

PhD proposal: Dorine Jansen, FitzPatrick Institute

Provisional title: The identity, origin and impact of a ‘mystery’ buzzard species breeding in South Africa

[[Note: what follows is an abridged overview of the project. A full and referenced project proposal will be developed in the first five months of 2010, when I will be based in the field at Elgin]]

Only two species of buzzards are known to breed in the W Cape – Forest Buzzard *Buteo trizonatus* and Jackal Buzzard *B. rufofuscus*: neither shows substantial plumage variability. Forest Buzzards are a recent colonist from further east in South Africa, thought to have arrived in the late 1970s or early 1980s – and have never been common. In addition, two Palearctic-breeding species – Steppe Buzzard *B. vulpinus* and Honey Buzzard *Pernis apivorus* – occur as non-breeding summer migrants: the latter is rare. Steppe Buzzards are genetically closely related to Common Buzzard *Buteo buteo*. Common Buzzards breed in the Palearctic and some migrate to Africa, but none are thought to migrate south of the Equator.

In recent years, however, strangely plumaged buzzards have been present and breeding around Table Mountain and in the Grabouw/Elgin area. These birds are variable in plumage, ranging from individuals that closely resemble Steppe or Common Buzzard to birds that are uniformly dark brown or cinnamon-brown. Some of these ‘mystery’ buzzards have hybridised with apparently pure Forest Buzzards and have successfully produced offspring, although it is not yet proven that these offspring are themselves reproductively viable. As yet, the identity of these ‘mystery’ birds is unknown. Phenotypically, most of them (but not all) fall closest to the Common-Steppe Buzzard complex.

Historically, a handful of migratory, Palearctic-breeding bird species have established breeding populations in southern Africa. These include White Stork *Ciconia ciconia* and European Bee-eater *Merops apiaster*. The most recent of these colonists was the Booted Eagle *Aquila pennatus* (first recorded breeding in 1973). In none of these instances was the colonization process well documented, nor have any of the new arrivals hybridized with local species.

The core of the study involves resolving the identity of the ‘mystery’ breeding buzzards in the Western Cape. There are several alternative hypotheses that can be tested:

1. The birds, including the brown morphs, are Forest Buzzards. This is very unlikely because they are morphologically distinct from Forest Buzzards and uniformly coloured brown and cinnamon morphs are not known from the core of the range of Forest Buzzard (southern Cape).
2. The new arrivals are Steppe Buzzards, some of which have hybridized with Forest Buzzards, giving rise to large phenotypic diversity. If this is the case, we may be

seeing the birth of a hybrid swarm that could, assuming the birds continue to spread east, threaten to hybridise the endemic Forest Buzzard to global extinction.

3. The new arrivals are Common Buzzards, extending their known range south of the Equator. There is some qualitative support for this hypothesis, including the underwing patterning (especially on the secondaries), the occasional use of cliff nesting sites, and their large body size. They are not known to occur this far south in Africa, but all possibilities have to be considered.

At face value, it should be fairly easy to distinguish between these hypotheses using molecular techniques. However, speciation within the genus *Buteo* buzzards is recent (perhaps no more than 300 000 years) and the genetic differences between taxa are small. This lack of genetic diversification requires that multiple lines of evidence, comparing similarities and differences across known taxa and the Western Cape mystery birds need to be explored. These include:

- Morphometrics and phenotypes of eggs, chicks, juveniles and adults;
- Siting and architecture of nests;
- Vocalisations and breeding displays/behaviour;
- Foraging behaviour (and hopefully diet);
- Migratory behaviour (studied with satellite tags); and
- Genetics. Given the close relatedness of all *Buteo* buzzards and the possibility of hybrids being present, this will require a combined mtDNA and microsatellite approach. There are new analytical programs (e.g. STRUCTURE) that can explore the percentage of an individual's genome that is derived from which species. To undertake such analyses it will be necessary to make a buzzard tetranucleotide microsatellite DNA library. This would be done in collaboration with our Centre of Excellence Core Team member (Professor Rauri Bowie) based at UC Berkeley.

If I am confident in not only identifying the 'new' buzzards in the field, but can also ascribe phenotypes to pure or hybrid individuals, it should be possible to assess a) the frequency of hybridization, b) the current extent of the range of the new buzzards, and c) the threat posed to the endemic Forest Buzzard by the new arrivals.

The project will require collaboration with other researchers based in USA, Austria, Germany and Russia.

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