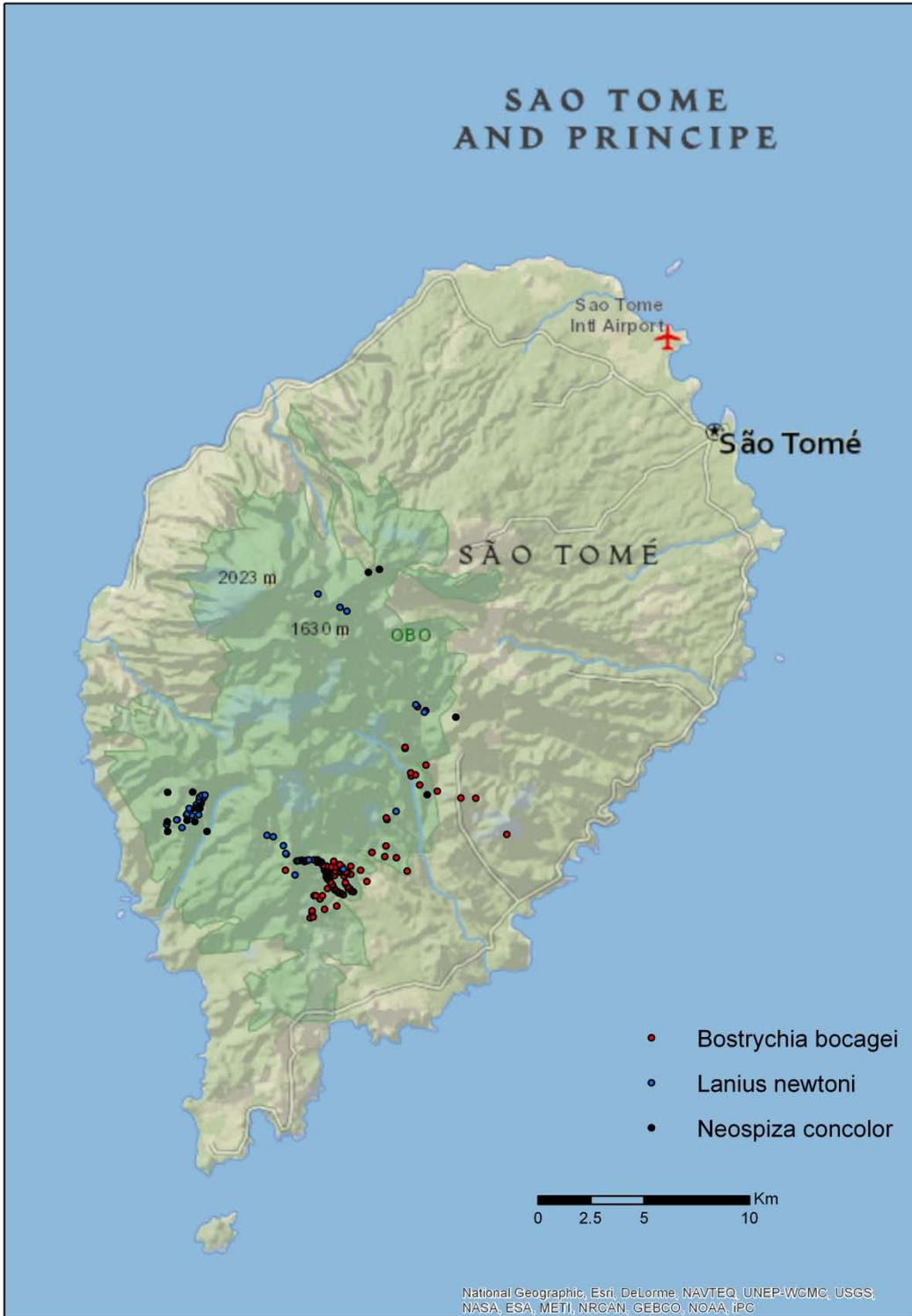


Figure 3. Distributional records of of Dwarf Olive Ibis, São Tomé Fiscal and São Tomé Grosbeak.

#### 2.1.4 Habitat requirements

The ecology of this species, including habitat associations, feeding and nesting habitats are poorly known. From what is known, the species generally occurs in old-growth forest below 450 m, and suitable habitat could extend up to 800 m. Recent observations from Monte Carmo were from mature or old second-growth forest with well-spaced large trees and very open undergrowth (Olmos and Turshak 2010). It has been observed foraging on forest floors in areas of bare ground or where there exists a sparse undergrowth of herbaceous plants, bracken and moss, or a covering of rocks and large stones (Christy and Clarke 1998; Olmos and Turshak 2010), including areas where the ground has been disturbed by wild pigs or in swampy areas bordering watercourses or small oxbow lakes (Atkinson *et al.* 1991; Christy and Clarke 1998; Borrow and Demey 2001; Olmos and Turshak 2010).

#### 2.1.5 Breeding ecology, survival and productivity

Again, very little is known about the species breeding ecology, including survival and productivity. It nest in trees, including some overhanging water (S. d'Assis Lima *in litt.* 1998). The Associação dos Biólogos Santomenses (ABS) undertook monitoring between 2008 and 2012 and a total of four nests were found, the first being in November 2009. Of these, only one has been successful, fledging one chick. Initial nest failures may have occurred due the impact of visits to the nest, indicating the species may be susceptible to disturbance. In addition, there have been suggestions that some nest failures were due to infertile eggs and possibly predation (Gascoigne *et al. in press*).

## **2.2 São Tomé Fiscal**

### 2.2.1 Taxonomy

São Tomé Fiscal *Lanius newtoni* was first collected in 1891 by Francisco Newton for the Lisbon Museum, as summarised in Bocage 1904. The species has been treated as a member of the *L. collaris* superspecies of the African mainland. *L. newtoni* was thought to be closely related to *L. collaris* but specifically distinct due to marked differences in habitat (interior of forest and not open habitat) and plumage (yellow underparts). Recent analysis of DNA sequences by Fuchs *et al.* (2011) showed that the closest living relative of *L. newtoni* is the Mackinnon's shrike (*L. mackinnoni*). The position of this sister pair remains uncertain as it was either nested within the *L. collaris* clade or it was sister to the *L. collaris*–*L. souzae* clade. The analysis also show that *L. newtoni* split from its closest continental relative c. 2.1 Ma Fuchs *et al.* (2011) also note that *L. newtoni* shares similar habitat preferences with *L. mackinnoni*. *L. newtoni* inhabits the interior of wet forest, whereas *L. mackinnoni* can be found at the edge of rain forest. In contrast, all other members of the *Lanius collaris* species complex are adapted to more open habitats.

### 2.2.2 Population size and trend

This species qualifies as Critically Endangered because it is believed to have a tiny population. It occupies a very small area of primary forest which is currently protected by the Obô Natural Park. This species was thought to be confined to a small area in the south west of Sao Tome, but a number of recent sightings have expanded its known range. Hence the population range may be greater than previously thought (A. Gascoigne *in litt.* 2010), although it still appears to be confined to a few nucleuses within this range (M. Melo, pers. Comm). Given that a full population survey has yet to be conducted, it is precautionarily assumed to have a tiny population of fewer than 50 individuals and mature individuals, given

the limited area of potentially suitable habitat. If its population size proves to be larger than suspected it may warrant down-listing.

#### 2.2.3 Distribution throughout the annual cycle

Historically, it is known from several specimens collected at São Miguel, Quija river, Roça Jou and the lô Grande valley. It was considered extinct after Correia's work (1928) until it was rediscovered in 1990 near the headwaters of the Xufexufe river. Currently it seems restricted to a few localities between 180-1,100 m in the southern forests, from Bombaim and Formoso Pequeno east through the lô Grande and Martim Mendes basins and west to the Xufexufe basin. It also occurs in the narrow valleys at the headwaters of the Ana Chaves, at 1,174 m, and has been recently recorded at Estação Souza, about 1,560 m (Figure 3).

#### 2.2.4 Habitat requirements

The habitat requirements and behaviour are poorly known, but some anecdotal observations exist. All recent records were in interior old-growth forest and are from those areas of highest rainfall. The bird apparently perches at mid or lower levels scanning for prey and flying to snatch large insects on the ground or on the vegetation. Often skulking in low bushes, it is sometimes found on more open vantage points in sites with little or no undergrowth, but with bare ground and rocks (Atkinson *et al.* 1991, Christy and Clarke 1998). It has been seen looking for food on boulders along a stream (Atkinson *et al.* 1991) and searching among epiphytic mosses and lichens.

#### 2.2.5 Breeding ecology, survival and productivity

Its breeding biology is unknown. All those collected by J.G. Correia in 1928 for the American Natural History Museum in May, Nov and Dec had small gonads except 2 males collected Nov–Dec; 2 females collected Nov–Dec had traces of juvenile plumage (Collar & Stuart 1985). One juvenile has been caught in nets in early February (M. Melo, pers. Comm).

### **2.3 São Tomé Grosbeak**

#### 2.3.1 Taxonomy (source: Dallimer *et al.* 2012)

The São Tomé grosbeak was discovered in 1888 by the Portuguese naturalist Francisco Newton who collected a male in the forests of south-eastern São Tomé. In 1890, Newton collected another two males in the south-western forests (Jones & Tye 2006). At this time he already considered the species to be extremely rare (Naurois 1988), but Newton probably never suspected that it would be over 100 years before the species was seen once more (Sargeant *et al.* 1992). After another decade, several individuals were encountered again in January 2002 (Dallimer *et al.* 2003), while later that same year, a new locality was discovered in the south-eastern forests (Melo 2007), where an individual was caught on 27 January 2003.

The phylogenetic position of the São Tomé grosbeak within the Old World finch family (Fringillidae) has now been firmly established. Indeed the species is a giant seedeater, whose closest relative is the Príncipe seedeater *Serinus rufobrunneus*, an endemic species restricted to the island group of São Tomé, Príncipe and Boné de Jócquei (Melo 2007). Genetic work revealed that the Príncipe seedeater population that co-occurs with the grosbeak on São Tomé is more closely related to the grosbeak than to its conspecific populations on the other two islands (Stervander 2009), suggesting that this species originated in sympatry – a highly unusual, if not unique, event in birds

### 2.3.2 Population size and trend

Previous bird surveys in São Tomé have made very few records of the species thus making it difficult to do a proper population estimate. However, based on expert advice used in the current IUCN Red listing the species is assumed to have a tiny declining population of fewer than 50 mature individuals, given the limited area of suitable habitat (BirdLife International 2014). This species is therefore classified as Critically Endangered in the IUCN Red List. All fieldwork has found it to be very rare and it is regularly recorded from just two areas: São Miguel, and Monte Carmo and more recently from close to Lagoa Amélia. This very small area of primary forest, although not severely threatened and protected by the Obô Natural Park, might be vulnerable in the future.

### 2.3.3 Distribution throughout the annual cycle

The São Tomé Grosbeak was previously known from just one 19th century specimen from southern São Tomé (Jones & Tye 2006). It was rediscovered in 1991, close to the rio Xufexufe in the south-west of the island (Sargeant *et al.* 1992). Since then it was sighted near the Xufexufe in 1997 (Kaestner *in litt.* 1998; Sinclair *in litt.* 1998), and sightings continue to be reported from the Xufexufe, Ribeira Peixe (Monte Carmo) and São Miguel areas (N. Borrow *in litt.* 2003; Dallimer *et al.* 2003; Olmos and Turshak 2007; F. Olmos *in litt.* 2007, 2008, Olmos and Turshak 2010). One individual was captured in the Monte Carmo area in 2003, and three in the São Miguel area in 2005 and 2011 (M. Melo, pers. comm). It was previously thought to be restricted to old-growth forest in the southern lowlands of the island, but was found further north and at higher elevations between Santa Maria and Calvário in 2010 and 2011, with further unconfirmed reports of the species at three nearby sites (Solé *et al.* 2012), and subsequently confirmed at nearby Formoso Pequeno (R. F. de Lima *in litt.* 2013). A record at Io Grande, matched a region where the species was originally recorded in 1888 (Dallimer *et al.* 2012). Given the limited area of suitable habitat and the paucity of records it probably has a tiny population, but recent extensions to the known range, elevation and habitat, raise the possibility that the population may prove to be larger than was feared. Still, the 2011 survey aimed at localising the grosbeak, underlined its rarity or at least its elusiveness: only 3 records were made in a total of 105 point counts, and only seven records were made in more than 100 km on foot (Dallimer *et al.* 2012). The distributional records of the species are shown in Figure 3.

### 2.3.4 Habitat requirements

The habitat requirements of this species are poorly known. Before 2010, it had not been recorded above 600m and seemed to be restricted to the mature and little disturbed lowland old-growth forests of the wettest parts of São Tomé, similar to the São Tomé Fiscal. Recent survey work by Dallimer *et al.* (2012) in 2011 brought in some new insights. The survey made a new record in the area of Io Grande, the first since 1888, and confirmed the records in the area of Lagoa Amélia. This is extremely valuable since these records suggest that the area of occurrence of the grosbeak may include the entire mature forest area – which roughly corresponds to the limits of the natural park – instead of only the southern primary forest core. Of particular interest is the fact that the locality near Lagoa Amélia, at about 1400 m altitude asl, extends the previously known altitudinal range by about 1000 m. These results of the 2011 surveys suggested that the grosbeak may be more ecological tolerant than previously thought (Dallimer *et al.* 2012).

The grosbeak is often seen alone or in pairs, both in the canopy and at 3-4 m in the understorey when feeding on small fruiting trees. It feeds on the fruit and seeds of the tree *Uapaca guineensis* and the tall shrub *Dicranolepis thomensis* crushing the seeds with its powerful bill (Dallimer *et al.* 2003). New data from the 2011 surveys by Dallimer *et al.* (2012) also identified three further food items: the fruits of the whipstick tree *Oxyanthus speciosus*, of the charcoal tree *Trema orientalis* and of the tree *Homalium* sp. (likely the endemic *H. henriquesii*) that is quite widespread in primary and old secondary forest and whose fruit is also favoured by other species of conservation interest such as the endangered Maroon pigeon (*Columba thomensis*). The charcoal tree is a pioneer species typical of areas subject to disturbance (Solé *et al.* 2012).

If the area of occurrence for the grosbeak is relatively large and its potential food sources widely distributed it is even more unclear why the species appears to be so rare (Dallimer *et al.* 2012). However, the grosbeak is probably a canopy species and is reportedly quite silent, which could partly explain why it has so rarely been seen (Christy and Clarke 1998), although the call has been recorded and some birds respond to playback (F. Olmos in litt. 2007, 2008).

#### 2.3.5 Breeding ecology, survival and productivity

The nesting and breeding biology of the São Tomé Grosbeak are unknown.

### **3.0 THREATS**

#### **3.1 Main threats**

Little is known about the threats facing these three species, or about the impact of the threats on populations. This major constraint to prioritising conservation activity needs to be addressed. Lack of understanding of causes of rarity is particularly high for the fiscal and the grosbeak, species for which we are unable to pinpoint any specific factor, whereas for the ibis we do know that hunting and destruction of areas previously used by the species have played a role.

#### 3.1.1 Habitat loss and degradation

##### *3.1.1.1 Large-scale agricultural development*

It has been suggested that the major driver of habitat loss occurring in São Tomé and Príncipe is the loss of lowland old growth and secondary forest, as the abandoned agricultural plantations are brought back into use to rehabilitate the cash-crop industry (Barros 2013). A key example of this are the oil palm plantations developed by the São Tomé and Príncipe Government and Agripalma, managed by the Belgian investment bank Socfinco. The development covers 3,500 ha under concession for 25 years, which is spread over seven sites but has not been comprehensively delineated.

Up to November 2013, c. 1,200 ha has been cleared, including the Monte Carmo concession, in the south-eastern part of the Obo Natural Park buffer zone, which has led to the loss of high quality forest habitat, upon which the Dwarf Olive Ibis previously depended (de Lima *et al.* 2013). The rest of the concession, includes more areas near Emolve, and areas near Porto Alegre (500 ha) and Santo António. In addition to the direct loss of suitable habitat from clearance for oil palm, there are two additional areas of concern regarding the impact of oil palm concessions, namely fragmentation and disturbance. The planned road developments

for improving transportation between the concessions areas are going to split potential areas of occurrence for the São Tomé Fiscal and São Tomé Grosbeak. The road to connect the northern concession (Santelmo) and western concession to Monte Carmo will separate the remaining Dwarf Olive Ibis populations outside Obo Natural Park. Of particular concern is the north-eastern road, which will separate a population of Ibis recorded in August 2013. These developments will effectively fragment the distribution of all three species and reduce the connectivity of their forest habitat. The second area of concern is disturbance, which is a much more difficult impact to quantify and monitor. The oil palm concessions will increase the level of disturbance to these populations in three main ways. 1). Opening up road access will lead to increased accessibility for forest users, including illegal logging and hunting, into sensitive sites that were previously not accessed by these groups. 2). All three species distributions will have increased proximity to human activities (including hunting), which will reduce the suitability of these habitats for the species. 3). Forest cuts have led to the loss of buffer habitats, importantly around Obo NP, which means a hardening of habitat edges. All this will lead to the reduced suitability of these areas for the species and degradation of the forest habitat.

SATOCAO has a 3500 ha concession to grow cocoa in São Tomé, and several cooperatives have been created through PAPAFA to increase the export of cocoa, coffee and spices in niche markets (e.g. organic, fair trade). It is difficult to assess the threat posed by these developments, because it is hard to access to the local land registry.

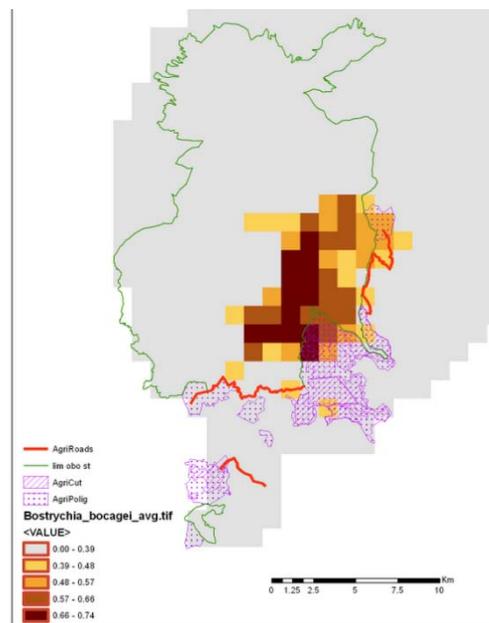


Figure 4. Modelled distribution of the Critically Endangered the Dwarf Olive Ibis. Purple polygons showing Agripalma concession areas, green outline showing protected area boundaries, red lines indicating associated road development, and coloured squares showing modelled species distribution with the darker colours representing higher suitability. Models built using maximum entropy modelling using remote sensing NDVI data, topography and climatic conditions are based on small sample sizes and remain unvalidated, but have a good fit to training data (AUC>0.9).

### 3.1.1.2 Large-scale infrastructure developments

On the 15<sup>th</sup> November, the Government of São Tomé and Príncipe made an agreement with the Brazilian energy company TECHNIC to build a series of three hydroelectric dams across

the Yo Grande River. The project is due to get underway in the next five months with completion set for 2016. The Yo Grande river basin holds a significant amount of the remaining well-preserved lowland forests that support the three Critically Endangered species, particularly the Dwarf olive ibis that occurs along the rivers course. The Hydroelectric dam development has the potential to negatively impact on these vulnerable species, as well as threaten the integrity of the globally important Obô Natural Park, due to the Yo Grande river's course along the eastern boundary.

#### *3.1.1.3 Small-scale agriculture, wood logging and palm wine harvesting*

As the human population density and the amount of São Tomé that is both urbanized and under active cultivation increases, biodiversity in the remaining natural areas is likely to face growing pressures. Apart from direct forest resource use and hunting, it is also possible that the quality of forest will be negatively affected by increased illegal exploitation of timber and other natural resources.

Already many of the low-intensity agricultural areas surrounding the Obô Natural Park are increasingly being cleared for vegetable production with little of the native vegetation retained. Such clearance is encouraged by investment in transport infrastructure and increased market opportunities for agricultural produce. Additionally, land privatisation is leading to an increase in the number of small farms and the clearance of trees (M. Melo *in litt.* 2006). Agricultural encroachment is evident in the more accessible areas of Obô Natural Park, where a range of crops can be grown at different times of year (Olmos and Turshak 2007, 2010). Small-scale logging is having a critical impact on areas inside Obô Natural Park, particularly around the northern border where the forest is in better condition.

#### *3.1.1.4 Disturbance from hunters, snail gatherers, tourists and wood loggers*

Although there is no rigorous evidence for disturbance having an effect, nest failures of Dwarf Olive Ibis have anecdotally been linked to disturbance by surveyors. There is no information for the other two species. Disturbance from humans will potentially have localised impacts, but there are high numbers of people from different groups, including loggers, hunters, palm-wine harvesters, already active in core parts of the species' range, such as in Obô Natural Park (Olmos and Turshak 2007, 2010). As infrastructure improvements proceed, and forest areas become more accessible, populations of endangered species will come under pressure (Dallimer et al. 2009). Road developments along the east and west coasts are increasing access to previously remote areas (A. Gascoigne *in litt.* 2000).

#### *3.1.1.5 Impact of invasive non-native species (INNS) on the habitat*

INNS, including invasive plant species, are also linked to habitat loss and degradation. Outlined below are some of the significant impacts that different INNS have on habitat:

- Increasingly dense vegetation in the forest understorey due to expansions of invasive plants will reduce the suitability of forest habitat for the ibis and fiscal.
- Introduced pigs impact the forest floor by churning up the undergrowth and impacting negatively on tree regeneration. This could however have a positive impact on the Ibis as it creates potentially good feeding habitat.
- Introduced monkeys impact the forest vegetation through seed dispersal, including of non-native plants.

### 3.1.2 Direct Mortality

#### *3.1.2.1 Hunting pressure*

Reports of Dwarf Olive Ibis hunting include: 16 birds being killed in 1996-1997 (S. d'Assis Lima *in litt.* 2006), and six birds killed on a single occasion by one hunter (del Hoyo *et al.* 1992). Álvares (*in press.*) estimated that a hunter would kill an average of 5 birds per year, with one hunter claiming to have killed up to 20 birds in one year. This author also mentions the areas around Maria Fernandes and Pico Cão Grande as targeted by the hunters for this species. Hunting pressure is believed to be increasing in the Monte Carmo area of the Obô Natural Park, one of the main strongholds for the species, and a group of hunters were found with at least one ibis in April 2011 (R. Grimmett *in litt.* 2011). In a single occasion nine birds were recorded killed by a hunter in 2013 (R. Lima, pers. comm). This suggests that these events, although relatively rare can have strong impacts on the population, because many birds can be killed in a single day. When considering the small size of the population, this is a major concern. These figures suggest that the Dwarf Olive Ibis is either more abundant than previously thought, or facing a very strong hunting pressure. Most likely both these scenarios are true.

#### *3.1.2.2 Predation from invasive, non-native species (INNS)*

Predation of adults, juveniles and nests by INNS could be a potential threat for all the three species and in particular for the ibis, although there are no recorded predation events. Introduced black rat *Rattus rattus*, mona monkey *Cercopithecus mona*, African civet *Civettictis civetta*, cats and weasel *Mustela nivalis* are all potential predators. Rats and civets have both colonized primary forest or certainly the edges of it and are very likely to have had a deleterious effect upon nesting birds (Atkinson *et al.*, 1994; Dutton, 1994). However civets and weasels have been observed to prefer plantations. Collar and Stuart (1985) reported old stories of wild dogs taking the eggs and young of Dwarf Olive Ibis.

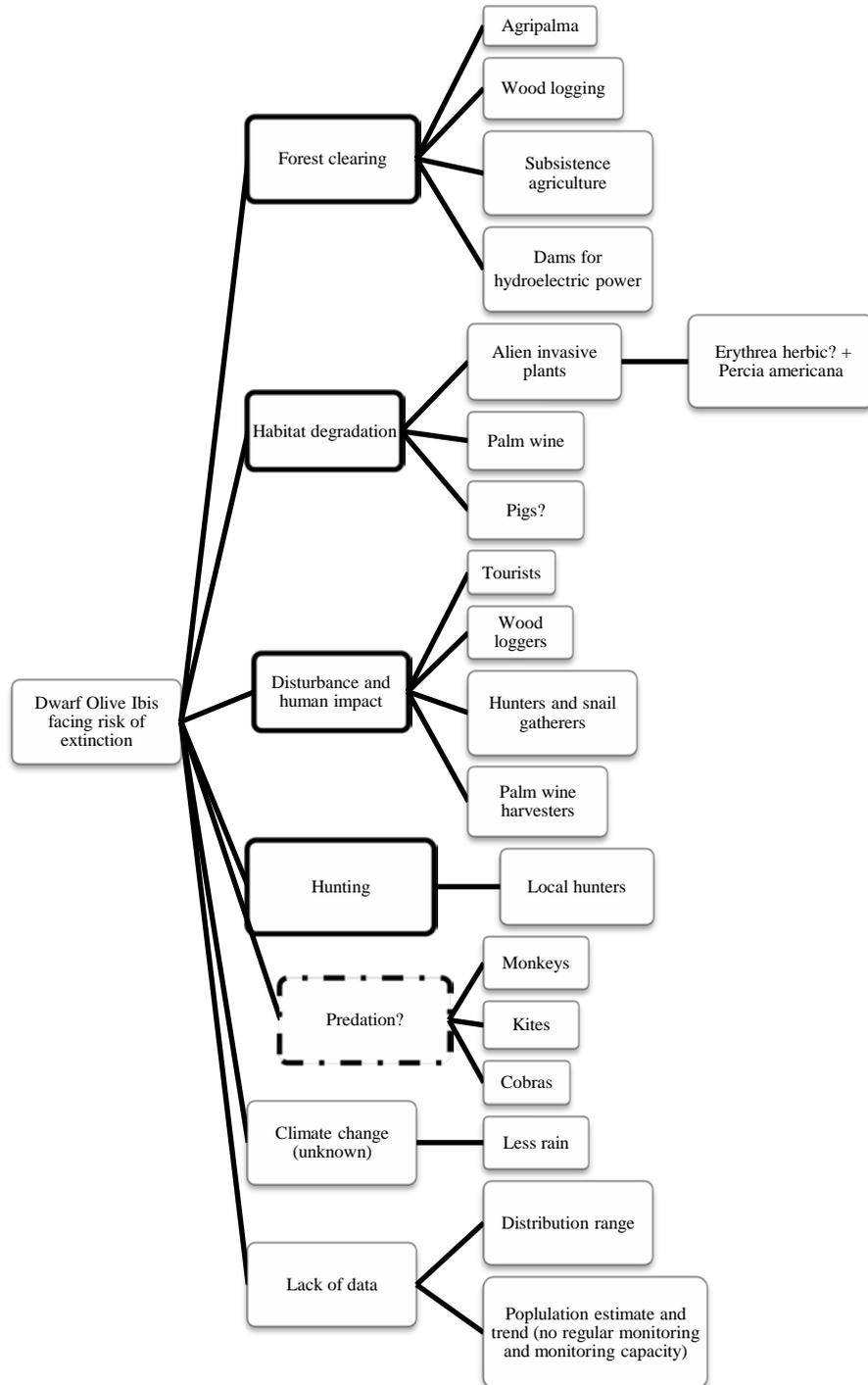
Although there is no direct evidence of predation of birds or nests by INNS in São Tomé, they have had dramatic impacts on many species that occurred on other oceanic islands that lacked indigenous land mammals. Introduced mammalian predators on the Gulf of Guinea islands have almost certainly had an adverse effect on native bird faunas that evolved in their absence (see review by Dutton 1994). Consequently it is included here as a potential threat, the impact of which requires urgent research.

### **3.2 Gaps in knowledge**

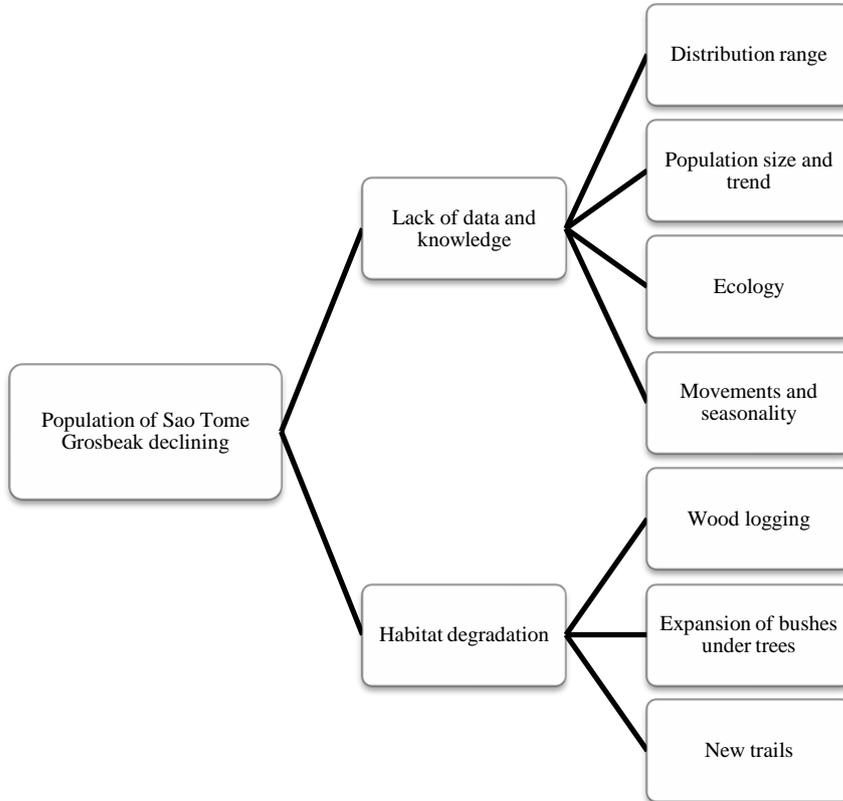
Lack of data and knowledge is a major problem for conservation of all the three species. . This constraint is considered a conservation threat as it prevents information such as species distribution, being fed into land-use planning, to prevent forest areas being lost that support these species. The key gaps in knowledge to be addressed include:

- Exact distribution
- Population size and trends
- Breeding and nesting ecology
- Feeding ecology
- Key threats and impacts
- Understanding of the causes of rarity for the fiscal and the grosbeak.

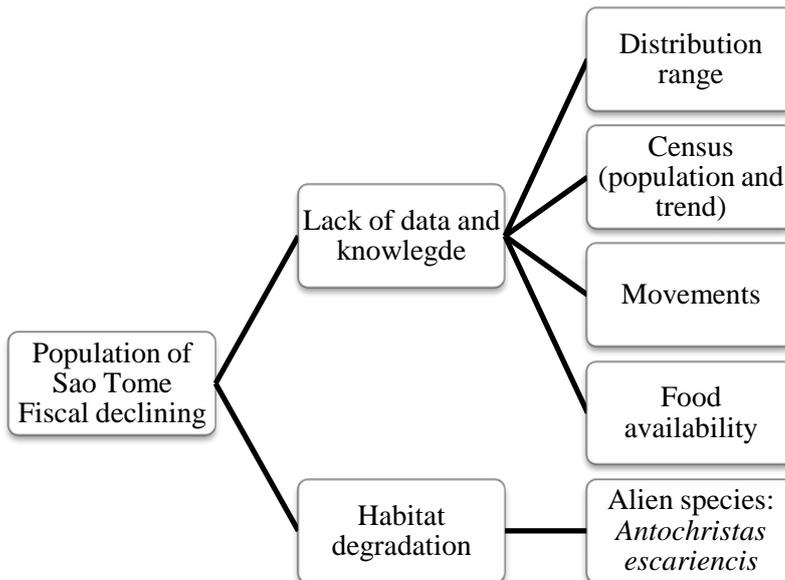
### 3.3 Analysis of threats to Dwarf Olive Ibis using a problem tree



**3.4 Analysis of threats to São Tomé Grosbeak using a problem tree**



**3.5 Analysis of threats to São Tomé Fiscal using a problem tree**



#### **4.0 POLICIES AND LEGISLATION RELEVANT FOR MANAGEMENT.**

##### **4.1 International conservation and legal status of the species**

All the three species are categorised as Critically Endangered in the IUCN Red List.

São Tomé and Príncipe are signatories to the Convention on Biological Diversity.

##### **4.2 National policies, legislation and ongoing activities**

###### *4.2.1 Summary*

Whilst the majority of the environmental legislation is soft law and does not have any legally binding force, mechanisms and laws exist that could be used to protect the habitat used by the three CR species. However, it is currently unclear as to whether these laws actually apply to these species in all (or any) cases. Clarification of legislation and direct, unequivocal protection conferred upon core habitats and birds within the existing framework of legislation is therefore essential.

The national report on the status of biodiversity in São Tomé and Príncipe, which was produced by the Ministry for Natural Resources and the Environment Directorate General for Environment in 2007, highlighted the current many problems with the legal framework and governing bodies, among these being: (1) scarce and mostly underqualified human resources, (2) slow approval and publication of new and urgent laws, (3) existence of obsolete regulations that have been there for a long time, and (4) limited material and financial resources as well as equipment. The following laws are relevant for the conservation of the species:

###### *4.2.2 Basic environmental law (Law n.10/99)*

This law defines the basic principles of environmental law in Sao tome and Principe.

###### *4.2.3 Law for the conservation of fauna, flora and protected areas (Law n. 11/99)*

This law provides a framework for species protection. CR species should be benefiting from the relevant protection afforded by this law and included as *'forbidden'* species. The law includes an article on the precautionary principle which is valuable when working to protect the three CRs included in this plan as there is a lack of information.

###### *4.2.4 Regulation on the process of environmental impact assessment (Decree n. 37/99)*

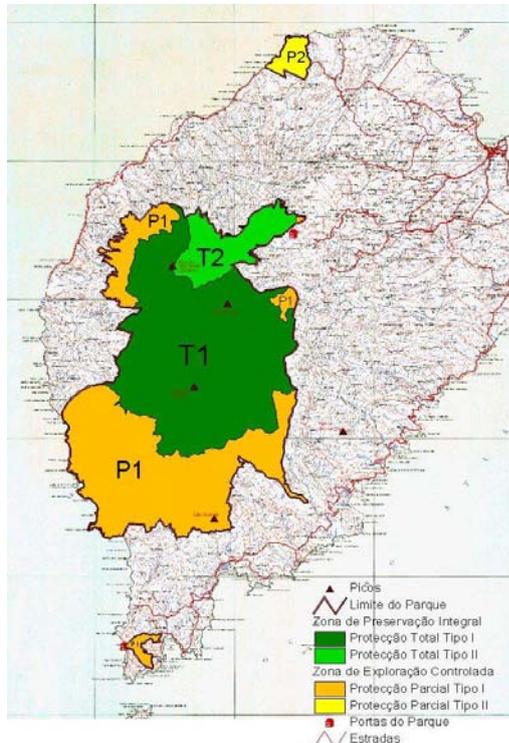
This is a valuable regulation for ensuring habitat protection; however there has previously been a lack of appropriate implementation. This could be developed as a mechanism to provide a source of income for local conservation organisations and people, to undertake monitoring and survey activities.

###### *4.2.5 Forestry law (Law n. 5/01)*

###### *4.2.6 Creation of São Tomé Obo Natural Park (Law n. 6/06)*

These laws identify the boundaries of the parks. It does not include any specific monitoring activities or targeted species actions, but it delegates a lot to the park management plans. Currently, c. 85% of the primary rainforest on São Tomé falls within a gazetted National Park, which covers 244 km<sup>2</sup> of the island. However, resources are limited and the park receives limited active conservation management on the ground (Dallimer et al. 2009). There is an article on the buffer area of the park,

which has unfortunately not been adhered to by the existing concessions. According to the management plan, the park is zoned such that three levels of protection apply to different sections of the park (Figure 5).



**Figure 5:** Zonation of São Tomé Obo Natural Park. P1 =: Partial protection ( low level tourism and small-scale infrastructure development permitted with prior Park agreement, certain low level extraction activities permitted with prior Park agreement) ; T1 = Total protection 1 (Only scientific and monitoring activities permitted); T2 = Total protection 2 (low level tourism activities permitted with prior Park agreement, intensive research activities permitted)

#### 4.2.7. Hunting law (in preparation)

This law will state that hunting any of the CRs is illegal. It is essential that key stakeholders are engaged in the process of developing this law and that there is suitable funding to enforce it, if it is to be effective. It is good progress that hunting zones and seasons have been defined but there is a lack of knowledge to underpin them, highlighting the need for further research. IUCN red list information should be used as a way of updating the annexes to ensure the species lists, their threat status and protection afforded is correct. STP biodiversity would benefit from amendments to this to permit hunting of non-native species in the park, to enable their management. Hunting of non-native species could provide a valuable mechanism for conservation and contribute to poverty alleviation.

## 5.0 FRAMEWORK FOR ACTION

### 5.1 Goal

The overall goal of this SAP is that the conservation status and knowledge on ecology and distribution for the three Critically Endangered bird species on São Tomé is improved.

### 5.2 Objectives and actions

The objectives and respective actions required to contribute the above goal are outlined below.

Action	Priority (Ibis)	Priority (Fiscal & Grosbeak)	Time scale	Organisations/individuals responsible
<b>Objective 1: Habitat degradation and human disturbance reduced in the species' areas of occurrence</b>				
1.1 Mark boundaries of PNO and monitor entrance and access to the park with a view to regulating	Essential	Essential	Immediate	PNO, Communities
1.2 Undertake public awareness campaign for the communities including on other endemics	High	High	2014	PNO + NGOs+ Portuguese illustrators
1.3 Undertake training and certification of tourist guides that work in PNO	Medium	Medium	2015	DGT + guides + PNO
1.4 Feed new data into revision of Obô Natural Park management plan to improve zonation for ibis	High	High	2014	SPEA/RSPB
<b>Objective 2: Increased understanding of ecology, population size and distribution of the respective species</b>				
2.1 Collate and manage available data	Essential	Essential	Immediate /ongoing	SPEA (+ RSPB)
(a) collecting records from visitors, birdwatchers etc.	High	High	Immediate	SPEA
(b) having in place a centralized restricted access database and terms of reference for the use and management of the database	Essential	Essential	Immediate	SPEA
2.2 Produce up to date population estimates and distribution maps	Essential	Essential	Immediate	SPEA/RSPB
(a) Undertake surveys in Obô Natural Park and additional quadrats outside the park and input data to database	Essential	Essential	Immediate	SPEA + local guides
(b) Analyse data to produce distribution map and population estimate	Essential		Immediate	SPEA/RSPB

<i>Action</i>	<i>Priority (Ibis)</i>	<i>Priority (Fiscal &amp; Grosbeak)</i>	<i>Time scale</i>	<i>Organisations/individuals responsible</i>
2.2 Undertake scientific research studies on:	Essential	Essential	Immediate	BirdLife in cooperation with UP and (SP)
(a) the ecology of the species (MSc/PhD),	High	Essential	2014	Universities + SPEA/RSPB
(b) the potential impact of INNS, including predation by monkeys and cobras	High	Essential	2015	Universities + SPEA/RSPB
(c) the impacts of human activities	High	Essential	2015	Universities + SPEA/RSPB
(d) Movements and seasonality	N/A	Essential	2015	Universities + SPEA/RSPB
2.3 Undertake training to build capacity for monitoring and research	Essential	Essential	2014	BirdLife
2.4 Establish standardised annual monitoring scheme and undertake regular monitoring, including regular census of the species, as well as all INNSs	Essential	Essential	2014	SPEA + local guides + PNO
<b>Objective 3: Hunting of the Dwarf Olive Ibis is stopped</b>				
3.1 List hunters who might target the Dwarf Olive Ibis, interview them and organise a workshop to identify means to guarantee that they'll stop targeting the species	Essential	N/A	2014	SPEA/PNO
3.2 Seek appropriate implementation of the hunting law	Essential	N/A	2014	SPEA/PNO
3.3 Undertake surveillance	Essential	N/A	2014	PNO
3.4 Increase understanding about motivations of hunters and work to identify alternative solutions	High	N/A	2014/2015	SPEA/PNO
<b>Objective 4: Priority areas of forest habitat are preserved</b>				
4.1 Identify priority sites of forest, including for respective species, and seek their increased protection, including through revision of Obô Natural Park Management Plan	Essential	Essential	2014	SPEA, RSPB, PNO, DG Agr + Amb + Florestas
4.2 Input to oil palm development plans, including associated infrastructure, to reduce impact on priority forest areas and avoid further habitat loss	Essential	Essential	Immediate	SPEA/RSPB/BirdLife

<i>Action</i>	<i>Priority (Ibis)</i>	<i>Priority (Fiscal &amp; Grosbeak)</i>	<i>Time scale</i>	<i>Organisations/individuals responsible</i>
4.3 Seek compensatory measures for forest habitat lost to cuts	Essential	Essential	Immediate	SPEA/RSPB/BirdLife
4.4 Lobby for mandatory approvals and improved monitoring by government agencies of cutting operations	Essential	Essential	Immediate	SPEA/RSPB/BirdLife
4.5 Ensure hydroelectric dam development undertakes appropriate EIA and work to reduce negative impact of development on species and forest habitat	Essential	Essential	Immediate	SPEA/RSPB/BirdLife
4.6 Lobby for inclusion of national environmental NGO into hydroelectric stakeholder consultation	Essential	Essential	Immediate	SPEA/RSPB/BirdLife
4.7 Build capacity of Obô Natural Park Management Authority to undertake park protection activities	Essential	Essential	2014	SPEA/BirdLife
4.8 Reduce impact of illegal loggers through surveillance and enforcement including in the buffer area	High	High	2014	DG Florestas, PNO, ASMM.
(a). Agripalma to prevent use of equipment for illegal clearance and access via concessions sites	High	High	Immediate	Agripalma
(b). Assess the need of legal protection in the buffer zone	High	High	2014	SPEA/RSPB/PNO
(c). Enhance implementation of Obô Natural Park protection through park guards	High	High	2014	PNO
(d). Involve the communities in education and surveillance	Medium	Medium	2014/2015	local NGOs

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**ANNEX 1: Most important sites for the species and their status.**

International and national name	Area (ha)	Location		Population		Year	Season	Accuracy	Protected areas name	Type of protected area	Protection status
		Lat	Long	Min	Max						
Dwarf Olive Ibis	235 km <sup>2</sup>	0°25'N - 0°01'S	6°28'E - 6°45'E	40	700	2006	Breeding	Medium (Estimate)	São Tomé Obô Natural Park	Not reported	Some overlap with Lowland Forest IBA
São Tomé Fiscal	400 km <sup>2</sup>	0°25'N - 0°01'S	6°28'E - 6°45'E	1	49	2010	Breeding	Poor (Estimate)	São Tomé Obô Natural Park	Not reported	Some overlap with Lowland Forest IBA
São Tomé Grosbeak	90 km <sup>2</sup>	0°25'N - 0°01'S	6°28'E - 6°45'E	1	49	2010	Breeding	Poor (Estimate)	São Tomé Obô Natural Park	Not reported	Some overlap with Lowland Forest IBA