

SUPPLEMENT

Supplement 1 - Potential survey methods for Indigenous lands and other areas

Standard trapping methods require a substantial amount of time, and specialist skills, which many potential surveyors lack. This short summary of some new and refined techniques provides some guidance to modified methods of survey and monitoring that could be applied in a range of situations.

Standard trapping surveys

Standard fauna survey methods mentioned above are useful methods for survey, but require scientific expertise to be conducted properly, and scientific permits are required. So, they can be done only where licence-holders are present and in charge of the surveys. These methods have been applied successfully on a number of Indigenous properties, such as Wardekker, south-east Arnhem Land, Wunambal Gaambera country, Talaroo Station, Olkola country, and others (E. Ens, A. Stevens, T. Vigilante, N. Preece, I. Radford, J. Perry, A. Watson, pers. comm.), albeit with non-Indigenous licence-holder scientists present. Where acceptable and there is a clear need and program, standard methods would be suitable.

Camera trapping alone

Camera trapping has become part of standard methods for detecting the presence of fauna during fauna surveys (Gillespie *et al.* 2015; Gillespie & Low Choy 2016; Caravaggi *et al.* 2017; Gillespie *et al.* 2017; Marcus Rowcliffe 2017; Randler & Kalb 2018). Using camera trapping alone has also become common. Advantages of camera trapping include the cost-effectiveness of obtaining large amounts of monitoring data over significant periods of time that cannot be done by active trapping methods. There are a number of methodological issues that need to be considered, including numbers deployed, periods of deployment, whether or not to bait, height and angle of cameras, the differences among different models and brands of cameras, and the costs (De Bondi *et al.* 2010; Meek, Ballard & Fleming 2015; Diete *et al.* 2016; Meek *et al.* 2016; Stokeld *et al.* 2016; Driessen *et al.* 2017; Jumeau, Petrod & Handrich 2017; Richardson *et al.* 2017; Heiniger & Gillespie 2018; Potter, Brady & Murphy 2018; Randler & Kalb 2018; Lepard *et al.* 2019).

Deployment of cameras has to be systematic and consider the power and arrangement of cameras to detect animals in a meaningful way (Gillespie & Low Choy 2016); and images need to be processed by experts at identifying the species (Potter, Brady & Murphy 2018). The images also need to be archived, and the statistical analyses need to be done by people with statistical and analytic skills.

Identification of species presents a significant issue. Identifying animals to species level requires both good images and identifiable features of the animals, and excellent skills, experience and confidence of the observers (Potter, Brady & Murphy 2018).

Where camera traps have been used by Indigenous rangers and custodians, and their use assessed, they have proven to be very useful tools that are quickly adopted as methods (Ens *et al.* 2016; Gillespie & Low Choy 2016). Camera traps have proven very useful in recording larger species that may be of cultural and conservation significance including those mentioned, but also feral animals like cattle, horses, donkeys, camels, pig and feral cats

(Gillespie & Low Choy 2016). Camera traps can be used to census these species over time. There are special considerations to make, for instance with feral cats. Single cameras are not nearly as good at detecting feral cats as an array of cameras (Gillespie & Low Choy 2016; Stokeld *et al.* 2016).

Tracking, spoor and sign surveys

Traditional skills at identifying species from their tracks, spoor and other signs have been used by many of the Indigenous ranger groups mentioned (e.g. Ens *et al.* 2016). These techniques can provide information on the presence and identity of a number of species. The skills could be particularly useful for information about the status and trends of species where they are coupled with well-designed linear, timed transects that are conducted systematically and repeated a sufficient number of times to give statistical power to the surveys (Sutherland 1996).

Vehicle surveys of tracks have been tried at Fish River Station, but found to be unreliable and are not recommended (Gillespie & Low Choy 2016).

High-Tech solutions

Methods of data acquisition can be varied and can provide the means to record and archive valuable information on fauna, pests, invasions, population crashes and other environmental factors. Cybertracker® (Ens *et al.* 2016) and iTracker® have been used extensively, as have Fulcrum® for data collection and automatic data uploading to the ‘cloud’ internet.

Recent Apps such as FrogID ® (<https://www.frogid.net.au/>) and Frogs of Australia (Hoskin *et al.* 2015), and the various bird identification Apps (e.g. Morcombe & Stewart 2011; Pizzey & Knight 2013) have changed fauna observation opportunities in a major way. Uptake by Indigenous rangers of these Apps has been enthusiastic in some areas (personal observations).

One significant advantage provided by Indigenous rangers and custodians who live on country and move across their lands frequently is their ability to observe major events, such as numbers of animals dying from heat stress or disease. These may include species such as the [Spectacled Flying-fox](#) and many others. These observations are rarely made by institutional scientists as they are not present in the landscape for most of the time. Recording these events and reporting, through Cybertracker and the like, to experts in the relevant disciplines would provide a major boost to the conservation of species.

Soundscapes and recordings of fauna are increasingly being used to monitor occupancy of various species, including birds and bats (Roe *et al.* 2021). They have not been reviewed here, but are developing rapidly and will become useful techniques that can be applied on Indigenous land by Indigenous people in the near future.

Supplement 2 – Decision on listing *Zaglossus bruijnii*

The most recent list of species of mammals (Ziembicki *et al.* 2015) listed *Zaglossus bruijnii* as being present in Australia. This has been disputed recently (Burbidge 2018). As the species was described and accepted, and there is one paper that disputes this, we are of the opinion

that the species should be retained in the list until a panel of experts determines whether or not the species was in Australia.

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