

The Development of an Avian Wind Farm Sensitivity Map for South Africa

EF Retief – Presenter

Co-Authors

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The Wind Farm Industry in South Africa

- New programme in South Africa
- Only 8 wind turbines currently in South Africa
- The South African Government indicated that it is committed to clean energy
- The National Energy Regulator of SA approved the Renewal Energy Feed-in Tariff (REFIT₁) guideline in 2009
- This guideline makes provision for 700MW to be implemented by the end of 2013





Uncertainty about the Impact on Birds in South Africa

- We know from experience in other countries in the world that there will be a negative impact on birds – from loss in habitat or birds that are directly killed by wind turbines
- We do know that the impact of wind farms in the rest of the world differs from site to site. At some wind farms no fatalities and in others lots of fatalities

Uncertainty about the Impact on Birds in South Africa (Continued)

- Big difference between South Africa and other countries in the world in terms of:

- Species diversity
 - 841 Species in South Africa
 - 125 Endangered species
- Behaviour (migration)



Arnold vd Westhuizen

- A direct comparison or prediction of what the effect will be on birds within South Africa is therefore **not possible**



Opportunity to be Pro-active

- South Africa can learn from experiences in other countries in the world and apply those lessons to minimise the effect on birds
- Experience in other countries showed that **the correct placement of wind farms** will minimise bird casualties
- Prevention is better than cure
- One way is to create an Avian Wind Farm Sensitivity Map or similar product to guide the wind farm industry, EIA practitioners and conservationists



Birds and Wind Energy Specialist Group (BAWESG)

- Birdlife South Africa and the Endangered Wild Trust decided to create an advisory group to guide all role players
- The group consists of representatives of the two organisations as well as EIA and bird specialists
- BAWESG is **NOT AGAINST** the development of wind farms but it should be implemented responsibly and in line with legislative requirements



Avian Wind Farm Sensitivity Map

- BAWESG decided to design an Avian Wind Farm Sensitivity Map
- Funding Provided by the Wildlife & Energy Programme of the Endangered Wildlife Trust
- Purpose of the Map: To provide an indication of the geographic areas in South Africa where the possible establishment of wind farms might have a negative impact on birds



What the map is not!

Not a substitute for EIA!!

- The only purpose of the map is to provide **guidance** to the industry in the early stages of the planning process

Does not indicate “no go” zones

- Only areas of sensitivity will be indicated

Project Phases

Phase 1

- Draft a discussion document with the aim to discuss methodology, data sources to be used, map design etc
- Create a basic species list to consider for inclusion on the map
- Draft a basic map using only SABAP2 data
- Define gaps in data and obtain comments on draft map

Phase 2

- Finalise discussion document
- Import species data from other data sources
- Finalise map

Phase 3

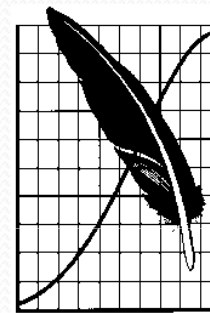
- Distribute map and make publicly available



Data Sources

Numerous data sources which could be used

- SABAP1 and SABAP2 data
- Co-ordinated Waterbird Counts
- Birds In Reserves Project
- Coordinated Avifaunal Road Counts
- Data from Endangered Wildlife Trust (EWT) working programs
- Specialist reports
- Lesser Kestrel (*Falco naumanni*) and Amur Falcon (*Falco amurensis*) roost sites



Animal
Demography
Unit

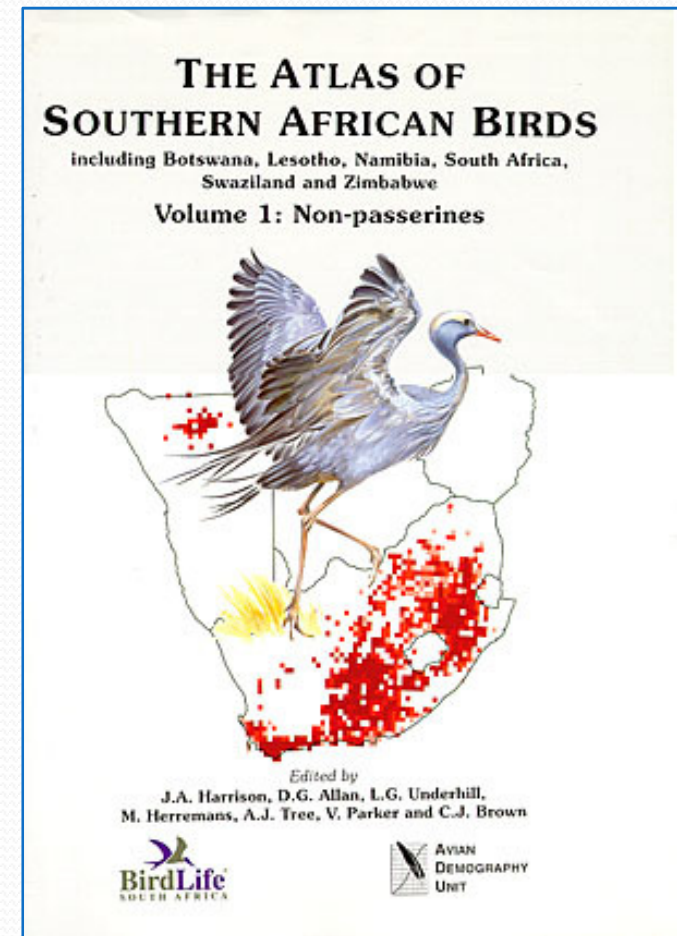
SABAP1 and 2

SABAP₁

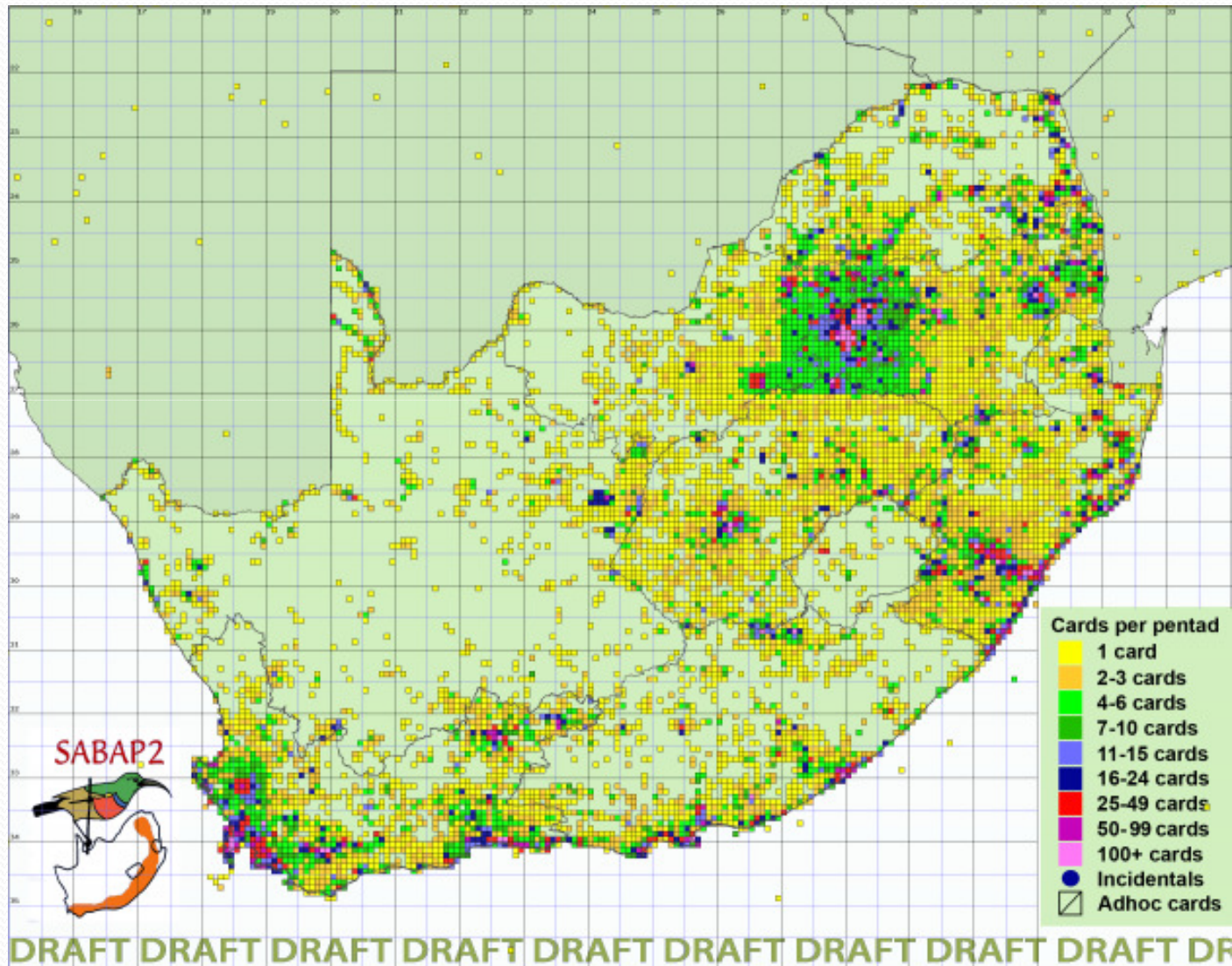
- Completed early 1990s
- Lists submitted per Quarter Degree Square
- Coverage for the whole of South Africa

SABAP₂

- Began in July 2007
- 5 Degree x 5 Degree grid (Called a pentad)
- More than 2.5 million records submitted by 850 atlasers
- Data vetted against SABAP₁ data and through vetting committees
- Strict protocol to determine for example effort
- Data submitted electronically



SABAP2 - Coverage



Map based on two factors

The sensitivity of an area is based on two factors:

- Status of the land
- Sensitivity of the land due to the species that occur in the area



Status of the land

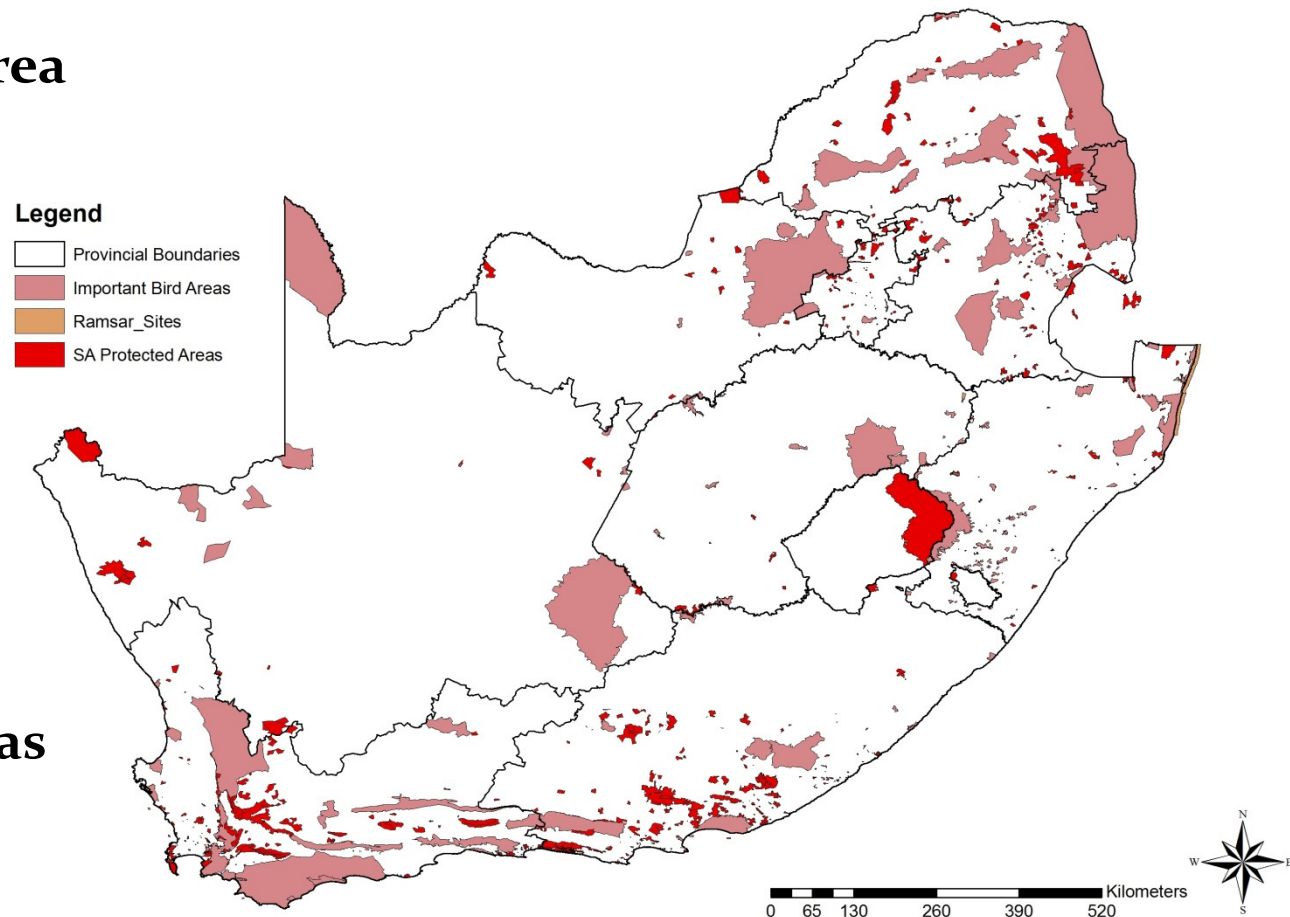
The following can be taken into consideration

Formal protected area

- National Parks
- Nature Reserves

Ramsar sites

Important Bird Areas



Status of the Land (2)

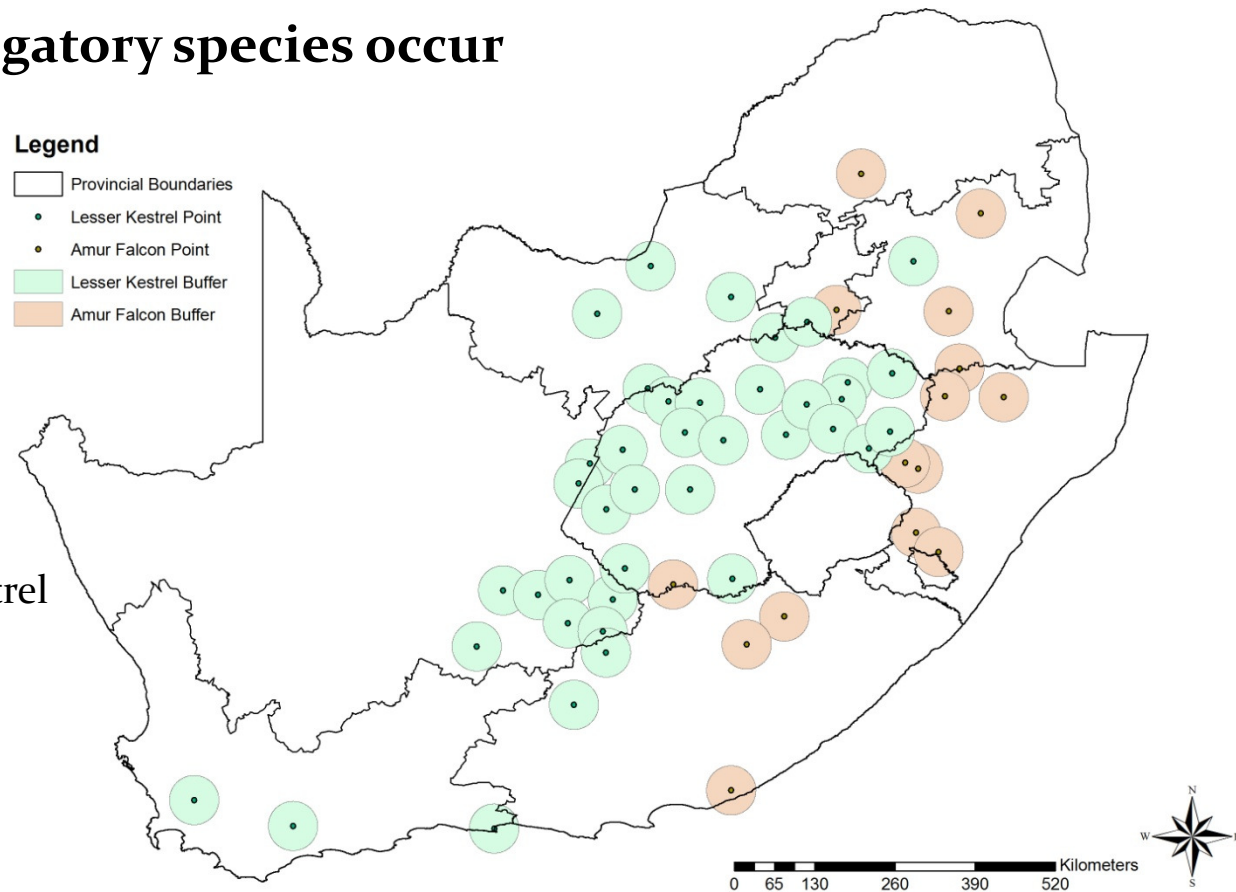
Status of land based on congregatory species

- **Areas where congregatory species occur**

- Waterbirds
- Vulture Colonies
- Bald Ibis Colonies
- Barn Swallow Roosts

- **Buffer zones**

- 3km around Lesser Kestrel and Amur Falcon Roost sites



Status of the Species

- **Species of Conservation Concern**
 - Global Conservation Status of Species (IUCN)
 - Regional Conservation Status of Species (Red Data Book – 2000)
- **Endemic species**
 - Endemic to South Africa
 - Breeding endemics
- **Migratory Species**



Species List

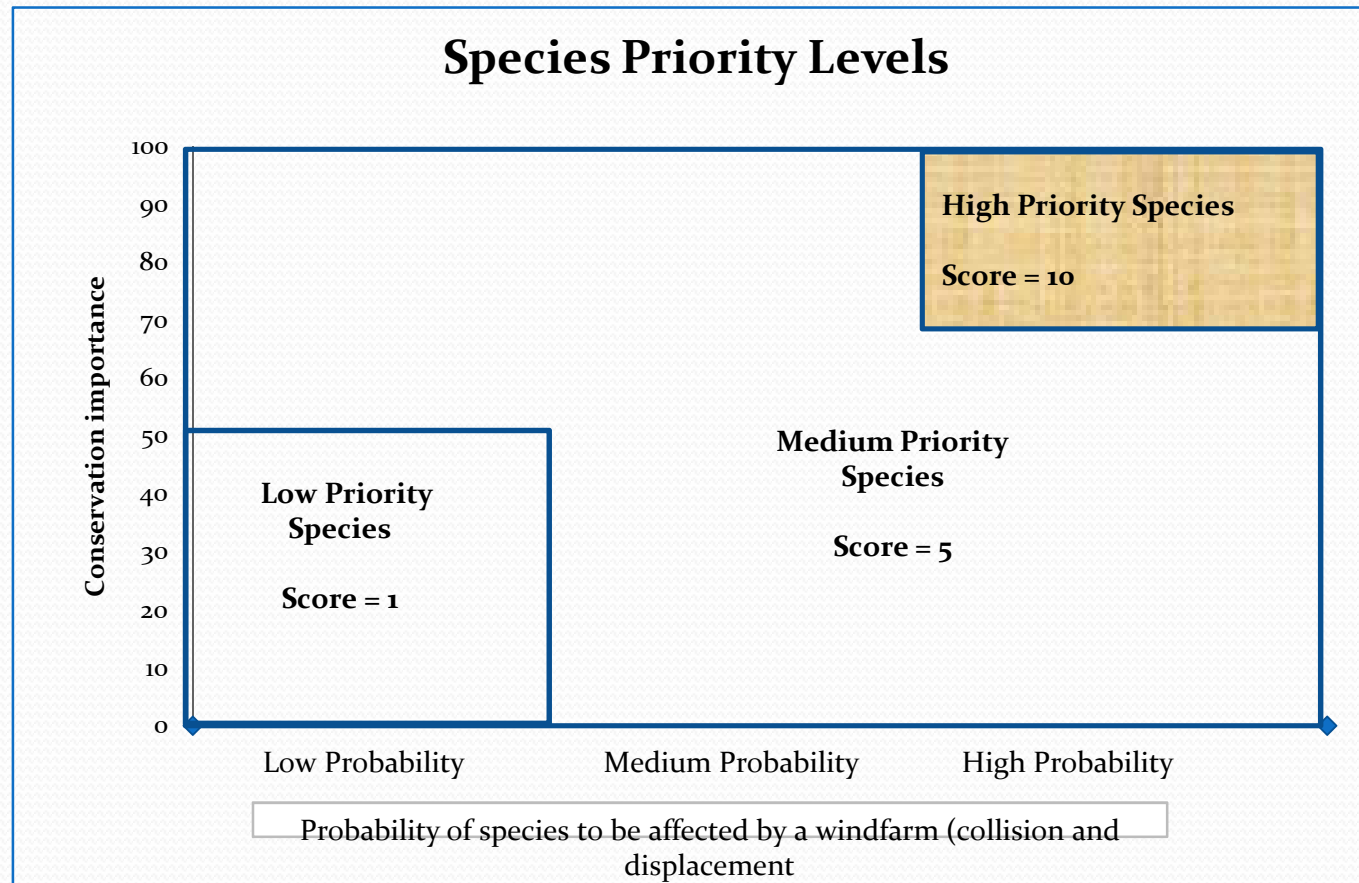
Considerable debate as to which and how many species should be included on the map for consideration

- No experience in South Africa as to which species should be included
- A list was compiled by studying literature and studies outside of South Africa
- Species list decided on contains 144 species

207	Wattled Crane
195	Ludwig's Bustard
352	Bearded Vulture
79	Southern Ground-Hornbill
194	Denham's Bustard
196	Kori Bustard
203	White-bellied Korhaan
205	Grey Crowned Crane
206	Blue Crane
355	White-backed Vulture
357	Cape Vulture
358	Lappet-faced Vulture
362	Southern Banded Snake-Eagle
364	Bateleur
366	African Marsh-Harrier
367	Black Harrier
387	Tawny Eagle
394	Martial Eagle

Species Priority Levels

How to determine which priority value to assign to each species?





Conservation Status Levels

Species of Conservation Concern Globally Critical Endangered: 100
Species of Conservation Concern Nationally Critical Endangered: 100
Species of Conservation Concern Globally Endangered: 90
Species of conservation Concern Nationally Endangered: 90
Species of Conservation Concern Globally Vulnerable : 70
Species of Conservation Concern Nationally Vulnerable: 70
Species of Conservation Concern Globally Near-threatened: 50
Species of Conservation Concern Nationally Near-threatened: 50
Breeding Endemic Species: 30
Endemic Species: 20
Near-Endemic Species: 15
All other species: 10

Conservation Status Levels (2)

Common Names	Global Threatened Status	Regional Threatened Status	Breeding Endemics	Endemics	Near-Endemics	Other Species	Conservation Value	Risk Factor	Risk Score	Species Priority Score
Wattled Crane		100				10	100	High Risk	100	10
Ludwig's Bustard	90	70				10	90	High Risk	100	10
Bearded Vulture		90				10	90	High Risk	100	10
Southern Ground-Hornbill	70	70					70	High Risk	100	10
Denham's Bustard	50	70				10	70	High Risk	100	10
Kori Bustard		70				10	70	High Risk	100	10
White-bellied Korhaan		70				10	70	High Risk	100	10
Grey Crowned Crane	70	70				10	70	High Risk	100	10
Blue Crane	70	70				10	70	High Risk	100	10
White-backed Vulture	50	70				10	70	High Risk	100	10
Cape Vulture	70	70				10	70	High Risk	100	10
Lappet-faced Vulture	70	70				10	70	High Risk	100	10
Southern Banded Snake-Eagle	50	70				10	70	High Risk	100	10
Bateleur	50	70				10	70	High Risk	100	10
African Marsh-Harrier		70				10	70	High Risk	100	10
Black Harrier	70	50			15	10	70	High Risk	100	10
Tawny Eagle		70				10	70	High Risk	100	10
Martial Eagle		70				10	70	High Risk	100	10



Map Sensitivity Calculation

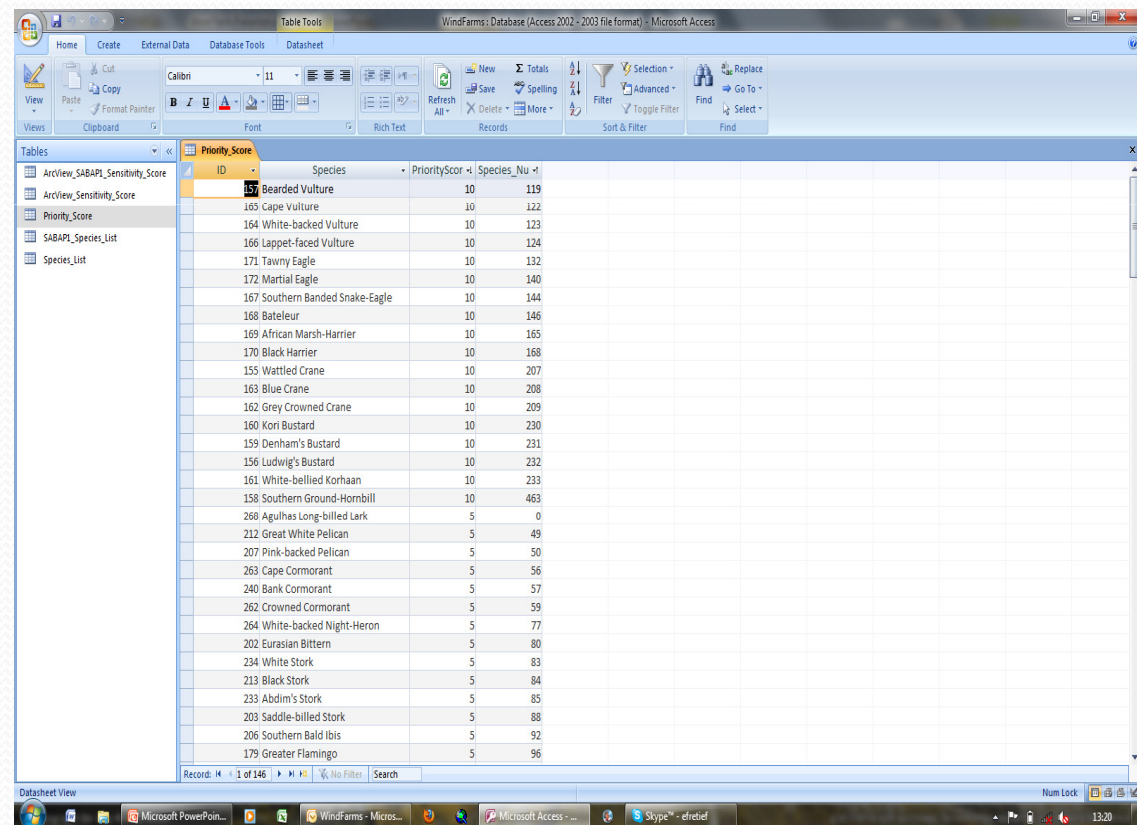
How is the sensitivity level of an area calculated?

- Status of the land
- Status based on the species that occur at a specific locality
 - **Obtain data** where all the species to be consider have been recorded in South Africa
 - Obtain the **species priority score** for each species
 - **Count** the priority scores together
 - **Calculate** a sensitivity value for the geographic area

Data Manipulation

Geographic Information System

- **MS Access**
 - Species data
 - Lookup tables
 - Calculations
- **ArcView 10**
 - Link with MS Access
 - Display data in map format

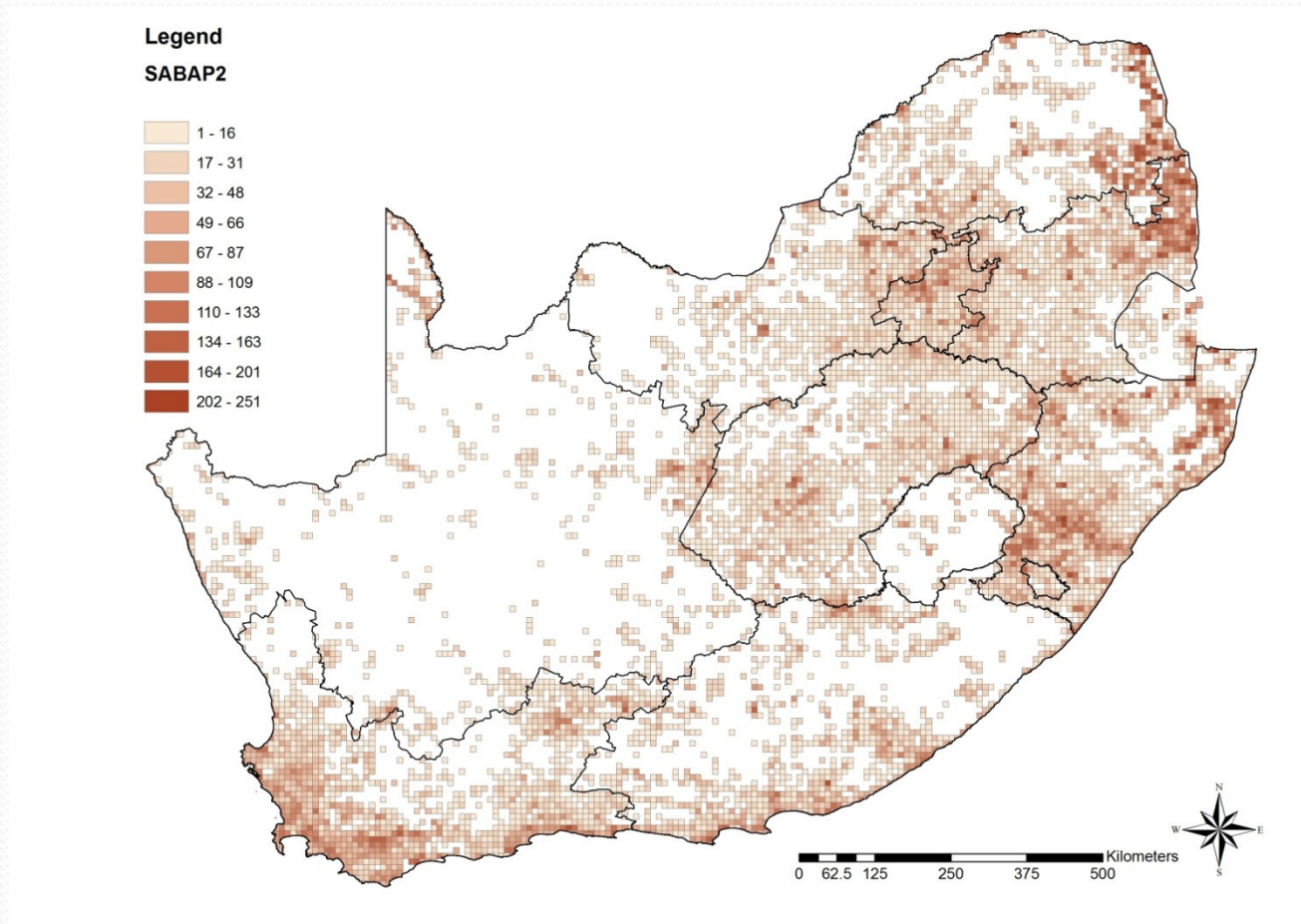


The screenshot shows the Microsoft Access application window titled 'Windfarms: Database (Access 2002-2003 file format) - Microsoft Access'. The 'Table Tools' ribbon is active, showing various options like Home, Create, External Data, Database Tools, and Datasheet. The 'Priority_Score' table is selected in the 'Tables' list on the left. The main window displays the 'Priority_Score' table in Datasheet View. The table has four columns: ID, Species, PriorityScore, and Species_Nu. The data is sorted by ID in ascending order. The table contains 26 records, with the last record being ID 179, Greater Flamingo, with a PriorityScore of 5 and Species_Nu of 96.

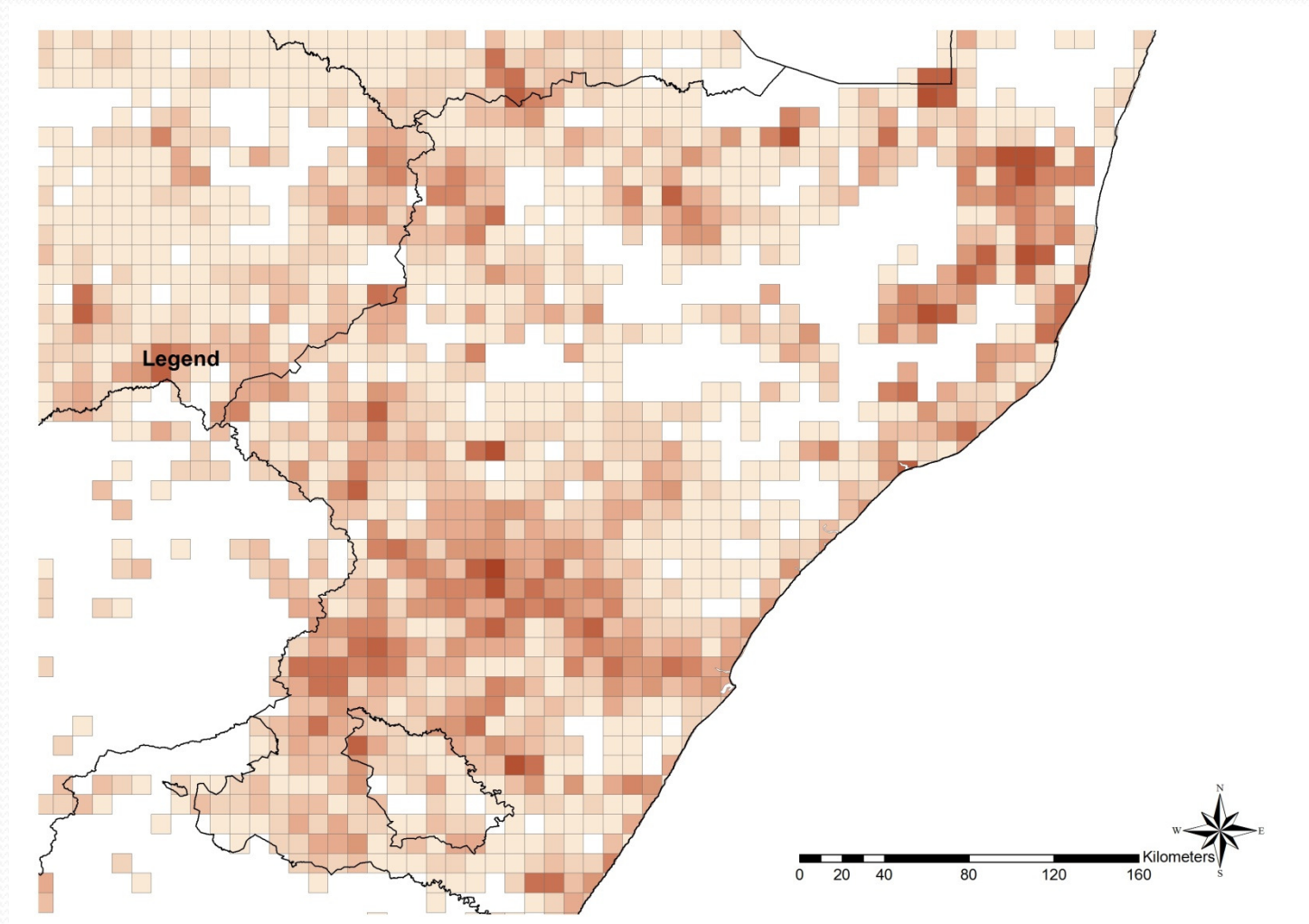
ID	Species	PriorityScore	Species_Nu
157	Bearded Vulture	10	119
165	Cape Vulture	10	122
164	White-backed Vulture	10	123
166	Lappet-faced Vulture	10	124
171	Tawny Eagle	10	132
172	Martial Eagle	10	140
167	Southern Banded Snake-Eagle	10	144
168	Bateleur	10	146
169	African Marsh-Harrier	10	165
170	Black Harrier	10	168
155	Wattled Crane	10	207
163	Blue Crane	10	208
162	Grey Crowned Crane	10	209
160	Kori Bustard	10	230
159	Denham's Bustard	10	231
156	Ludwig's Bustard	10	232
161	White-bellied Korhaan	10	233
158	Southern Ground-Hornbill	10	463
260	Agulhas Long-billed Lark	5	0
212	Great White Pelican	5	49
207	Pink-backed Pelican	5	50
263	Cape Cormorant	5	56
240	Bank Cormorant	5	57
262	Crowned Cormorant	5	59
264	White-backed Night-Heron	5	77
202	Eurasian Bittern	5	80
234	White Stork	5	83
213	Black Stork	5	84
233	Abdim's Stork	5	85
203	Saddle-billed Stork	5	88
206	Southern Bald Ibis	5	92
179	Greater Flamingo	5	96

Using SABAP2 Data

Darker areas indicate where lots of priority species have been recorded

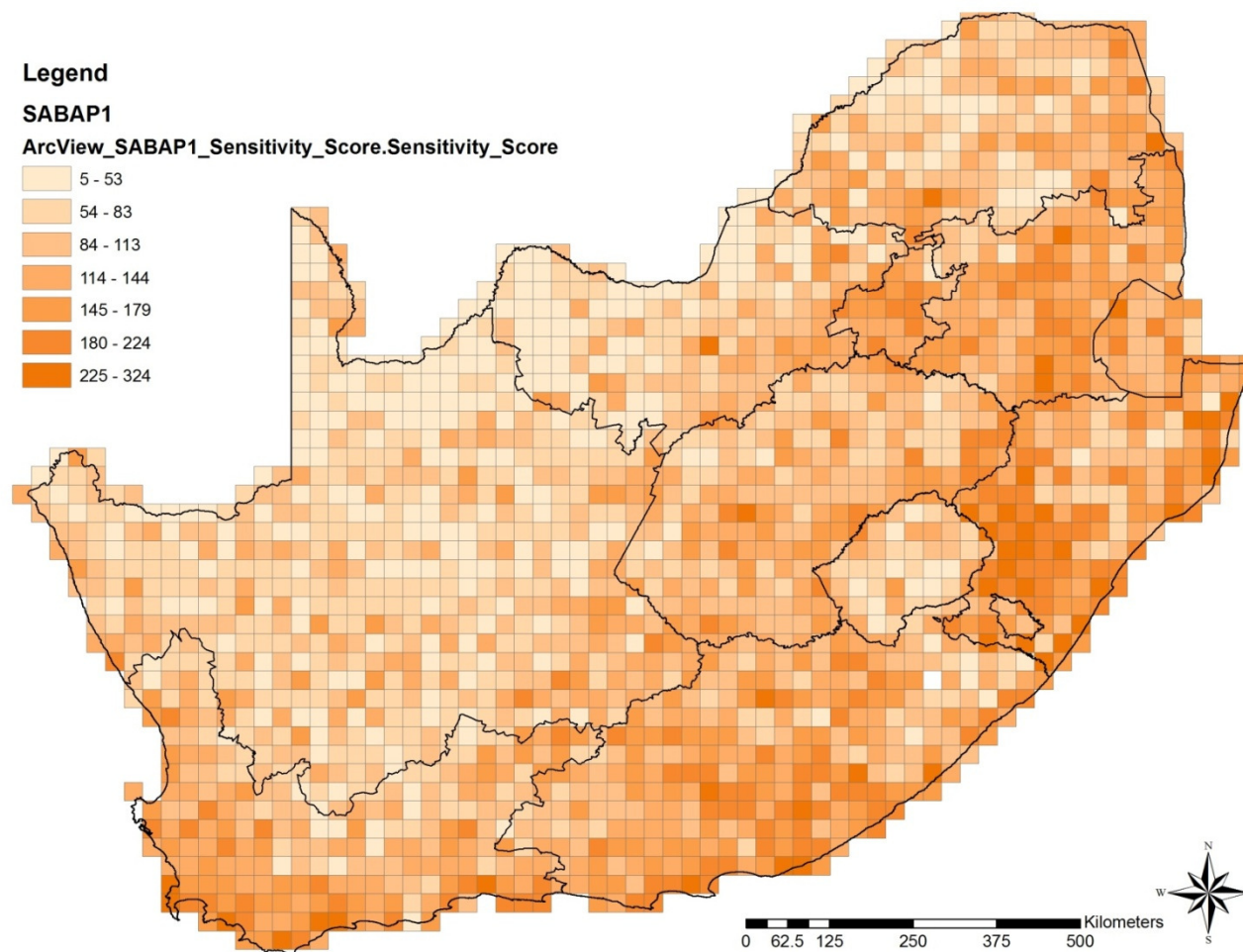


Using SABAP2 Data



Using SABAP1 Data

Darker areas indicate where lots of priority species have been recorded





Challenges Experienced

During the process to create the map a number of problems were encountered mostly relating to the available data sources:

- Different resolution levels
 - Point Data
 - Quarter Degree Square
 - Pentad (5 minute x 5 minute)
- Different time periods
 - 1990s
 - Current
- Different protocols (Time period used to collect the data)
- Different levels of coverage

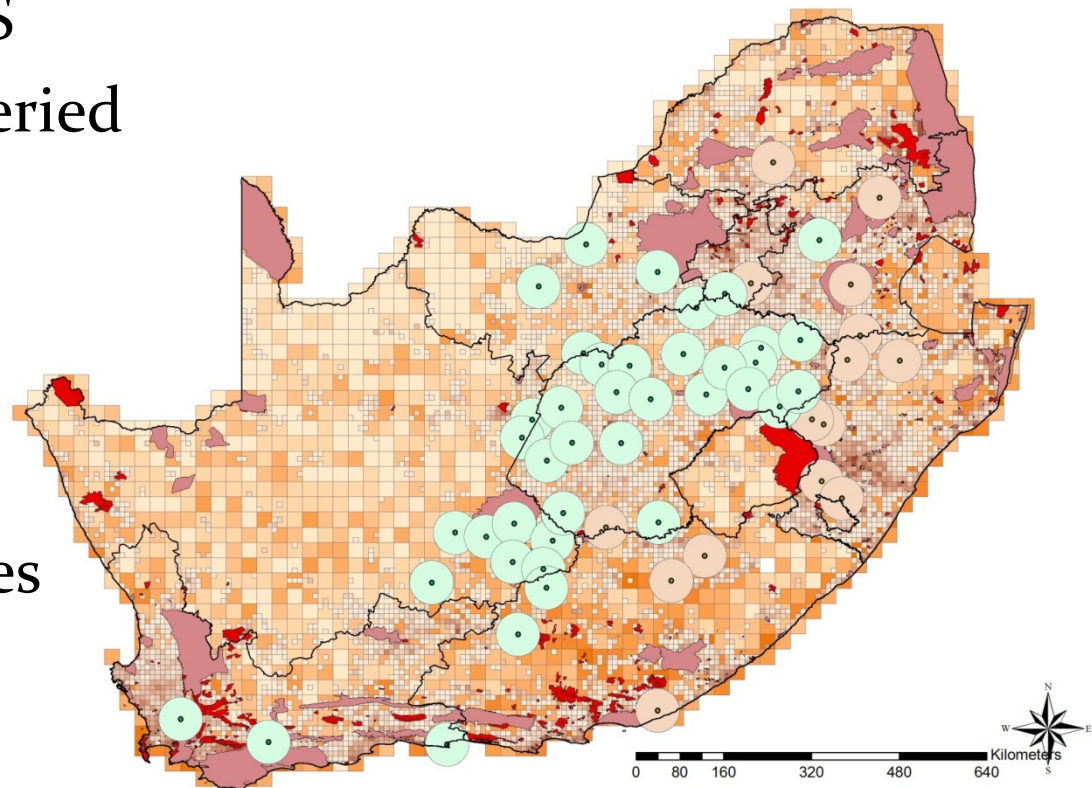
So it is difficult to combine all the data into one sensitivity map without distorting the data

GIS – Interactive System

The focus has moved away from a single Avian Sensitivity map

Create an interactive GIS system which can be queried on an individual basis

With a GIS system data can be used with its strengths and weaknesses in mind

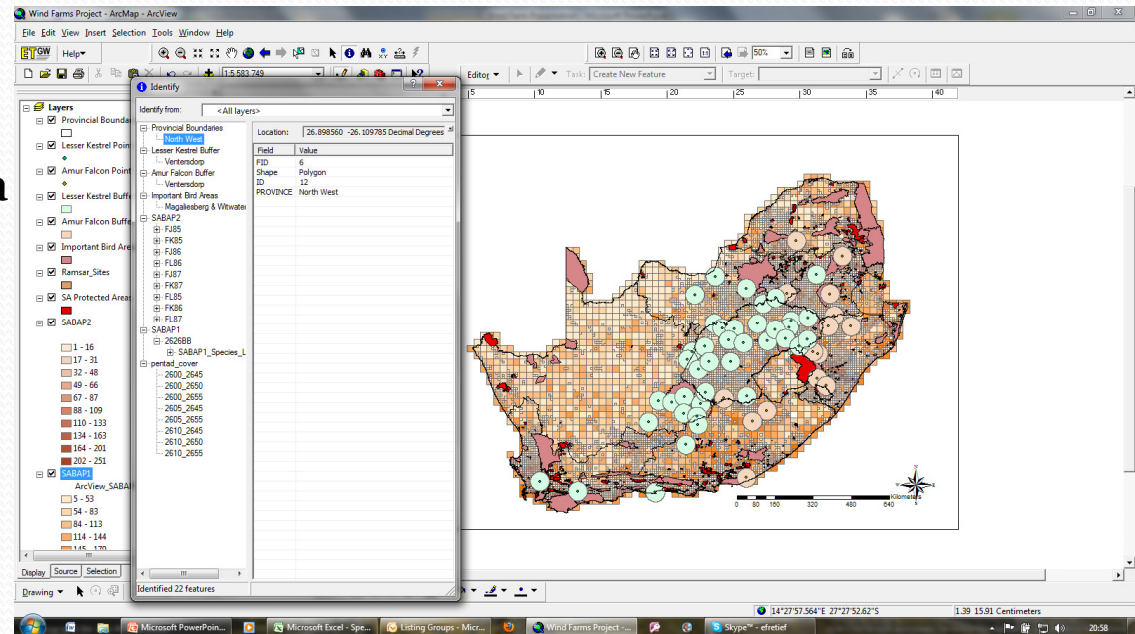


GIS – Interactive System

Process to be followed:

- Shapefile will be received of proposed wind farm development
- A report will be created indicating the status of land as well as the species that have been recorded taking into consideration all the available data sources
- Where sufficient data are available sensitivity levels will be indicated
- Limitations of the data sets used will be clearly indicated

This report will provide developers, EIA specialists and the general public with a tool which can be used to make an informed decision as to where to place a wind farm



Thank You

