The Ingula Partnership

# BirdLife South Africa Southern Bald Ibis *Geronticus calvus*, Species Action Plan

Compiled by:

BirdLife South Africa

Robin Colyn

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## A. Species Overview

### Current Status and Population Trend

The Southern Bald Ibis is an endemic species to southern Africa and is currently listed as globally *Vulnerable* under the IUCN Red list Criteria (Henderson 2015). The species is restricted in range to north-eastern South Africa, Lesotho and Swaziland. South Africa forms the core of this species' range, with breeding strongholds occuring in KwaZulu-Natal (Drakensberg), Free State and Mpumalanga (Figure 1) (Henderson 2015, Barnes 2000). The global population size is estimated at around 7227 ± 709 individuals, of which 3290-4010 are mature individuals, which comprises approximately 1825 ± 180 breeding pairs (Henderson 2015). The regional and global population trend is in decline due to various pressures and threats placed on the species, with an estimated decline rate of 11% in mature individuals over the past 30 years.

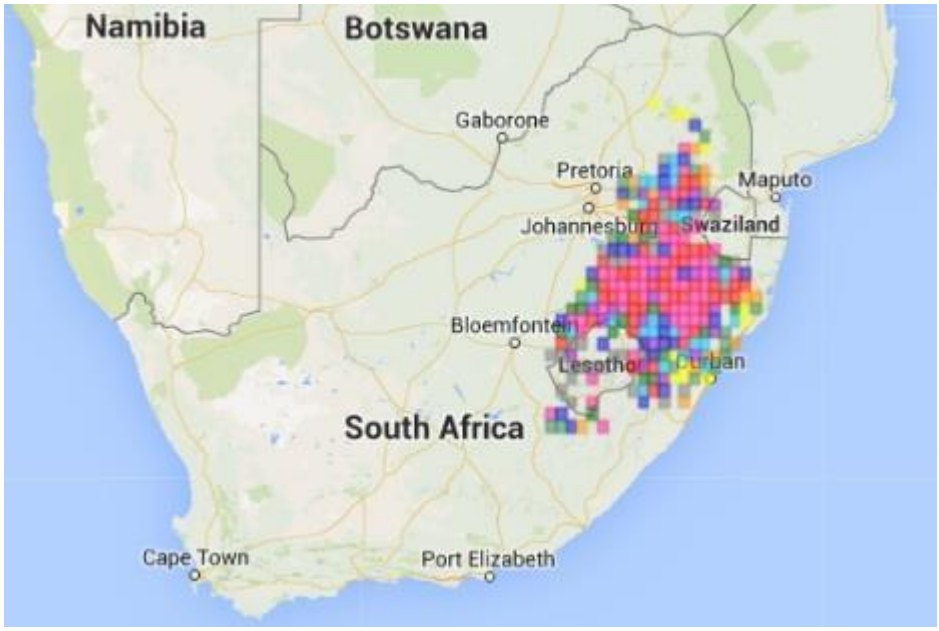


Figure 1: The current recorded distribution of Southern Bald Ibis as per data sourced from the Second Southern African Bird Atlas Project SABAP2 (Animal Demographic Unit 2015).

The major threats facing this species include habitat degradation, fragmentation and loss through various forms of anthropogenic development and associated impacts, including intensive crop farming, afforestation, open cast mining, acid mine water contamination and human-settlement related developments (Barnes 2000 and BirdLife International 2014). Another significant threat is the illegal harvesting of eggs and young chicks for consumption or for use in traditional medicine and/or ceremonial purposes.

### Ecology

This species favours mesic grasslands in high rainfall (>700mm per annum) and high altitude areas (>1200m a.s.l.). Preferred grassland is generally characterised by alpine and sour grassland types, without significant woody components including trees and bushes. Foraging can however occur within a wide range of habitats including natural grassland, pastures, croplands, irrigated fields and ploughed lands (Manry 1985, Manry 1984, Manry 1982). Favoured foraging habitat includes a short dense grass sward, including heavily grazed, recently burnt and mowed grass (Manry 1985, Manry 1984).

This gregarious species roosts and breeds communially on steep clifflines, with rare records of trees being utilised (Tarboton 2001). The peak breeding season within South Africa is August to September, with timing of breeding commencement often correlated to the quantity of burnt grassland available. Clutch sizes of 1 -3 eggs are laid at the commencement of the breeding season, which are incubated for 27-31 days. Multiple chicks can hatch at a given nest site, although multiple successful fledgings from one nest site are rare. Significant breeding failure can be recorded during very wet years, when breeding colonies are flooded or washed out from adjacent waterfalls (Manry 1985). Predation of nestlings is well recorded by species including Verreauxs' Eagle, Jackal Buzzard, White-necked Raven, Pied Crow, Cape Eagle Owl and other cliffline associated raptors (Manry 1985, Manry 1984).

## B. Research and Monitoring

### 1. National

A number of projects addressing various facets of Southern Bald Ibis ecology and status are underway at present.

Niche Modelling

In order to understand the current status of Southern Bald Ibis within its global range, habitat suitability analyses were conducted to estimate the quantity of habitat presently available under current land use practices within South Africa, Lesotho and Swaziland. These analyses factored in various environmental constraints noted for the species, including elevation, slope, rainfall, eco-region/biome and fine scale land cover data (Figure 2).

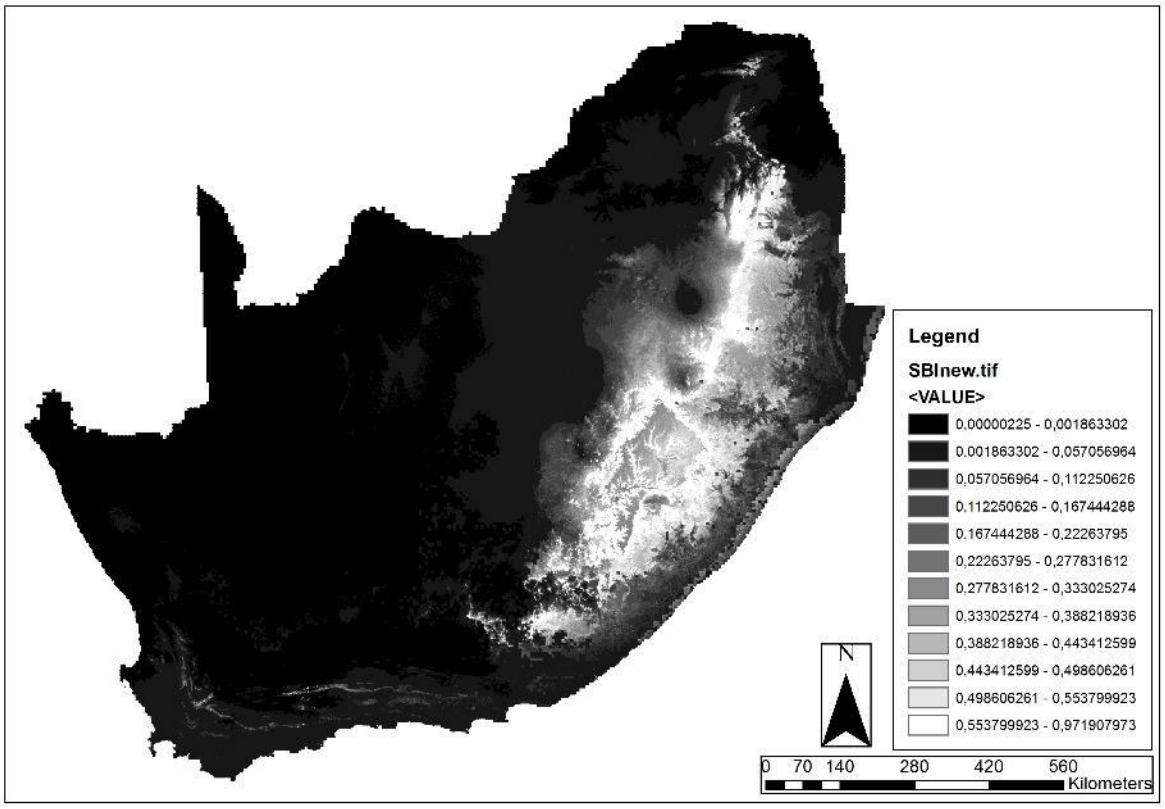


Figure 2: The refined niche modelling output for Southern Bald Ibis across South Africa, Lesotho and Swaziland (Colyn 2016).

To gain insight into the potential impact and threat of global climate change on this species, projected habitat suitability analyses were conducted for the species (Figure 3). These analyses included the

same respective environmental thresholds as the current (2016) model, but incorporated a specific greenhouse gas concentration trajectory, namely Representative Concentration Pathway (RCP) 8.5, with associated predicted climatic data under the HadGEM2-AO 2050 climatic model (WorldClim 1.4).

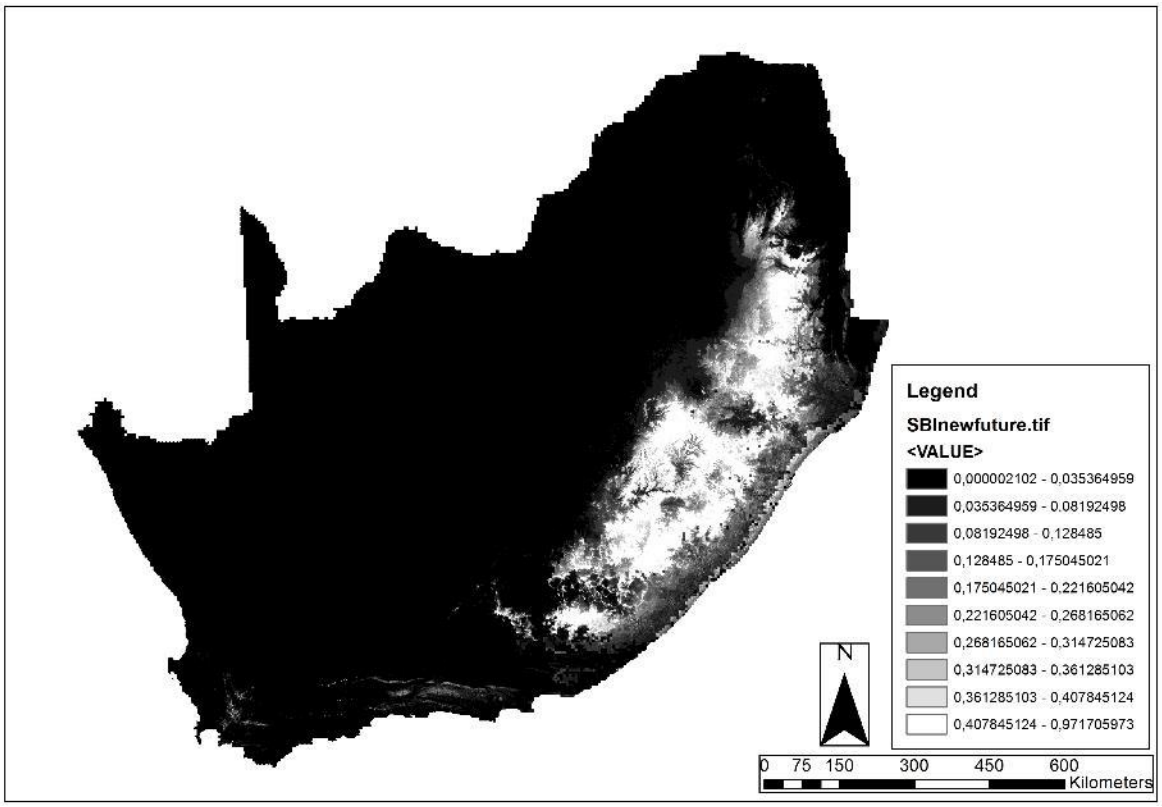


Figure 3: The refined niche modelling output for Southern Bald Ibis across South Africa, Lesotho and Swaziland, incorporating global climate change projections under the HadGEM2-AO climate model for 2050 (Colyn 2016).

The results of these analyses highlighted the habitat available for Southern Bald Ibis currently, which will guide future surveys assessing new potential breeding sites. Furthermore, the incorporation of climate change projections provides insight into the potential impact and threat of climate change on this species. Of particular significance is the noted eastward shift in suitable habitat under the projected changes climatic conditions, as well as the contraction of available habitat along the western part of the species current range (Figure 4). The subsequent shift in suitable habitat under climate change projections also highlights those areas that would remain suitable under changing climatic conditions and could therefore be prioritised as sites that require conservation focus with regard to stewardship initiatives.

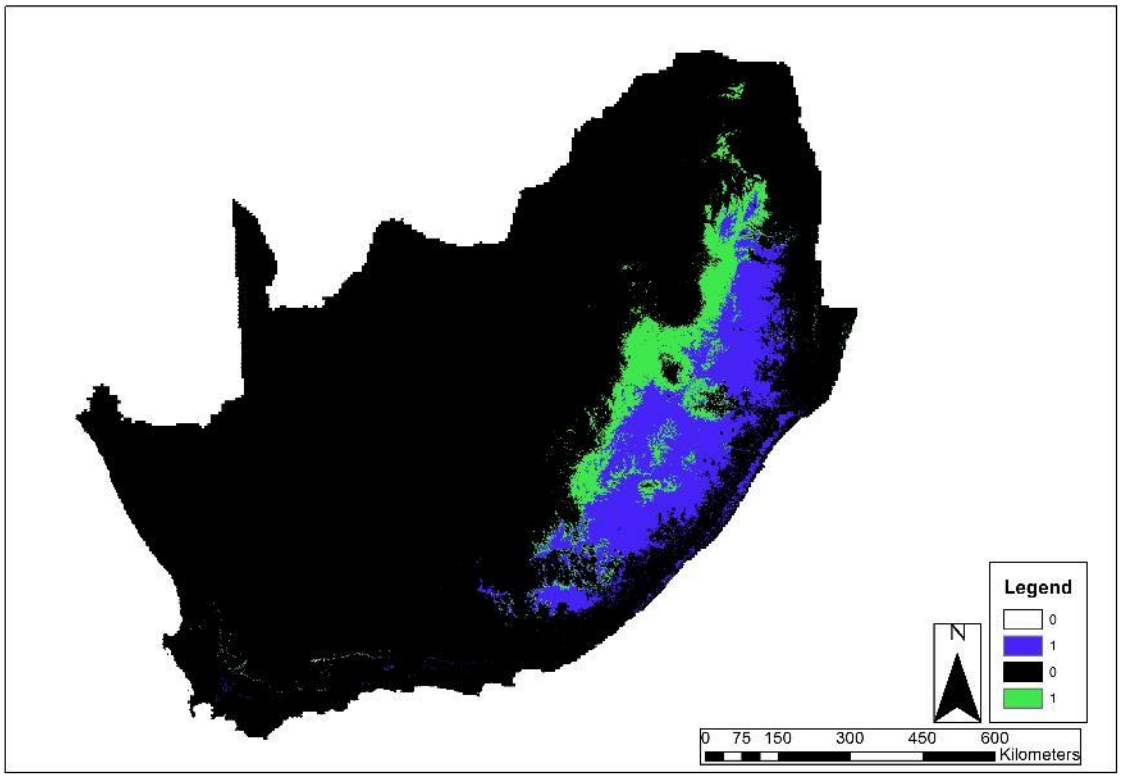


Figure 4: The current habitat available (green) and projected habitat available under climate change conditions in 2050 (blue) as identified by Maxent niche modelling (Colyn 2016).

Home range, habitat use and foraging dynamics study

As part of a study evaluating the movements of Southern bald Ibis and associated ecological interactions such as habitat use, foraging and home range dynamics, two chicks were fitted with satellite tracking devices on 2 January 2014. Unfortunately, one of the tracking devices failed four months into data collection, but the other tracker has been providing consistent data for 30 months. These data have provided crucial insight into the foraging distance travelled across seasons and habitats (Figure 5), home range size in an eastern Free State landscape (Figure 6) and habitat preference across seasons and rainfall patterns (Figure 7 & 8).

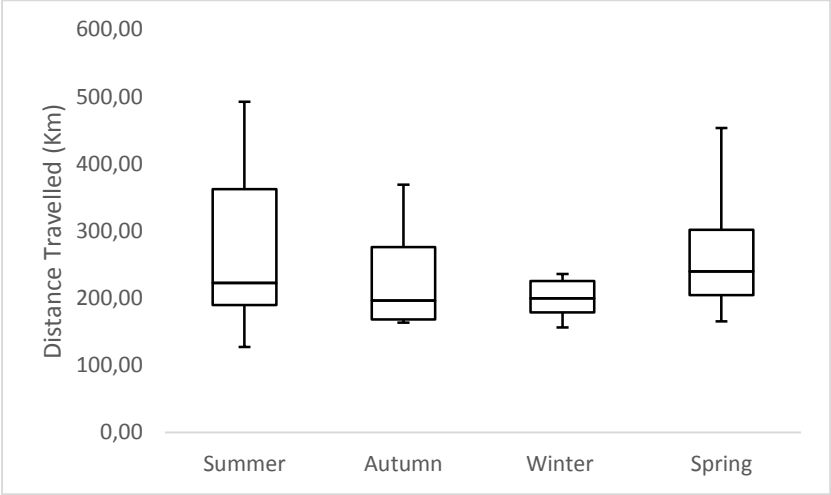


Figure 5: The foraging distance travelled per season by a juvenile Southern Bald Ibis between 2014 and 2016 (Colyn 2016).

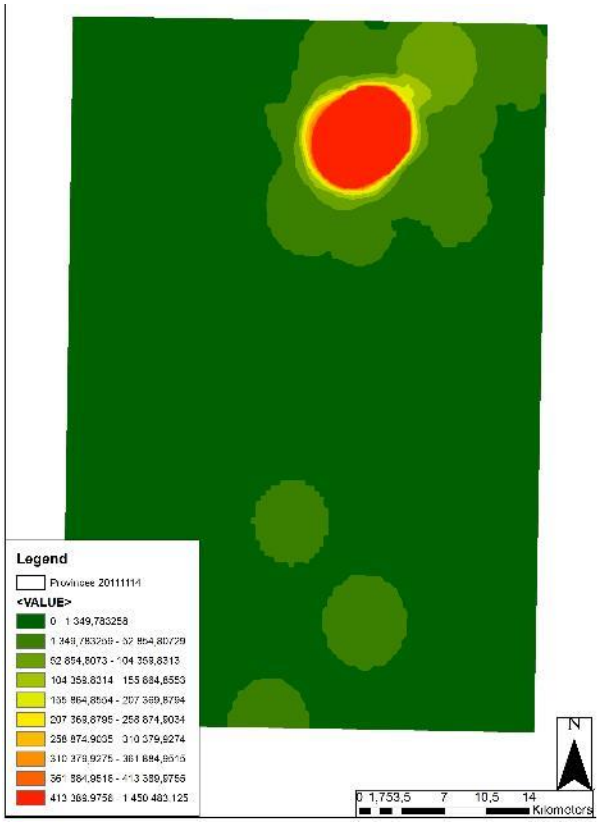


Figure 6: The mapped Kernel Density Estimation (KDE) for a Southern Bald Ibis juvenile in eastern Free State (Colyn 2016).

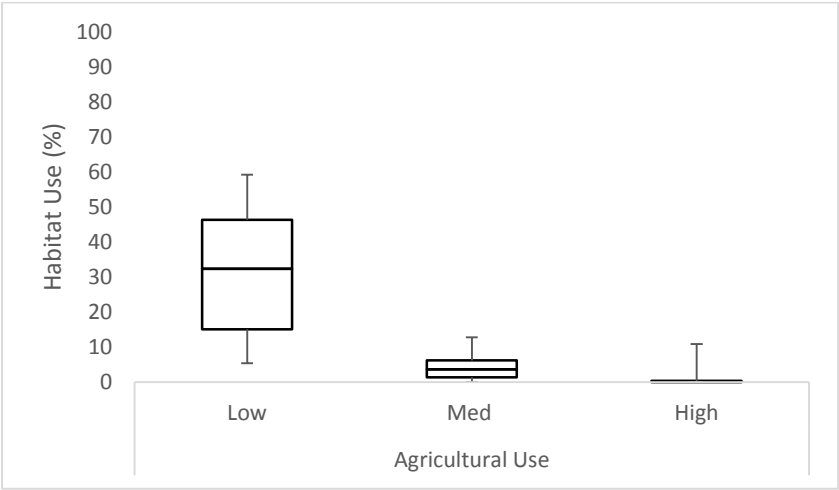


Figure 7: Habitat use of agricultural land by a juvenile Southern Bald Ibis between 2014 and 2016 (Colyn 2016).

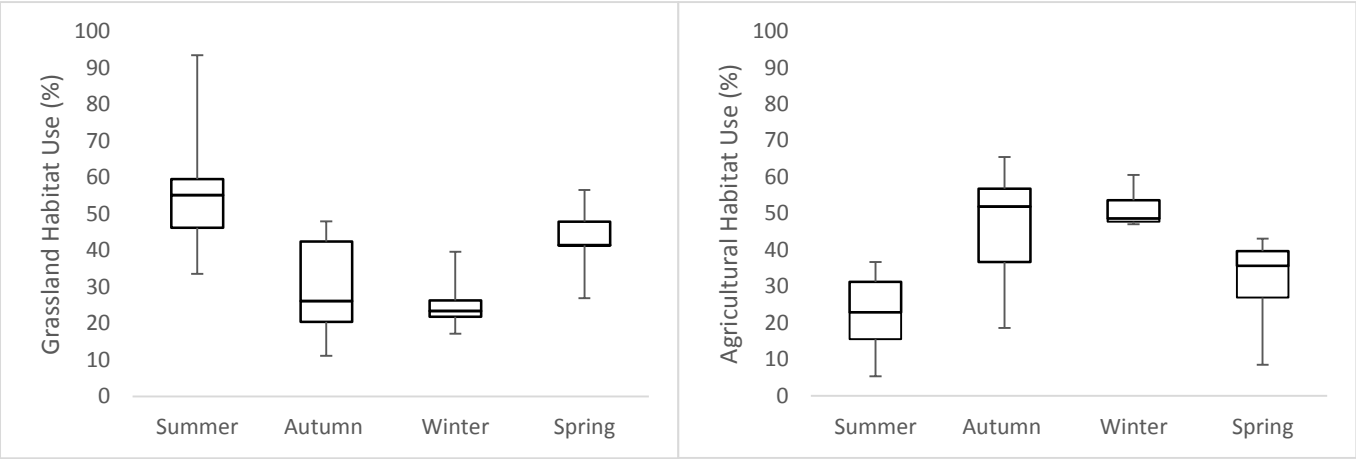


Figure 8: The seasonal variation in use of grassland and agricultural habitats by a juvenile Southern Bald Ibis (Colyn 2016).

Breeding Colony Monitoring

Extensive monitoring of breeding colonies was conducted between 2010 and 2015 in order to assess the breeding success of Southern Bald Ibis across both spatial and temporal scales. These data have directly contributed to our understanding of the status of the species at present. Future surveys are being coordinated across significant breeding colonies through working relationships with BirdLife South Africa Bird Clubs. All data received is being house in a National Southern Bald Ibis database and will be analysed periodically to determine if any changes in breeding success or distribution are noted. Thus far, data has been collated on 224 breeding colonies across South Africa and Lesotho between 1997 and 2016, which has been utilised in various analyses (Figure 9).

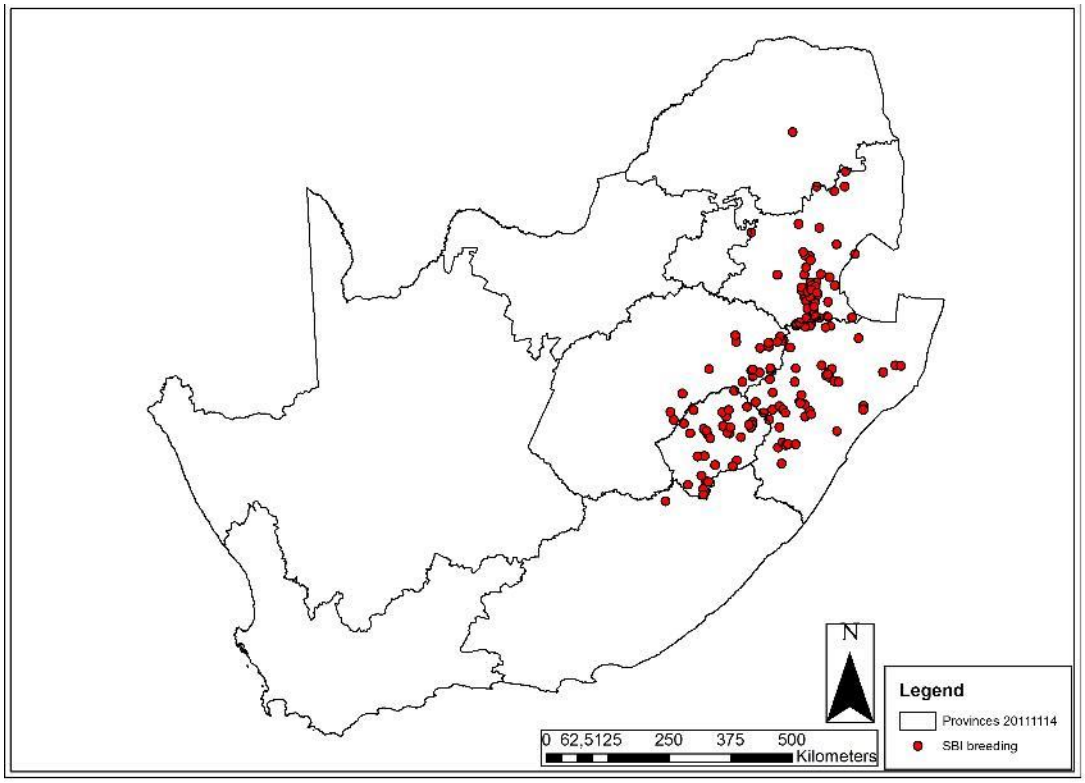


Figure 9: Southern Bald Ibis breeding colonies recorded in the database across South Africa and Lesotho (Colyn 2016).

## 2. Local (Ingula Nature Reserve)

Monitoring has taken place of the breeding colony at Ingula since 2010 (Figure 10). Unfortunately this site was flooded with the partial filling of the Bedford Dam in June 2015 (Figure 11), after which the birds began breeding under the artificial colony nest holes on available rock ledges during the 2015 breeding season (Figure 12). These ledges below the nesting holes have subsequently flooded in May 2016 and the 2016 season will reveal whether the birds will utilise the nesting holes for breeding.

Figure 10: The original breeding colony site at Ingula with three active nest sites visible (Colyn 2014).

Figure 11: The original breeding site after flooding (Colyn 2015).

Figure 12: The artificial breeding site at Ingula (left), with an active nest site on a ledge below the nesting holes (right) in the 2015 breeding season (Colyn 2015).

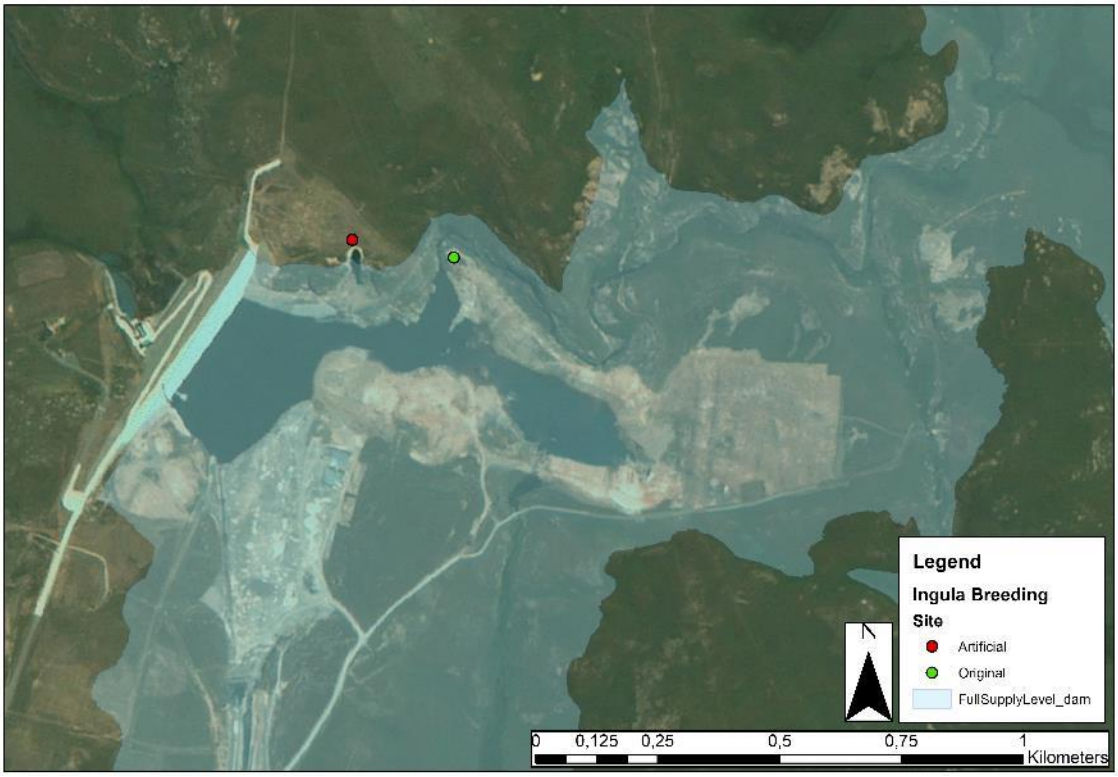

Figure 13: The localities of the original (green) and artificial (red) breeding sites at Ingula, with the associated full supply level for the Bedford Dam.

## C. Threat Analysis

### 1. National

| Threats | Severity | Timing | Scope |
|---|---|---|---|
| Habitat loss, degradation and fragmentation through agricultural, urban and peri-urban development | High | Immediate | All |
| Habitat loss and fragmentation through global climate change. | High | Slow | All |
| Harvesting of eggs and chicks at breeding colonies for consumption or traditional ceremonies | Medium | Immediate | Some |
| Collision with power infrastructure (power lines, wind turbines, etc.) | None | Moderate | Some |
| Impact of poisoning/bioaccumulation of pesticide exposure | Unknown | Unknown | Unknown |

**Severity** (potential population deterioration over 10 years or three generations): High (>30%), Medium (10-30%), Low (<10%), None (<1%); **Timing**: Immediate (Currently happening), Moderate (within the next five years), Slow (beyond five years); **Scope**: All (>90% of the population), Some (10-50% of the population), Few (<10% of the population). Unknown: Data Deficient.

### 2. Local (Ingula Nature Reserve)

| Threats | Severity | Timing | Rationale |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Habitat alteration and/or availability | High | Immediate | This species requires sour grassland with a short dense grass sward for foraging. **An efficient grazing (and fire) management plan is required to ensure the supply of suitable foraging habitat on site for this species.** This is further emphasised in that the majority of recent (>3 years) sightings of foraging SBI's have been off Ingula property (adjacent grazed land). |
| Breeding colony disturbance | High | Immediate | Following the flooding of the natural cliff line utilised for breeding, the potential successful use of the artificial site will need to be monitored. A major concern is the accessibility of the new artificial breeding site. There is a management track running right to the nest holes that are 2 m below the cliff lip. **A major disturbance could be the mere presence of people checking on the nest site which could lead to nesting failure and desertion**. Access should be tightly controlled and monitored, particularly during the breeding season (August - February). |
| Habitat loss, degradation and fragmentation through agricultural, urban and peri-urban development | None | Slow | Formal proclamation underway and Reserve Management Plan strictly manages development through appropriate zonation. |
| Harvesting of eggs and chicks at breeding colonies for consumption or traditional ceremonies | None | None | Formal proclamation underway and Reserve Management Plan strictly manages social interaction with threatened species. |
| Collision with power infrastructure (power lines, wind turbines, etc.) | Low | Moderate | Seasonal power line infrastructure checks are conducted and no fatalities have been recorded to date. |
| Impact of poisoning/bioaccumulation of pesticide exposure | None | None | Formal proclamation underway and Reserve Management Plan strictly manages agricultural activities through appropriate zonation. |

**Severity** (potential population deterioration over 10 years or three generations): High (>30%), Medium (10-30%), Low (<10%), None (<1%); **Timing**: Immediate (Currently happening), Moderate (within the next five years), Slow (beyond five years).

## D. Conservation Constraints

### 1. National

| Constraint | Resolution/Mitigation |
|---|---|
| The core breeding range is extensive, covering three provinces and furthermore a significant proportion of the global range occurs within Lesotho. | Initiate contact and build relationships with associated BirdLife South Africa Bird Clubs across the species' range. Ascertain the viability of conducting breeding colony counts using BirdLife South Africa Bird Blub members. |

| | |
|---|---|
| There is currently no BirdLife Partner in Lesotho, where a significant proportion of the core range occurs. | Assess the viability of Partner Development work with appropriate Lesotho conservation representatives. Alternatively, assess the viability of utilising Lesotho based monitors (e.g. BVTF monitors) to conduct breeding assessments. |

## 2. Local (Ingula Nature Reserve)

| Constraint | Resolution/Mitigation |
|---|---|
| **Limited breeding habitat available** following the Bedford Dam flooding. The flooding event removed the natural cliff line utilised up until 2015, as well as the cliff ledges 2-5 m below the artificial nest cavities which was utilised for the first time in 2015. | Assess whether the artificial cavities are utilised during the 2016 breeding season. If not, investigate methods of making the cavities more suitable for breeding. |
| **Limited foraging habitat available**. Until full proclamation of the Ingula Nature Reserve and completion of the construction phase of the project, stocking of grazers is highly unlikely. | Assess the available options for maintaining optimal grazing dynamics at Ingula. Furthermore, from the available options implement the most viable option at selected sites and monitor the associated changes. |

The breeding success prior to the flooding of the original breeding site and respective rock ledges under the artificial breeding holes were below the national average (Colyn *et al*. 2016 *in prep*). The 2008 to 2010 seasons at Ingula resulted in breeding success rates of 0.25, 0.29 and 0.22 (avg. = 0.25) respectively, with the number of nests varying between seven and nine. The national fledgling success rate calculated across 21 colonies between 2004 and 2010 is estimated at 0.47 (Colyn *et al*. 2016 *in prep*), which is 88% higher than that of Ingula over a similar temporal period. The fledgling success rates for Ingula between 2014 and 2015 was somewhat higher at 0.33 and 0.35 respectively. The lower survival rates between 2008 and 2010 were attributed to noted predation of eggs and/or fledglings by White-necked Raven and Jackal Buzzard, as well as mortalities associated with severe rainfall events resulting in nest flooding.

The limited foraging habitat available on Ingula property is of utmost concern as it is a direct threat to the persistence of this species locally. Hotspot analysis clearly displays the only actively utilized area within Ingula property being directly around the breeding site (Figure 14). Other areas of significant activity to the west of Ingula is on private land that is regularly grazed, producing the short grass sward favoured by this species (Manry 1985). The average flock size recorded at Ingula is relatively small (avg. = 6), which is not uncommon for this species as they are known to break up into smaller foraging parties (Manry 1985). However, the full colony (n = 28) has been recorded foraging together along areas of optimal habitat, particularly along recently burnt fire breaks or block burns in winter and early spring.

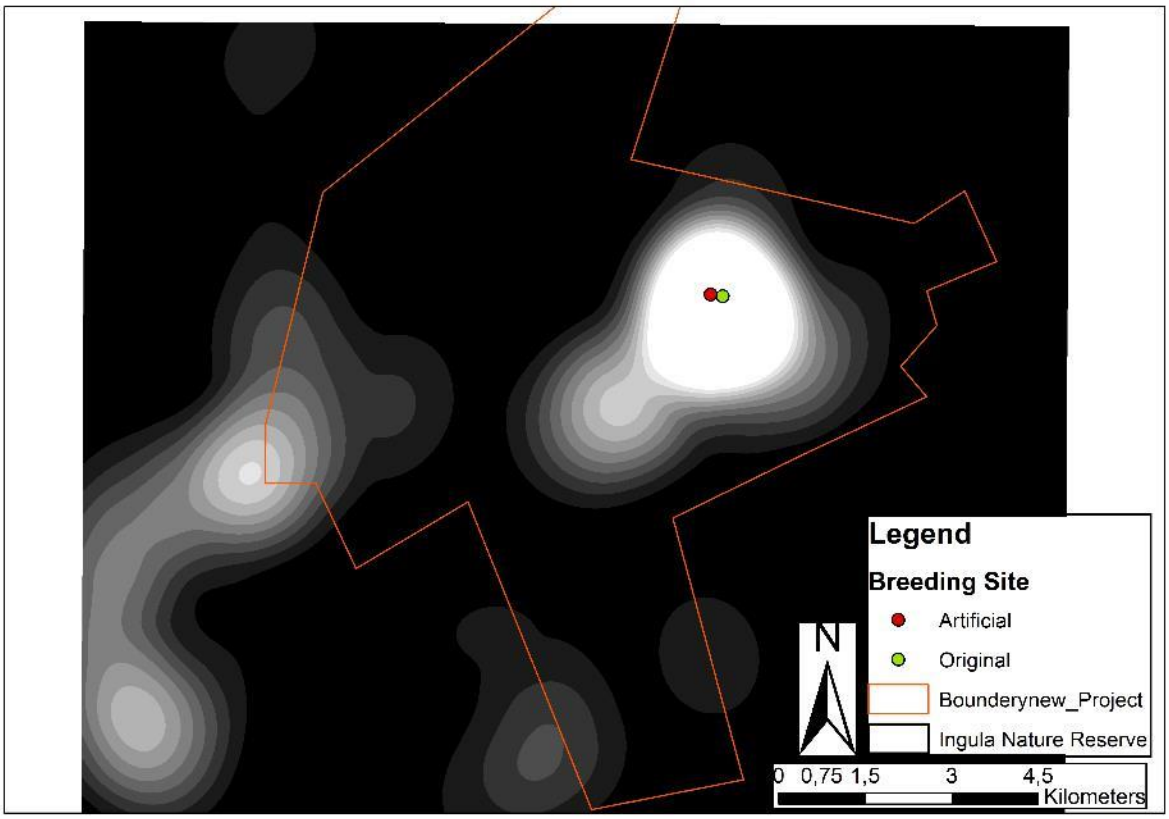


Figure 14: Hotspot analysis highlighting the most significant areas of Southern Bald Ibis activity within Ingula and surrounds (Colyn 2016). The artificial and original nesting sites are indicated on the map for reference.

## E. Conservation Action Matrix

### 1. National

| Action | | Responsible Stakeholder | Priority | Timing | Funds Required | Associated cost/resource |
|---|---|---|---|---|---|---|
| **Research** | | | | | | |
| R 1 | Conduct distribution modelling to determine and quantify suitable habitat across southern Africa. | BLSA | Essential | Immediate (2016) | No | N/A |
| R 2 | Conduct home range, habitat use and activity pattern analyses to determine the current foraging requirements of the species. | BLSA | Essential | Immediate (2015) | No | N/A |
| R 3 | Assess the current status of surveyed Southern Bald Ibis breeding colonies across South Africa. | BLSA | Essential | Immediate (2010 - 2016) | No | Associated post graduate student (K. Henderson) |
| R 4 | Determine the potential impact of continued habitat loss and global climate change impacts on the species. | BLSA | Medium-High | Short | No | N/A |
| R 5 | Assess the potential impact of pesticide poisoning and exposure on Southern Bald Ibis within agricultural - grassland mosaic habitats. | Tertiary institution - BLSA collaboration with academic institutions | High | Short-long | Yes | A fully funded MSc candidate |
| **Monitoring** | | | | | | |
| M1 | Assess the current known Southern Bald Ibis breeding colonies across South Africa. | BLSA | High | Immediate (2016) | Yes | Potential for Bird Clubs to assist |
| M2 | Assess the current status of known Southern Bald Ibis breeding colonies within Lesotho. | BLSA | High | Immediate (2016 - 2017) | Yes | R6000 for two/three monitors for one season |

| | | | | | | |
|---|---|---|---|---|---|---|
| M3 | Assess whether known local extinctions in the Eastern Cape have been recolonized. Utilise the distribution model to guide surveys in the absence of discrete locality data. | BLSA | High | Short | Yes | Potential for Bird Clubs to assist or fieldwork by dedicated staff member or monitor |
| M4 | Utilise the distribution model to identify potential unknown/unsurveyed breeding sites | BLSA | Low | Short-long | Yes | Potential for Bird Clubs to assist |
| **Habitat Conservation** | | | | | | |
| H1 | Utilise the distribution model and current breeding colony data to identify core areas of conservation significance based on colony size and available habitat. | BLSA | Essential | Short | No | N/A |
| H2 | Utilise the distribution model and current breeding colony data to determine what proportion of breeding colonies and available habitat fall under formal protection and within Important Bird and Biodiversity Areas (IBAs). | BLSA | Essential | Short | No | N/A |
| H3 | Under the current Important Birds and Biodiversity Area (IBA) Programme, assess the viability of including the identified core Southern Bald Ibis areas under adjacent IBAs (if not already), as well as other appropriate conservation stewardship initiatives. | BLSA | High | Short-long | Yes | ? |
| **Education and Awareness** | | | | | | |
| E1 | Develop a Southern Bald Ibis education/awareness strategy for particular areas of concern. | BLSA | High | Immediate (2016) | No | N/A |
| E2 | Develop and implement Southern Bald Ibis education/awareness content for integration into the current school curriculum (CAPS). | BLSA | High | Immediate (2016) | Yes | R 10 000 |

**Timing**: Immediate (Currently happening), Short (within the next three years), long (beyond three years)

## 2. Local (Ingula Nature Reserve)

| Target | Action Required | Progress | Priority | Timeline | | Resources Required | Responsibility |
|---|---|---|---|---|---|---|---|
| | | | | Replication | Start Date | | |
| Assess the breeding status of colonies within Ingula following the flooding of previously utilised cliff lines. | **Annual Monitoring of breeding colonies** at start of breeding season (August). | Implemented, commenced annually. | Essential | Annually (August to January). | 2012 | N/A | BLSA |
| Promote sustainable sections of suitable habitat for SBI and other grassland species favouring a shorter grass sward. | Develop and implement a **Grazing Management Plan (GMP)**. Develop and implement a **grassland monitoring tool** to assess the condition of grassland habitat. | Underway, NDVI mapping tool developed and being refined. GMP not yet developed. | Essential | Monitoring conducted seasonally or as required. | 2016 | ArcGIS, LandSAT and Spot imagery. | Eskom and BLSA (Coordinated effort) |
| Monitor the status and distribution of SBI activity in relation to management practices (Fire and Grazing Management Plan). | Monitor number of nest sites, clutch sizes and fledging success. Assess the distribution of foraging sightings across Ingula. | Falls within current monitoring activities. Data analysis to commence annually. | High | Annual data analysis to assess trends. | 2016 | N/A | BLSA |

## Conclusion

Managing the two most significant grassland drivers, namely fire frequency and grazing intensity, are one of the most significant and often challenging management objectives for any protected area within the Grassland Biome. Inappropriate frequency and intensities of these respective drivers will have a detrimental and potentially severe impact upon a host of invertebrate and vertebrate species inhabiting these ecosystems. Avian grassland specialist species are among those that are most detrimentally impacted upon, particularly by extensive over-grazing and annual fires (Little *et al.* 2013, Batary *et al.* 2006 and Martin *et al.* 2005).

These drivers are however critical for the persistence of Vulnerable Southern Bald Ibis within grasslands across South Africa, but more specifically within Ingula. The significance thereof is further emphasized in that the majority of foraging records for Southern Bald Ibis from the Ingula colonies are recorded within adjacent properties where grazing is maintained. Sightings within Ingula are largely restricted to burnt areas within season (May to October) or near the roosting or breeding colonies. Results from a satellite tracking study conducted in eastern Free State emphasized the reliance of natural suitable grassland habitat for this species during summer months. These data also highlight the adaptability of this species, whereby birds will willingly utilise low intensity agricultural fields including pastures and irrigated fields in wintering months (Colyn *et al*. 2016 *in prep*). When agricultural intensity increases from low to high intensity though, utilisation by birds ceases. Natural grassland habitat forms the most significant component of their preferred foraging habitat, including the availability of a short grass sward throughout the year and sections of burnt grassland in winter (Manry 1985). An efficient grazing and burning regime is therefore imperative for the survival of this species on a local level in future.

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