

# Capability Statement

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## ABOUT US

Terrestrial Ecosystems is an environmental consultancy and wildlife research company, that specialises in terrestrial vertebrate fauna. We work in collaboration with other industry specialists to provide flora and vegetation, and short-range endemic (SRE) invertebrate and subterranean fauna survey and management programs.

Terrestrial Ecosystems has a commitment to improving the quality of terrestrial fauna surveys, fauna assessments and fauna management in Western Australia, by utilising research and a robust knowledge of terrestrial fauna assemblages and ecosystems. The company's principal zoologists are active researchers and recognised as having a comprehensive understanding of the biology and ecology of Western Australian vertebrate fauna.

As a science focussed company, we publish in the peer-reviewed scientific literature, present at workshops and conferences and are always on the lookout for new and innovative ways to improve our own deliverables and those of the industry as a whole. We use science and industry best practice in planning, designing and implementing our daily operations.

Our focus is on clients who want quality outcomes, applied, innovative and science-based solutions and not simply the cheapest product. Clients come to us because of our reputation for utilising good science and providing excellent outcomes, and practical, cost-effective and workable solutions in a complex regulatory environment.

The Terrestrial Ecosystems team are highly qualified, with most holding a PhD or other postgraduate qualification in a biological science. Dr Scott Thompson has completed additional training and qualifications and is the only Certified Environmental Practitioner (Ecology Specialist), with post-graduate tertiary qualifications and authorisation as a licenced pest management technician (LPMT) which is based on completing a Certificate III in vertebrate pest management in Western Australia.

Our business focus can be summed up as 'a scientific approach to providing cost-effective, quality outcomes in a timely manner'.





## FAUNA SURVEYS, ASSESSMENTS AND MONITORING

The zoologists at Terrestrial Ecosystems have undertaken desktop, basic, targeted and detailed vertebrate fauna surveys across much of Western Australia, including the Goldfields, Swan Coastal Plain, Pilbara, south-west, mid-west, south-coast, sandy deserts and the Kimberley. These assessments have been for infrastructure corridors, mining, oil and gas, residential and industrial developments.

### A science-based approach

Terrestrial Ecosystems staff endeavour to apply the available published science to their planning and implementation of vertebrate fauna surveys and assessments. As a science focussed company, we have published in peer-reviewed scientific literature, presented at workshops and conferences and are always on the lookout for new and innovative ways to improve our own deliverables and those of the industry as a whole. We typically use science and industry best practice in planning, designing and implementing our daily operations.



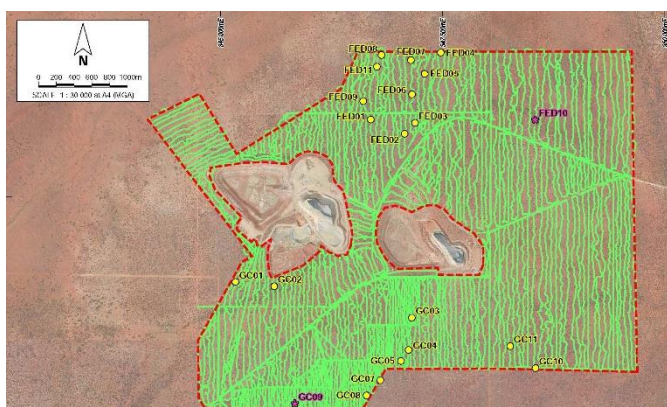
To demonstrate our commitment to robust science and industry best practice we have contributed more than 30 peer-reviewed articles directly related to fauna surveys and assessments. These publications and research include work on threatened species detection and management, adequacy of fauna surveys, temporal and spatial variations in fauna assemblages, trapping techniques and improving the quality of fauna surveys for EIA. Most of our staff have contributed to the peer-reviewed literature, with Drs Graham and Scott Thompson having in-excess of 100 papers between them in peer-reviewed journals, plus a number of books and book chapters, and multiple conference and workshop presentations.

No other vertebrate fauna environmental consultancy in Western Australia has demonstrated a similar commitment to robust scientific design and publishing the outputs in the peer-reviewed literature.

### Surveys and assessments

Terrestrial Ecosystems have undertaken detailed surveys in many parts of Western Australia for a variety of clients, so we have a strong track record of achievement in this area.

The EPA's (2020) technical guidance for terrestrial vertebrate fauna surveys requires that consultants are able to demonstrate the reliability, veracity and effectiveness (i.e. the use of species accumulation curves) of their surveys. Terrestrial Ecosystems' staff have published numerous papers in the peer-reviewed literature on these specific issues. We have a well-established methodology of data collection for detailed fauna surveys, which enables us to compare the trapped fauna at a particular project area with multiple other sites in Western Australia, so we are able indicate whether the species richness and abundance are low, average or high relative to other areas.



One of our research projects (Thompson et al. 2002, Thompson and Withers 2003b, a, Thompson et al. 2003, Thompson et al. 2007a) focused on the use and effectiveness of species accumulation curves to indicate how much survey effort was required to adequately describe the vertebrate fauna assemblage in a project area, how to use data published in reports to calculate species accumulation curves to determine the adequacy of previous surveys, and the most appropriate techniques for calculating species accumulation curves for WA fauna assemblages.

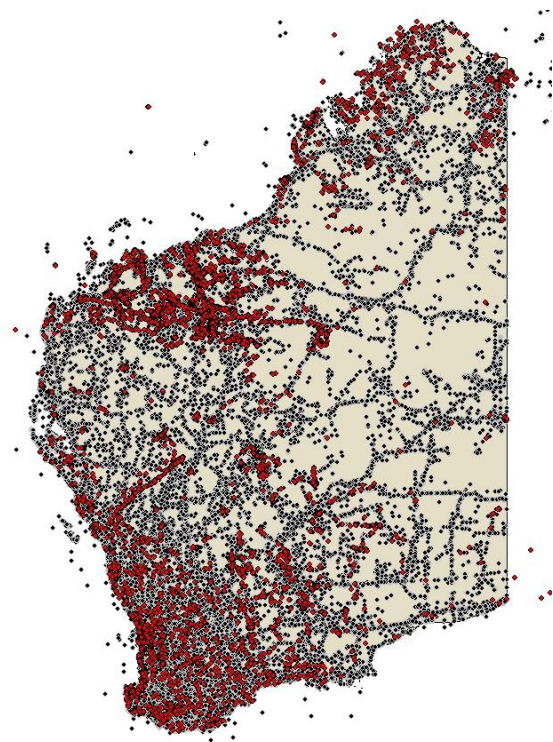
Terrestrial Ecosystems owns a diverse range of field trapping equipment, which enables us to undertake large scale surveys in remote areas.

### **Targeted surveys**

Routine targeted fauna surveys and assessments are undertaken by Terrestrial Ecosystems for numerous conservation significant species including Northern Quolls, Night Parrots, Black-Cockatoos, Western Ringtail Possums, Malleefowl, Chuditch, Ghost Bats, Pilbara Leaf-nosed Bats, Mulgara, Bilbies and Pilbara Olive Pythons.

### **Fauna survey database**

Terrestrial Ecosystems has developed a comprehensive terrestrial vertebrate fauna survey database. This searchable database enables us to quickly provide a comprehensive matrix of the vertebrate fauna recorded in areas adjacent to a project area, thus providing high quality contextual information and a very good indication of the vertebrate fauna, including relative abundance, likely to be recorded in a project area.



### **Innovation and best practise**

Terrestrial Ecosystems' zoologists have a track record of innovation and improving best practice surveys and detection methods. The following projects illustrate our commitment to this area.

#### *Funnel traps*

One of our Principal Zoologist's PhD students initiated the development, and Terrestrial Ecosystems subsequently improved and implemented the widespread use, of funnel traps across Australia as a technique for recording terrestrial vertebrate fauna that were being inadequately surveyed by other methods. This innovation was supported by research to demonstrate the benefits of this new method (Thompson and Thompson 2007a, 2009).

#### *Aerial photography to search for Malleefowl mounds*

On-ground transect searches for Malleefowl mounds are expensive, provide a health and safety risk for staff, and mounds are often not recorded. Terrestrial Ecosystems' Principal Zoologists developed and tested the use of high-definition aerial photogrammetry as a cost-effective and accurate tool for searching for Malleefowl mounds (Thompson et al. 2015).



### *Species accumulation curves*

Species accumulation curves are a practical tool to use when reporting on the adequacy of fauna surveys. Species accumulation curves were either not used or being incorrectly used by environmental practitioners in WA. Terrestrial Ecosystems' Principal Zoologists published numerous papers on the benefits and procedures for using species accumulation curves which have subsequently been used widely by consultants across Australia (Thompson and Withers 2003a, b, Thompson et al. 2003, Thompson and Thompson 2007b, Thompson et al. 2007b).

### *Trapping urban foxes*

Urban fox populations appear to remain relatively constant or slowly increasing, despite annual trapping programs implemented by State and local government authorities. This is partly due to the wary and cunning nature of foxes leading to difficulties in trapping, and vixens who increase their ovulation rate to compensate for a significant reduction in fox densities (Marlow et al. 2016). Terrestrial Ecosystems' staff initiated and were subsequently commissioned by the



South West Corridor Development Foundation Inc to undertake a research program that placed GPS tracking collars on foxes. The research objective was to map their fine-scale movement patterns and micro-habitat use for the purpose of informing future trapping programs, so that we can achieve better value and outcomes for the resources committed to fox population programs.

### *Camera traps to monitor vertebrate fauna*

Camera traps are now a widely used, as a non-invasive tool in monitoring vertebrate fauna, however, they have significant limitations that are not always widely appreciated (Thompson et al. 2019). Terrestrial Ecosystems' zoologists are very experienced in the use of camera traps and can assist with the development and implementation of an appropriate fauna detection or monitoring program on your site.



### *Monitoring and habitat rehabilitation*

Terrestrial Ecosystems' zoologists have a long-standing interest in monitoring and measuring impacts on ecosystems and the success of rehabilitation programs. Impacts on the vertebrate fauna in areas adjacent to a development are often poorly understood and rarely objectively measured and monitored. This issue is exacerbated because regulators often fail to provide specific and measurable rehabilitation objectives, targets and KPIs (Kragt et al. 2019).

Vertebrate fauna succession processes in rehabilitated areas can provide an excellent data source to quantitatively measure rehabilitation success, particularly as an area approaches middle and late stage developments. However, fauna are seldom used for this purpose (Cross et al. 2019a, Cross et al. 2019b, Cross et al. 2020).

Dr Scott Thompson's PhD developed a quantitative tool to measure rehabilitation success or impacts on an area using the reptile assemblage (Thompson et al. 2008). This tool has now been successfully applied to quantify impacts of a mining disturbance on adjacent habitat and mine site rehabilitation success. The rehabilitation and degradation index (RDI), utilises a combination of fauna diversity, assemblage composition and ecological parameters, to develop a score for an area out of 100. Scores based on data from impact and analogue sites are compared, and the closer these scores, the more similar the vertebrate fauna assemblages and ecosystem function in the two areas.

Like all useful tools to quantify changes in ecosystem function, the RDI is dependent on quality input data.

## **Monitoring**

Project approvals often require that the effectiveness of management plans are monitored, fauna in areas adjacent to the impacts are monitored, or the results of revegetation or restoration programs are monitored. Terrestrial Ecosystems' zoologists are very experienced in implementing fauna monitoring programs for these purposes.

Fauna monitoring should have a clear purpose, which typically is to inform subsequent management decisions, but data are also often used in reporting to regulators, providing input for performance or KPI reviews, or evaluating the success of fauna relocation programs. Effective monitoring is based on good planning, and good monitoring programs typically are built on the before-after-control-impact (BACI) principles advocated in the peer-reviewed literature.



Terrestrial Ecosystems' zoologists have experience in monitoring the success of relocation programs for conservation significant species (e.g. Northern Quoll, Mulgara, etc) and the maintenances of populations in or adjacent to development sites (e.g. Chuditch, Malleefowl, Western Whipbirds, Western Mouse, Western Brush Wallabies, Quenda or the generic fauna assemblage).

## **Remote location projects**

Terrestrial Ecosystems' zoologists are experienced in working on logistically challenging projects in remote locations. We are equipped with appropriate safety equipment including satellite phones, Garmin Inreach personal locator devices, off-road vehicles, and trailers.

## **Health and safety**

We have well established safe work procedures and protocols to adequately manage staff safety and project outcomes whilst in urban, peri-urban and remote locations. This can best be illustrated by

100,000 hours without lost time due to injury for work related accidents on the Wheatstone project in the Pilbara.



## References

- Cross, S. L., P. W. Bateman, and A. T. Cross. 2019a. Restoration goals: Why are fauna still overlooked in the process of recovering functioning ecosystems and what can be done about it? *Ecological Management & Restoration*.
- Cross, S. L., S. Tomlinson, M. D. Craig, and P. W. Bateman. 2020. The Time Local Convex Hull method as a tool for assessing responses of fauna to habitat restoration: a case study using the perentie (*Varanus giganteus*: Reptilia: Varanidae). *Australian Journal of Zoology*.
- Cross, S. L., S. Tomlinson, M. D. Craig, K. W. Dixon, and P. W. Bateman. 2019b. Overlooked and undervalued: the neglected role of fauna and a global bias in ecological restoration assessments. *Pacific Conservation Biology*.
- Environmental Protection Authority. 2020. Technical Guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment. Western Australia.
- Kragt, M. E., A. Manero, J. Hawkins, and C. Lison. 2019. A review of mine rehabilitation condition setting in Western Australia. Perth, Western Australia.
- Marlow, N. J., P. C. Thomson, K. Rose, and N. E. Kok. 2016. Compensatory responses by a fox population to artificial density reduction in a rangeland area in Western Australia. *Conservation Science Western Australia* **10**:1-10.
- Thompson, G. G., and S. A. Thompson. 2007a. Usefulness of funnel traps in catching small reptiles and mammals, with comments on the effectiveness of the alternatives? *Wildlife Research* **34**:491-497.
- Thompson, G. G., and S. A. Thompson. 2007b. Using species accumulation curves to estimate trapping effort in fauna surveys and species richness. *Austral Ecology* **32**:564-569.
- Thompson, G. G., and S. A. Thompson. 2009. Comparative temperature in funnel and pit traps. *Australian Journal of Zoology* **57**:311-316.
- Thompson, G. G., S. A. Thompson, and A. Bengsen. 2019. The value of camera traps in monitoring a feral-cat and fox reduction program. *Wildlife Research* **46**:599-609.
- Thompson, G. G., S. A. Thompson, P. C. Withers, and J. Fraser. 2007a. Determining adequate trapping effort and species richness using species accumulation curves for environmental impact assessments. *Austral Ecology* **32**:570-580.
- Thompson, G. G., S. A. Thompson, P. C. Withers, and J. Fraser. 2007b. Determining adequate trapping effort and species richness using species accumulation curves for environmental impact assessments. *Austral Ecology* **32**:570-580.
- Thompson, G. G., and P. C. Withers. 2003a. Effect of species richness and relative abundance on the shape of the species accumulation curve. *Austral Ecology* **28**:355-360.
- Thompson, G. G., and P. C. Withers. 2003b. Species accumulation curves: the effect of species richness and relative abundance on the shape of the curve. *Austral Ecology* **28**:355-360.
- Thompson, G. G., P. C. Withers, E. R. Pianka, and S. A. Thompson. 2002. Assessing reptile diversity using species accumulation curves. Page 42 in *Australian Society of Herpetologists, 29th General meeting, 11-15 July, 2002*. Australian Society of Herpetologists, Birrigai, ACT, Australia.
- Thompson, G. G., P. C. Withers, E. R. Pianka, and S. A. Thompson. 2003. Assessing biodiversity with species accumulation curves; inventories of small reptiles by pit-trapping in Western Australia. *Austral Ecology* **28**:361-383.
- Thompson, S., G. Thompson, J. Sackmann, J. Spark, and T. Brown. 2015. Using high-definition aerial photography to search in 3D for malleefowl mounds is a cost-effective alternative to ground searches. *Pacific Conservation Biology* **21**:208-213.
- Thompson, S. A., G. G. Thompson, and P. C. Withers. 2008. Rehabilitation index for evaluating restoration of terrestrial ecosystems using the reptile assemblage as the bio-indicator. *Ecological Indicators* **8**:530-549.



## BLACK COCKATOO ASSESSMENTS

In the south-west of Western Australia there are three species of Black-Cockatoo that are listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)* and the *WA Biodiversity Conservation Act 2016*. These are Carnaby's Black-Cockatoo (*Calyptorhynchus latirostris*; Endangered), Baudin's Black-Cockatoo (*Calyptorhynchus baudinii*; Endangered) and Forest Red-tailed Black-Cockatoo (*Calyptorhynchus banksii naso*; Vulnerable).

The Commonwealth Government department (Department of Sustainability Environment Water Population and Communities 2012) which manages the *EPBC Act*, has issued referral guidelines for these threatened species. These include the survey and habitat assessments that are required to determine if a proposed development is likely to have a significant impact on any populations of Black-Cockatoos.



Terrestrial Ecosystems are experienced in undertaking Black-Cockatoo tree and habitat assessments and have been doing this for over 15 years. This includes drafting reports that are suitable as supporting documents to *EPBC Act* referrals.

The Commonwealth referral guidelines refer to the importance of 'quality' foraging habitat for Black-Cockatoos, without providing a definition of what 'quality' habitat is. Terrestrial Ecosystems' has therefore developed an assessment criteria tool to enable foraging habitat to be quantified with clear indicators of habitat quality.

Terrestrial Ecosystems measure, rather than estimate tree trunk diameter at breast height and use a rangefinder to determine the height of trees and hollows, rather than providing estimates.

The use of a camera mounted on a 9m extension pole to examine potential tree hollows, enables non-invasive checking of tree hollows. Where necessary we hire an elevated work platform to inspect hollows. The team at Terrestrial Ecosystems have undertaken the necessary high-risk worksite training and are qualified to undertake these assessments.

Should your development contain habitat that might be used for foraging, roosting or breeding by Black-Cockatoos, or you need to investigate potential impact on Black-Cockatoos, then we would be happy to discuss the best assessment approach.



### Reference

Department of Sustainability Environment Water Population and Communities. 2012. EPBC Act Referral Guidelines for Three Threatened Black Cockatoo Species: Carnaby's Cockatoo (endangered) *Calyptorhynchus latirostris*, Baudin's Cockatoo (vulnerable) *Calyptorhynchus baudinii*, Forest Red-tailed Black Cockatoo (vulnerable) *Calyptorhynchus banksii naso*. Canberra.



## FAUNA SALVAGE AND RELOCATION

Best practice requires infrastructure, industry, land developers and mining companies to mitigate and minimise the potential impacts on fauna during the vegetation clearing process. Terrestrial Ecosystems have extensive experience in fauna salvage, spotting and management having undertaken this work over the past 15yrs and have developed procedures and techniques that have been field tested and refined to achieve the best outcomes for fauna and the client.

Terrestrial Ecosystems has an experienced team of zoologists who have undertaken fauna salvage and rescue programs across Western Australia. Notably, our team worked on the Wheatstone development project in the north-west Pilbara region, where we completed more than 100,000hrs without loss-time-injury and recovered ~35,000 individual mammals, birds amphibians, and reptiles. This fauna management program led to one book, four journal publications and countless newspaper articles over a seven-year period.

### Threatened fauna relocation and monitoring programs

Development and mining approval conditions typically specify that conservation significant fauna (e.g. Bilbies, Northern Quoll, Western Ringtail Possums, Quenda, etc) are trapped and relocated from a disturbance area prior to the disturbance. Terrestrial Ecosystems is experienced in preparing the appropriate fauna management plans and undertaking trapping and relocation programs for conservation significant fauna.



### Fauna rescue programs

Terrestrial Ecosystems' zoologists have regular experience working with heavy machinery operators during the vegetation clearing process, to retrieve and protect live and injured fauna. Terrestrial Ecosystems has established detailed protocols and procedures for this work including: working with heavy machinery, fatigue and heat stress management, PPE requirements, fauna handling techniques, euthanising and the care of injured animals, and reporting.

## Trenches

Unmanaged trenches for pipelines (gas, water and sewage), around mine sites, infrastructure and industrial developments, can result in high fauna mortality. Effective fauna management procedures are now routinely required by the regulators and as approval conditions, to minimise the number of individuals that die from heat stress or predation in trenches. Terrestrial Ecosystems can prepare the appropriate fauna management plans and implement these required procedures.



## Pre-clearing trapping and relocation programs

Best practice requires that prior to vegetation clearing programs for infrastructure, residential and industrial land developments or large scale mining projects, a trapping and relocation program is implemented (Thompson and Thompson 2015a, Thompson and Thompson 2015b, Menkhorst et al. 2016, Thompson and Thompson 2016, Thompson and Thompson 2020). These trapping and relocation programs can target conservation significant fauna (i.e. Quenda, Northern Quoll, etc), or mitigate impacts on vertebrate fauna assemblages. Terrestrial Ecosystems have all of the necessary equipment and experience to overcome many challenges associated with different fauna trapping and management programs.



## References

- Menkhorst, P., N. Clemann, and J. Sumner. 2016. Fauna rescue programs highlight unresolved scientific, ethical and animal welfare issues. *Pacific Conservation Biology* **22**:301-303.
- Thompson, G. G., and S. A. Thompson. 2015a. Termitaria are an important refuge for reptiles in the Pilbara of Western Australia. *Pacific Conservation Biology* **21**:226-233.
- Thompson, G. G., and S. A. Thompson. 2020. A comparison of an EIA vertebrate fauna survey with a post-approval fauna salvage program: Consequences of not adhering to EIA survey guidelines, a Western Australian example. *Pacific Conservation Biology*.
- Thompson, S. A., and G. G. Thompson. 2015b. Fauna-rescue programs can successfully relocate vertebrate fauna prior to and during vegetation-clearing programs. *Pacific Conservation Biology* **21**:220-225.
- Thompson, S. A., and G. G. Thompson. 2016. Response to 'Fauna-rescue programs highlight unresolved scientific, ethical and animal welfare issues' by Menkhorst et al. *Pacific Conservation Biology* **22**:304-307.



## CHEMICAL CAPTURE

Terrestrial Ecosystems is skilled and experienced in chemically capturing fauna using tranquiliser darts. This specialist service enables the sedation and anaesthesia of fauna so that they can be captured, relocated, euthanised, have a transmitter attached or a health assessment undertaken.

### Chemical capture and sedation programs are useful for:

- the capture and relocation of kangaroos that are isolated by land clearing or urban development;
- relocation of over-populated kangaroos on a golf course;
- the capture and relocation of Western Ringtail Possums from residential or commercial developments;
- attaching radio-transmitters to Judas donkeys, goats, camels, horses, etc;
- euthanasia of feral cats from mine sites and other areas where firearms are not permitted;
- sedating and restraining animals for health checks and physical examinations; and
- recapturing caged animals.

Wild animals are often difficult to catch safely for a number of reasons. They may be aggressive, move too quickly, difficult to restrain, arboreal and difficult to reach or trap, or their capture may significantly increase the potential for injuring the animals or the person attempting the capture. Chemical capture uses an anaesthetic to temporarily sedate animals so that they can be safely handled.

In Western Australia, chemical capture has mostly been confined to the sedation of kangaroos in urban areas so that they can be relocated into nearby bushland. In the last 10 years, Terrestrial Ecosystems has relocated more than 500 kangaroos from numerous development estates, and also assisted wildlife carers with the transfer of hand reared animals.



Terrestrial Ecosystems has the equipment for darting and tranquillising animals. Senior staff have attended an appropriate training course under veterinarian supervision to develop and refine their skills. Staff have the appropriate firearms licences and senior staff are authorised persons under the *Veterinary Surgeons Act* to administer appropriate drugs. All work is done in accordance with a standard operating procedure that was prepared in consultation with experienced veterinarians and the Department of Biodiversity, Conservation and Attractions. Terrestrial Ecosystems works with an experienced veterinarian who can be called upon at short notice to answer questions, or to deal with unforeseen issues.

Terrestrial Ecosystems is the only environmental consultancy with post-graduate science qualified staff authorised to undertake this work in Western Australia.



*Our highest priority is providing objective scientific advice and maintaining animal welfare.*

## FAUNA MANAGEMENT PLANS

Terrestrial Ecosystems' zoologists are experienced in preparing practical, cost-effective fauna management plans. These can either mitigate and monitor the full community of fauna in a project area, or alternately focus on conservation significant fauna. Plans can be prepared for all phases of a development including vegetation clearing, early earth works, development and construction, and ongoing operations.

Fauna management plans are typically required before a vegetation clearing program is approved by a State or local government authority. For developments that potentially impact on conservation significant species, regulators typically require an ongoing fauna management plan for the life of the project. This plan may cover the entire project from vegetation clearing until closure, or might just cover the development or operational period.

Fauna management plans, should include outcome statements supported by appropriate KPIs, triggers for further action, and clear statements of what specific actions are required should any of the triggers be activated. Our fauna management plans contain relevant monitoring protocols to report on KPIs and to signal when triggers are activated. Terrestrial Ecosystems' zoologists have prepared numerous fauna management plans for a variety of clients.

### **Fauna management plans for vegetation clearing programs**

Fauna management plans for vegetation clearing and development programs typically include:

- Objectives and Scope
- Relevant legislation
- Fauna species likely to be encountered
- Potential impacts on fauna
- Management of:
  - Nesting birds and arboreal fauna
  - Venomous snakes
  - Feral and pest fauna (i.e. foxes, cats, rabbits)
  - Vertebrate fauna assemblages
- Licenses
- Trapping programs
- Active foraging programs
- Beehive management
- Vegetation clearing procedures and operator inductions
- Managing injured fauna
- Reporting
- Management actions that are linked to performance indicators, timing and who is responsible for ensuring that the task is completed as required
- Tailored management plans for conservation significant fauna, take into account the environment and potential impacts on threatened species.

### **Kangaroo management plans**

Knowledge and experience are particularly important in successfully relocating kangaroos, as there is likely to be considerable public interest in animal welfare issues, and kangaroos are prone to suffering from capture myopathy.

Terrestrial Ecosystems' zoologists are the most experienced environmental consultants in Western Australia in managing kangaroos in urban and peri-urban development areas.



## OUR DETECTION DOG

Dazzy, a Springer Spaniel, is Terrestrial Ecosystems' conservation detection dog. She has been trained to find Bilbies, Northern Quoll, feral cats and foxes by searching for scats, retreat sites (e.g. dens, burrows, holes) and of course, the animal itself. As part of Dazzy's training she has been conditioned to ignore other fauna and has had snake and bait (i.e. 1080) aversion training for her own safety. Dazzy is currently in training to find the critically endangered Western Swamp Tortoise and Southwestern Snake-necked Turtle.

Terrestrial Ecosystems has access to one of the most experienced professional detection dog trainers in Australia, Steve Austin ([steveaustindogtrainer.com](http://steveaustindogtrainer.com)), who provides on-going advice and assistance as required. Terrestrial Ecosystems network of conservation detection dog teams ensures that where required we can facilitate other highly trained dogs to support Dazzy if the search area is too large for a single dog, the required time frame is very short or the list of target species extends beyond her expertise.

### Why Use a Detection Dog?

Specifically selected and professionally trained detection dogs are faster and more efficient than human searchers, they are non-biased and remain focussed for longer periods. For these reasons and many more, dogs can stretch limited budgets a long way.

A detection dog has considerably better hearing and vision than any human, and a nose which is able to detect odours 1000 times more effectively than humans. A detection dog can find animal scats and odours in places humans would never find them (e.g. dense leaf litter) and they can detect the odour of animals and humans that have long since passed through an area and have left no visible signs.



In a recent published research program testing the efficacy of our detection dog to find Bilby scats, a human searcher located six of 90 scats (6.7%) compared to Dazzy who located 89 of 90 scats (98.9%; Thompson et al. 2020).

Our conservation detection dog can help you to:

- find cat and fox scats so that they can be analysed to identify the presence of cryptic fauna in the area (i.e. marsupial moles, Night Parrot, threatened cryptic species, etc);
- find threatened Bilby and Northern Quoll scats and latrine sites;
- find the optimum sites to locate traps and cameras for threatened species and feral animal management
- find fox dens for management and fumigation;
- find Northern Quoll maternal dens, Bilby burrows and feral cat retreat sites; and
- identify habitat utilised by Bilbies, Northern Quoll, feral cats and foxes for mapping.



### Reference

Thompson, S. A., G. G. Thompson, P. C. Withers, and E. M. Bennett. 2020. Conservation detection dog is better than human searcher in finding bilby (*Macrotis lagotis*) scats. *Australian Zoologist*.

## FERAL ANIMALS

There is more to feral and pest animal control than just simply a gun and a spotlight. As wildlife researchers and scientists, Terrestrial Ecosystems has an applied management approach based on robust science when completing feral and pest animal management. We use the best available science combined with regular training and accreditation, to ensure that we are aware of the approach most appropriate to your specific circumstances. With clients in the private sector, mining operations, local and state government, and NRM and wildlife management industries, we have developed practical solutions for varied situations and scale projects.

Terrestrial Ecosystems is a registered Pest Management Business and all operational staff are registered Pest Management Technicians and have a Certificate III (Vertebrate Pest Management). Staff have also undertaken additional training in the use of firearms in the workplace, chemical capture of wild animals, bird management and fumigation. We particularly focus on vertebrate pest species in urban and peri-urban areas but can also work across other Western Australian locations.

Terrestrial Ecosystems staff have experience in the following programs:

- fox control and management
- unowned and feral cat management
- corella management
- pigeon management
- wild dog management
- feral fish management

Terrestrial Ecosystems owns the necessary equipment for feral and pest species management including but not limited to, firearms, a range of trap types, 4WDs, trailers, ATVs, night vision and thermal detection equipment. Terrestrial Ecosystems are primarily wildlife ecologists, so we take a wholistic approach to feral and pest management.

Being discrete and safe are two key factors when undertaking feral and pest management. Dr Scott Thompson has completed Certificate IV (Work Health and Safety), so he is able to provide oversight and advice to other staff in the preparation of health and safety plans and procedures.

Good outcomes are based on good science. In addition to our staff keeping abreast of recently published literature, Terrestrial Ecosystems contribute to the literature and the improvement of feral and pest species management practices. The Principal Zoologists published the results of a control and monitoring program that assessed the value of camera traps as a tool for monitoring the effectiveness of 1080 bait deployment of foxes and feral cats (Thompson et al. 2019). These same staff are currently involved in a fox research program commissioned by South West Corridor Development Foundation Inc that aims to:

- use state-of-the-art GPS tracking devices to map fine-scale spatial movement of urban foxes;
- use these data to model the preferred movement patterns and micro-habitat utilisation of foxes and the locations of den sites, and
- summarise this information to inform the future trapping programs for the seven participating WA Councils (i.e. Cities of Canning, Cockburn, Fremantle, Kwinana, Melville and Rockingham and the Town of East Fremantle).



### Reference

Thompson, G. G., S. A. Thompson, and A. Bengsen. 2019. The value of camera traps in monitoring a feral-cat and fox reduction program. *Wildlife Research* 46:599-609.



## Scope of Work Includes:

- Terrestrial fauna surveys and assessments
- Feral and pest animal control and management (i.e. fox, cat, birds, fish)
- Fauna management plans
- Conservation detection dog
- Fauna relocation, spotting, salvage, handling and management
- Fauna monitoring
- Vertebrate fauna research
- Targeted conservation significant fauna surveys and management
- Chemical capture and sedation of fauna using tranquillising darts
- Kangaroo relocation
- Bird management
- Peer review of fauna reports

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*A scientific approach to providing cost effective and timely solutions*

