

## **SW234 The effects of habitat, elephant damage and fire management on winter bird communities in Welgevonden, South Africa**

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### **Introduction**

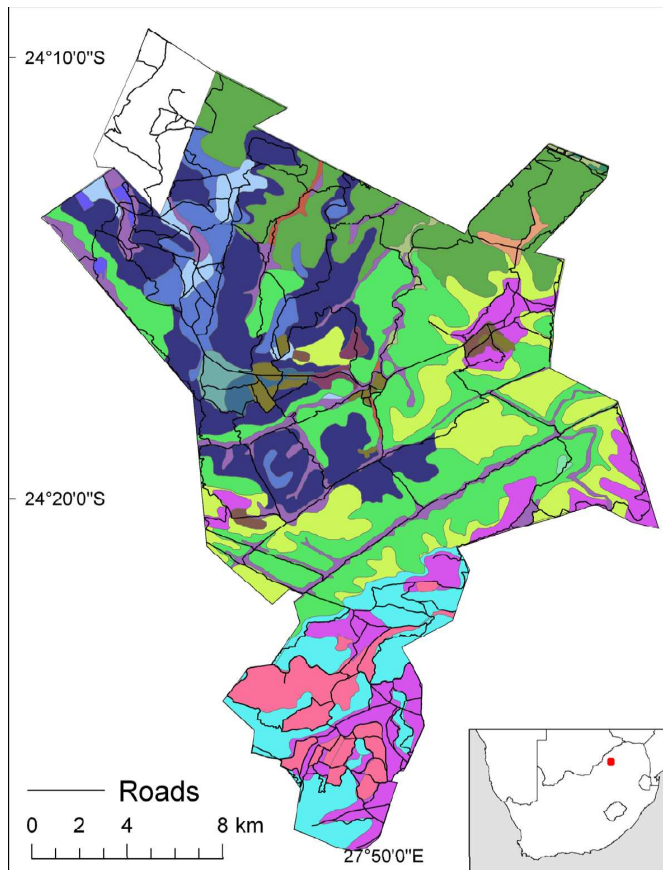
Welgevonden is a privately owned reserve that covers 37,500 hectares of South Africa's Waterberg Biosphere between the towns of Vaalwater and Lephalale. Welgevonden was formed using a novel funding mechanism. The 37,500ha reserve, some of which was game ranch and some farmland, was bought by a developer, fenced and stocked with game. 61 blocks of 500ha each were then sold off to private investors who had the rights to build a lodge on the land and to traverse with a single vehicle across the whole reserve. Monthly payments are then made by each of the landowners to manage the reserve. This form of private but joint ownership has succeeded in creating a substantial reserve without the problems normally encountered with separate landowners having separately fenced areas and may perhaps provide a model for private investment to create substantial new areas of land under conservation.

African bird assemblages are reportedly affected by environmental variables, human activity and browsers (Wilson et al., 2008). Savannah grasslands are periodically burned in a mosaic pattern to improve the grazing value and also to reduce the fire load of dead grass (Parr & Anderson, 2006). Savannah habitat is also heavily impacted by elephants (Levick & Rogers, 2008) and the combination of fire management strategies and high densities of elephants has led to major changes to the savannah ecosystem (Ribeiro et al., 2008; Mapaure & Moe, 2009). Recent studies in African reserves have suggested and mosaic burning strategies combined with elephant impacted habitat can have a significant effect on bird populations (c.f. Valentine et al., 2007). A major concern for the Welgevonden management team is therefore to monitor the effect of their rotational fire management strategy on biodiversity of other taxa.

Bird point counts in both summer and winter have been completed at 40 study sites across the reserve with differing fire histories to determine the abundance and diversity of birds in the reserve, bird distribution patterns, seasonal variable in bird assemblage, and environmental impacts on bird abundance, diversity and distribution patterns. Some of the terrain in the reserve is mountainous, with plateaus and open plains in the higher lying regions. Some areas of the reserve have dense thickets of shrubs and trees and other areas of the reserve which were previously used for farming, have more nutrient rich soil and host other grassland species. The land areas of Welgevonden have been classified into nine different types; riparian, plateau, valley bottom, hill slope, saddle, crest/summit, marsh, old farmlands and old overnight cattle storage lands. The reserve can further be divided into a range of different vegetation community types determined by the predominate vegetation (Figure 1). There are three rivers which transect the reserve and combine at the Limpopo River.

Bearing in mind the key issues faced by the Welgevonden reserve management team, the primary research objectives of the Operation Wallacea project are:

1. To monitor bird distribution patterns in Welgevonden Private Game Reserve in relation to habitat
2. To investigate seasonal differences in bird abundance and diversity
3. To monitor the effect of elephant impacted habitat on bird abundance and diversity



### Vegetation types

- Burkea africana*/ *Setaria pallide-fusca* open woodland *Terminalia sericea* subcom.
- Burkea africana*/ *Chrysopogon serrulatus*/ *Schizachirium sanguineum* open woodland *Terminalia sericea* s
- Burkea africana*/ *Setaria pallide-fusca* open woodland *Faurea Saligna* subcom.
- Burkea africana*/ *Setaria pallide-fusca* open woodland *Terminalia sericea* subcom.
- Burkea africana*/ *Trachypogon spicatus*/ *Diheteropogon amplexans* open woodland *Terminalia sericea* sub
- Burkea africana*/ *Trachypogon spicatus*/ *Schizachirium sanguineum* open woodland *Faurea saligna* subco
- Burkea africana*/ *Trachypogon spicatus*/ *Schizachirium sanguineum* open woodland *Terminalia sericea* subc
- Burkea africana*/ central grassland open woodland *Faurea Saligna* subcom.
- Burkea africana*/ central grassland open woodland *Terminalia sericea* subcom.
- Central Grasslands
- Mixed *Burkea africana*/ *Chrysopogon serrulatus*/ *Melinis repens* woodland *Diplorynchus*
- Mixed *Burkea africana*/ *Chrysopogon serrulatus*/ *Schizachirium sanguineum* woodland *Diplorynchus*
- Mixed *Burkea africana*/ *Trachypogon spicatus*/ *Diheteropogon amplexans* woodland *Diplorynchus condyloc*
- Mixed *Burkea africana*/ *Trachypogon spicatus*/ *Diheteropogon amplexans* woodland *Englerophytum*
- Mixed *Burkea africana*/ *Trachypogon spicatus*/ *Schizachirium sanguineum* woodland *Diplorynchus condyloc*
- Northern Grasslands
- Southern Grasslands
- Trachypogon spicatus*/ *Diheteropogon amplexans* Rocky plateau open woodland
- Trachypogon spicatus*/ *Melinis repens* Rocky plateau open woodland
- Trachypogon spicatus*/ *Schizachirium sanguineum* Rocky plateau open woodland
- Western Grasslands

Figure 1: Distribution of Vegetation types in Welgevonden Private Game Reserve

### **Research Design**

Students will be divided into two groups that will alternate between field and camp activities on a daily basis (i.e. 1 day in the field collecting data followed by one day in camp then one day in the field, followed by one day in camp and so on). During days in camp, students will be expected to attend lectures and practicals on African conservation and complete their data entry. The data collected by students is part of a long-term population monitoring and land management project and thus all students joining the Opwall expedition to Welgevonden are expected to pitch in and assist with all data collection rather than focussing solely on the data required for their project. In exchange for assisting the reserve management with their conservation project, students will have access to the long-term data sets that belong to the reserve and may use them for their research projects.

### **Data Collection**

A stratified sample of 40 survey sites have been designated in the Welgevonden Private Game Reserve for the purpose of bird point counts and habitat surveys. Each of the 40 sample sites will be surveyed for birds using point counts to obtain 3 replicate counts. The sites will be point counted for birds from just after dawn until a period up to 3 hours after dawn. The survey team with supporting Field Guide / Ranger will gather around the central point of the 100m X 100m square. Any birds disturbed during that period will be recorded. The survey teams facing outwards in a circle from the centre of the square so birds over all 360 degrees can be recorded. One person will be designated to record all birds identified by the team and to note the time from the beginning of the 10-minute period that each bird was observed. The survey team will then identify all birds seen or heard over the 10 minute period, their approximate distance (in 10m bands to 50m), their compass bearing (the distance and compass bearing data enable the distribution of the records within the 100m square to be plotted) and their height (ground, low, mid, canopy and flying). A digital recorder will be used to record the whole 10 minute point count so that any reported observations or data accompanying those observations missed by the recorder in the heat of the 10 minute count (observations can come very rapidly at some sites) can be picked up.

The data collected on vegetation during the season will be a combination of plot samples and transects at 40 sites throughout the reserve. Structural variables will be measured on grass and woody vegetation, including predictors of biomass, along with species of each woody plant in the sample. Each woody plant will also be assessed for browsing damage by herbivores using the Walker scale, and fire damage also using the Walker scale. Identification of grass species in each plot will be conducted in the spring (when grasses are flowering and identification is possible) and these data will be made available for student projects. GIS shape files of reserve features will also be available to be used for analysis. These include water sources, roads, lodges, habitat and vegetation types and others, depending on project needs.

### **References**

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