Monitoring fox and feral cat populations using sand plots

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Background

Monitoring animal populations is crucial to wildlife researchers and managers for a range of reasons. These include assessing the presence and relative abundance of native and introduced species (e.g. foxes and feral cats), determining the success of control programs (e.g. fox baiting), and accumulating ecological and biological information. Methods used include live trapping, spotlighting, scat counts, and the use of active and passive sand plots. Much of the Western Shield fauna recovery program has relied on live trapping of native fauna to provide relative abundance estimates through comparison of trap success rates. Unfortunately many of the factors that may influence species abundances have not been measured and interpretation of why native fauna abundances may have increased or decreased has been difficult.

One of the known threatening processes for fauna recovery is the impact of predation by introduced predators, particularly the fox and feral cat. Broadscale fox baiting has been underway in the south-west of Western Australia since 1996, and research is nearing completion on an effective feral cat bait. However there has been no systematic assessment of the effect of fox baiting on fox abundance in the south- west. A method to do this using transects of sand plots is described here.

Sand plot methodology

Predators often use roads/tracks for travel. For effectiveness and convenience, 1 m wide sand plots are placed across existing tracks at 500 m intervals. The plots need to consist of sand that will adequately hold footprints for several hours, i.e. have some clay content. They need to be marked with a dropper post, or similar, and have their location recorded by GPS. Ideally sand plot transects should be located in areas away from potential disturbances such as high public use areas. Transects should run for at least 25 km (50 sand plots), and be replicated spatially (at least 5 km apart) where possible.

Installing sand plots at Lake Magenta nature reserve

Once established sand plots should be operated for a minimum of four consecutive nights. The timing of when sand plots are run depends on their purpose. If it is to measure effectiveness of a fox baiting event, sand plots should be operated at a 'control' site where there is no fox control, and at a site where fox control is implemented. Sand plots should be operated at both sites five – ten days before the baiting then again 12 - 16 days after the baiting, and the results compared. Given the effort required to establish sand plots their use should be for repetitive measures rather than a "once off" measure. Sand plots need to be inspected as early as possible each morning, then raked over and smoothed out each day. The reading of sand plots needs to be undertaken by experienced observers i.e. those who know how to identify tracks of individual species in sand.

Sand plots should not be read if there has been inclement weather (e.g. heavy rain, or strong winds) over night. Results are recorded on a data sheet and include:

> Date
> Location
> Weather conditions
> Observer(s)
> Sand plot #
> Species observed and number of individuals
> Measure of certainty

Sand plots can be either "passive" or "active". Passive plots have no attractants and rely on animals walking across the sand plot. Active plots have an attractant such as an audible phonic, meat bait or urine/faeces mix. Passive plots are suitable for monitoring fox activity and relative abundance, while active plots are used for monitoring feral cats. To monitor both foxes and cats, passive and active sand plots should be alternated i.e. 1000 m between two successive active plots, and 1000 m between two successive passive plots.

An Activity Index (AI) for foxes can be derived by determining the average number of tracks on passive sand plots per day, then averaging the daily index. Similarly, by looking only at the activity on active sand plots an activity index can be derived for feral cats. The amount of variation around the average AI (standard error) can also be calculated so that comparisons can be made between AI measures. However activity is not always a good surrogate measure for numbers of animals. It is more accurate when there are fewer tracks on plots and becomes less accurate as activity increases. Numbers of animals can be estimated by looking at patterns of activity. Foxes usually follow tracks for several kilometres and this will be reflected by a set of tracks crossing several sand plots. This should be recorded as one fox, and the total number of these track groupings can be used to estimate the numbers of foxes along the transect at that time. A similar analysis can be undertaken for feral cats tracks on active sand plots. More accurate methods of estimating fox and cat abundance using DNA genotyping from hair and scat samples are also available.

Sand plots installed at Lake Magenta   Preparing for cat baiting at Lorna Glen

Management Implications

Analyses of track activity and patterns can provide useful information on the activity and numbers of foxes and feral cats moving along transects. This technique can also be applied to monitoring wild dog activity. Consequently the effectiveness of management such as introduced predator control programs, can be determined, and modified if necessary. The use of sand plots needs to be incorporated into the Western Shield fauna monitoring program to assist with interpretation of native fauna abundance results.

For more information: Engemann, R.M (2005). Indexing principles and a widely applicable paradigm for indexing animal populations. *Wildlife Research* **32**: 203-210.