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Charles Darwin University Animal Ethics Committee

Standard Operating Procedure:

DPAW SOP 11.2019 Funnel Trapping for Terrestrial Fauna

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NOTE: Reference 5.4 g) regarding release of animals after capture. In addition to this SOP, **animals should be released as soon as possible after capture. Furthermore, the time of animal holding and release must be specified in the project application, and this must be justified.**

Standard Operating Procedure

FUNNEL TRAPPING FOR TERRESTRIAL FAUNA

Prepared by: Species and Communities Branch, Science and Conservation, Department of Biodiversity, Conservation and Attractions

Prepared for: Animal Ethics Committee

Version 1.1

October 2017

GOVERNMENT OF WESTERN AUSTRALIA

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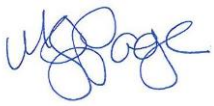
Approved by:  Date: 17/08/2017

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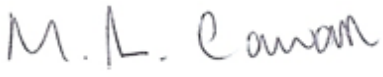
Approved by:  Date: 30/9/2015

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1 Purpose

Funnel traps function as a confusion trap by making it difficult for animals to find their way out once they have entered. They are effective for trapping reptiles and to a lesser extent, amphibians, invertebrates and mammals. Funnel traps are useful when attempting to trap species not readily caught in pitfall traps or in situations that prevent the use of pitfall traps, such as areas with shallow or rocky soil (Jenkins *et al.,* 2003).

This standard operating procedure (SOP) provides advice on the use of funnel traps for non-lethal trapping of fauna only.

2 Scope

This SOP has been written specifically for scientific and education purposes, and endorsed by the Department's Animal Ethics Committee. However, this SOP may also be appropriate for other situations.

This SOP applies to all fauna survey and monitoring activities that may require the use of funnel traps to capture and collect terrestrial vertebrates, undertaken across the State by Department of Biodiversity, Conservation and Attractions (hereafter Department) personnel. It may also be used to guide fauna monitoring activities undertaken by Natural Resource Management groups, consultants, researchers and any other individuals or organisations. All Department personnel involved in the use of funnel traps should be familiar with the content of this document.

All projects involving the funnel traps for the capture and collection of fauna must be approved by the Department's Animal Ethics Committee. Funnel traps with different design features and/or mechanisms may also be appropriate and their use is not excluded. Approved projects that prefer to use alternative funnel traps to those mentioned here may do so if the differences are described in detail, demonstrated to be effective and have acceptable levels of impact on animals. The Department's Animal Ethics Committee may also request to view the proposed trap.

Projects involving wildlife may require a licence under the provisions of the *Wildlife Conservation Act 1950* and/or the *Biodiversity Conservation Act 2016*. Personnel should consult the Department's Wildlife Licensing Section and Animal Ethics Committee Executive Officer for further guidance. In Western Australia any person using animals for scientific purposes must also be covered by a licence issued under the provisions of the *Animal Welfare Act 2002*, which is administered by the Department of Primary Industries and Regional Development. This SOP complements the *Australian code of practice for the care and use of animals for scientific purposes* (The Code). The Code contains an introduction to the ethical use of animals in wildlife studies and should be referred to for broader issues. A copy of the code may be viewed by visiting the National Health and Medical Research Council website (http://www.nhmrc.gov.au).

3 Definitions

Animal handler: A person listed on an application to the Department's Animal Ethics Committee who will be responsible for handling animals during the project.

Drift fence: A length of short fence which runs along the trapping location, guiding the animals to the trap.

Funnel trap: A confusion trap in which the animal enters through a funnel entrance and cannot find its way out. The trap can be single or double ended and are often used with drift fences.

4 Approved Trap Types

4.1 Double ended funnel trap

The funnel trap most commonly used for terrestrial surveys in Western Australia is the double-ended funnel trap (see Figure 1). Single-funnel traps are also available however the double-funnel design has generally been found to be more effective (Farallo *et al.*, 2010).

Standard size and construction: approximately 750mm x 180mm x 180mm, internal diameter of the funnel entrance is 40mm. They fold up for transporting and storage, are constructed of shade cloth, have an internal spring and wire frame to maintain shape when open and have a near full length zipper for removing captured fauna (Thompson and Thompson, 2007). *Note: there are a variety of sizes available*.

Figure 1 A double-ended funnel trap opened up and folded up for transportation (left) and two double-ended funnel traps set up next to drift fence (right). Photo: Terrestrial Ecosystems, 2007-2010.

5 Procedure Outline

5.1 Setting funnel traps

(a) The number of funnel traps, their locations and configuration (e.g. transects, grids) will be determined by the purpose of the study. Maps showing vegetation types and access routes may assist trap placement.

(b) Traps should be set so that they are not readily visible from roads or access tracks to avoid public curiosity and possible interference.

(c) Trap locations must be marked with a GAPs and flagging tape and labelled/numbered. A GPS reading for each trap is also recommended and is required for long term monitoring sites. Permanent monitoring trap sites should also be marked using a numbered dropper post.

(d) Run the drift fence (approx. 25cm high once partially buried) constructed from aluminium fly-wire mesh, nylon fly-wire mesh or other suitable material, supported by wood and/or wire pegs along the transect. Aluminium flywire fence is always preferable to nylon as it is more resilient and requires no supporting pegs when constructed correctly. The length of the drift fence will be determined by the purpose of the study. Drift fences increase the probability of capturing animals and the length of the drift fence can greatly affect results (Greenberg *et al.,* 1994).

(e) Place the funnel traps (one on each side of the drift fence) at the trap locations (see Figure 1) making sure the traps are placed tightly against the drift fence and the ground so that no gaps exist (Jenkins *et al.,* 2003). The number of funnel traps placed along the drift fence and at what intervals will be determined by the purpose of the study. Alternative arrangements include placing a single trap between lengths of drift fence (fence inserted firmly into the entrance at both ends), a single trap at the end of a drift fence or alternating traps either side of a drift fence.

(f) Funnel traps must be set in level positions. Clear debris from under the trap to ensure it is level. If an uneven surface is unavoidable, ensure the bottom of each end is flush with the ground and no large gaps exist between the trap and the drift fence. The transition from the substrate into the trap must be as smooth as possible (use soil and leaf litter or even flat rocks if required). Note that traps can become disfigured during folded storage and may need adjusting upon placement.

(g) Do not place funnel traps in the vicinity of ant nests. Ants can be an animal welfare risk in congregation and can kill captured animals.

(h) Cover traps with 90% shade cloth or reflective insulative material to provide shelter for captured animals. Shade is vitally important in warm to hot weather. Funnel traps must never be exposed to full sunlight as animals can easily die of heat stress. Operators of funnel traps should carefully consider the passage of the sun during the day and minimise total exposure of the trap. Where possible place traps in areas shaded by vegetation as well as a shade cloth cover (Thompson and Thompson, 2009). Using vegetation such as leaves or Spinifex can also be an effective shade cover but must be anchored by branches or sticks so that it is not blown off traps by wind.

(i) A long wet sponge inside the trap or a wet hessian under the trap may be appropriate to provide moisture to animals in high temperature conditions, particularly where amphibians are likely to be caught (Jenkins *et al*., 2003). Consideration should however be given to the risk of this attracting ants in hot environments.

(j) Baiting funnel traps is not standard practice and would require an application to be assessed by the Animal Ethics Committee. The nature of the environmental conditions typically associated with the use of funnel traps poses a high risk of attracting ants and/or rodents which may damage and/or kill animals that have been caught in the trap (Thompson and Thompson, 2007).

(k) All traps must be accounted for before and after each trapping session.

5.2 Opening funnel traps

(a) Traps should be set either in the evening or early morning. Before the trap is left it is important to check that it is set up correctly and secured.

(b) Avoid trapping in extreme weather conditions (conditions at the extent of the thermal or wet weather range characteristics of the particular site) by planning ahead and monitoring long-range and daily weather forecasts.

(c) Ensure traps are protected from direct sunlight and heat by taking advantage of natural shading and vegetation in the landscape in addition to trap covers.

5.3 Checking of funnel traps

(a) Venomous snakes and invertebrates may be captured in funnel traps. A job safety analysis should be undertaken before trapping is undertaken that plans for the removal and handling for such species. People with the appropriate skills and expertise must be available to assist. A range of appropriate handling bags and equipment (i.e. long forceps, gloves) must be carried when checking traps (refer to the Department's SOPs for *Hand Capture of Wildlife*, *Animal Handling and Restraint using Soft Containment* and *Hand Restraint of Wildlife*).

(b) It is vital that extreme care is taken when checking traps in case animals that can cause harm to handlers are caught inside. Verify what type of animal/s are inside (particularly venomous snakes and invertebrates) before deciding how to handle the animal and putting hands in. Gloves, padded tongs and long forceps can be used to remove potentially harmful animals however particular care needs to be taken not to injure them due to reduced dexterity.

(c) Traps must be thoroughly inspected to ensure all animals are removed. Small specimens can easily be overlooked in folds and dark corners. Hold the funnel trap up to the sky and rotate before unzipping and fully inspecting the inside of the trap.

(d) Traps must be checked and cleared as determined by the nature and biology of the species being targeted (and potential by-catch species) in association with the environmental conditions characteristic at the site. For example, reptiles in arid environments are well adapted to high temperature conditions and are most active mid to late morning. Trap checking in this instance should be adapted to concur with this and take place late morning to avoid prolonging the confinement of trapped animals throughout the afternoon. By ensuring traps are cleared by midday, the risk of remaining active animals entering traps will be reduced (most animals will be sheltering during the hottest part of the day). Traps need to be checked more frequently throughout the day if weather conditions are of concern for target or potential by-catch species (e.g. mammals), capture rate is high or the combination of species trapped results in unacceptable trap deaths through predation. If traps are to remain open overnight at a site where nocturnal small mammals may enter traps, a trap checking round must occur early morning within 3 hours of sunrise. Traps must be closed if weather conditions become extreme (e.g. extreme heat, rain, cold) or a high number of trap related injury or deaths occur (e.g. if frogs are entering traps and dehydrate before traps are checked).

(e) Shake out the funnel trap after checking to double-check that all captures have been removed.

(f) All traps must be accounted for during each days trapping. Personnel undertaking the trapping must keep tallies of traps to ensure that all are inspected, cleared and collected. This is the responsibility of the person in charge at the specified location on the day, ideally the chief investigator of the project or personnel under their direct supervision.

(g) The presence of ants in the trapping area can lead to detrimental impacts on captured animals. Surface insecticide (e.g. permethrin based products like Coopex ®) can be applied around traps to discourage ants. Surface insecticides should never be used inside traps and should not be used routinely as they can be harmful to trapped animals, particularly frogs and reptiles. Powder and spray forms are available however extreme care must be taken to ensure that no free standing liquid droplets remain when using the spray form as absorption/ingestion can be lethal to frogs and reptiles. Always read the *MSDS* of chemicals before use. If ants become highly attracted to the trapping area remove the traps and relocate them to a more suitable position.

5.4 Animal handling

(a) Techniques for removing animals from funnel traps vary depending on the species of invertebrate, mammal, reptile or frog involved and the experience and skills of the personnel. Venomous snakes for example generally don't require handling. Opening the zip with long forceps and stepping back quietly is safer and less stressful for the animal compared with attempting to handle it. General advice on capture and handling of animals is contained in the Department's SOPs for *Hand Capture of Wildlife*, *Animal Handling and Restraint using Soft Containment* and *Hand Restraint of Wildlife*. All removal of animals should be undertaken by (or under the guidance of) experienced personnel under the direction of the chief investigator of the project.

(b) Depending on the mix of animals in the funnel trap, removal must be as quick and efficient as possible, with the least amount of stress inflicted on captured animals.

(c) Personnel undertaking trapping should be equipped with a trapping field kit and animals should be processed as quickly and efficiently as possible ensuring stress is kept to a minimum.

(d) Use handling bags appropriate for the species and length of containment as advised in the Department SOP for *Animal Handling and Restraint using Soft Containment*.

(e) If an animal is injured during trapping or handling treat any superficial wounds (refer to the Department SOP for *First Aid for Animals*).

(f) If an animal is seriously injured, refer to the Department SOP for *Humane Killing of Animals under Field Conditions* to aid decision making and determine if euthanasia or veterinary care is required. A euthanasia action plan should be developed before undertaking field work.

(g) Captured animals must be released at point of capture (unless the purpose of the trapping is for translocation, specimen collection or other approved reasons). Animals must be released, or reach an alternate endpoint approved by the Department's Animal Ethics Committee, generally within 24 hours of capture. Animals should be released at a time when they are normally active and in a location that does not expose them to additional risks, e.g. predation.

5.5 Identification

The taxonomy of many of the species captured by funnel traps (especially fossorial skinks, Uperoleia frogs and others) can be dynamic. Many species may not be in field guides or fully described in museum records and can be difficult to identify accurately. Operators of funnel traps should contact the WA Museum to check which new taxa occur in their area of study, which existing taxa are under revision and if new specimens/tissue are required by the museum. Any trap deaths should be retained and offered to the museum.

5.6 Trap care and maintenance

(a) Ensure funnel traps are dried thoroughly as they are susceptible to mould. Traps must be maintained in good working order and ensure they are clean after each trapping session (see Section 7.7).

(b) Small rodents and marsupials readily chew holes through the shade cloth and escape from funnel traps (Thompson and Thompson, 2007). Any damaged traps requiring attention must not be used until repaired or replaced.

6 Level of Impact

Funnel trapping generally has a low to moderate level of impact on animals though in extreme weather conditions this can be elevated to very high. Funnel traps are most effective in warm conditions due to the nature of the species commonly targeted and the maximum temperature considered comfortable varies between different types of animals. Ground temperature can be significantly higher than the official ambient temperature and careful planning must be undertaken prior to field work to ensure the below animal welfare risks are mitigated to the full extent possible.

Potential animal welfare impacts of funnel trapping include:

- Stress as result of harsh environmental and/or thermal conditions within the trap.
- Heatstroke as reptiles, amphibians and small mammals caught in funnel traps are more exposed to heat stress than in pitfall traps (Thompson and Thompson 2007).
- Stress, injury or self-harm as a result of extended period in confinement.
- Trauma (e.g. accidental injuries inflicted during hand capture as some species can be difficult to remove from funnel traps).
- Hypothermia/hyperthermia.
- Dehydration (particularly of concern where amphibians are likely to be caught).
- Starvation (particularly if mammals are likely to be caught).
- Distress (e.g. caused by discomfort, social isolation, separation of mother and young, exposure to predators etc.).
- Stress or mortality as result of interspecific or intraspecific interaction in trap (e.g. predation, ants).

If funnel traps are monitored by people with appropriate skills and experience, and preventative actions are in place, the impact should be low and only short term.

7 Ethical Considerations

To reduce the level of impact of funnel trapping on the welfare of animals there are a number of ethical considerations that should be addressed. Department projects involving funnel trapping will require approval from the Department's Animal Ethics Committee.

7.1 Removal from trap

Funnel traps are capable of capturing very small species that may reside inconspicuously in folds and corners of the trap. Take extreme care to ensure traps are searched thoroughly and every specimen removed. After checking, shake out the funnel trap to double-check that all captures have been removed. Personnel must have adequate skills to capture, restrain and remove any species likely to be caught including those that have potential to cause harm.

7.2 Handling time

To ensure minimal stress, captured animals should only be handled for as long as required to identify them and collect any necessary measurements (usually no more than five minutes). Animals must be released (or reach alternate end point) within 24 hours of capture (unless an alternative is approved by the Department's AEC) if not released immediately.

7.3 Frequency of trapping

Consideration must be given to minimising the frequency of trapping (to minimise the impact on animals) whilst still achieving the goal of the activity. Funnel trapping can greatly impact the wellbeing of animals by disrupting their feeding, foraging and defending territory activities. This is particularly relevant to small mammals such as honey possums, which due to their small size are at risk of death if prevented from feeding on each night.

7.4 Weather

Avoid trapping in extreme weather conditions (hot, cold or wet) by planning ahead and monitoring long-range and daily weather forecasts. Traps must not be deployed during any period of flood risk at a site.

Shade covers over funnel traps will be required to reduce the temperature inside funnel traps. Small vertebrates caught in funnel traps are more exposed to heat stress than those caught in pitfall traps for example, and they should be shaded (preferably with 90% shade cloth or a hessian bag) (Thompson and Thompson, 2007). It is recommended that all funnel traps deployed be protected by a shade cover and be positioned to take full advantage of natural shading and vegetated areas at the site where ground temperatures are likely to be reduced.

7.5 Trap placement

If possible funnel traps should not be placed in the vicinity of ant nests or ant lines. Ants are known to distress and kill trapped occupants of funnel traps. Traps must be placed in locations that are unlikely to be visible to the public, take advantage of natural vegetation and be placed on stable level surfaces where possible.

7.6 Time animals spend in traps

No animal should be in a trap for a period of time approaching 24 hours and the timing of trap checking must be adapted to suit the range of biological characteristics of the species likely to be trapped in the area. If traps are to be left open overnight at a site where small nocturnal mammals could likely enter traps, traps must be cleared early morning within 3 hours of sunrise. If reptiles are being targeted and mammals are unlikely to be entering traps, traps should be cleared after the peak activity period of reptiles (late morning) and an early morning check is not required.

Traps left open during the day will need to be checked regularly and potentially closed if weather conditions are unpleasant, capture rate is high or the combination of species trapped results in unacceptable trap deaths or injury through predation. If it is necessary to operate traps during the day in unfavourable conditions (i.e. summer months in the semi-arid to arid parts of the state) and adequate protection and insulation from radiant heat cannot be provided, traps must remain in the field disabled from capturing any further animals after the morning check and subsequently be checked and/or re-opened late afternoon (EPA & DEC 2010).

7.7 Hygiene

All handling bags/equipment should be cleaned and disinfected where appropriate to minimise the risk of disease transmission to personnel or other animals. Traps should be emptied by unzipping and shaking out any loose material (particularly seeds and faecal material) before folding and transporting. If wet faecal matter is caught in the mesh cleaning with a disinfectant is required. Refer to the Department SOP for *Managing Disease Risk in Wildlife Management* for further guidance.

7.8 Breeding season

If mammals are likely to be caught in the trapping area, avoid trapping in breeding seasons where lactating females may be separated from dependent young or when there is an increased likelihood of injury or separation of dependent young. However, many species breed throughout the year making it impossible to avoid trapping animals at sensitive times. If captured, lactating animals should be released as soon as possible.

7.9 Injury and unexpected deaths

If injury, unexpected deaths or euthanasia occur then it is essential to consider the possible causes and take action to prevent further deaths. For projects approved by the Department's Animal Ethics Committee, adverse events such as injury, unexpected deaths or euthanasia must be reported in writing to the AEC Executive Officer on return to the office (as per 2.2.28 of The Code) by completing an *Adverse Events Form*. Guidance on field euthanasia procedures is described in the Department SOP for *Humane Killing of Animals under Field Conditions.* Where disease may be suspected, refer to the Department SOP for *Managing Disease Risk in Wildlife Management* for further guidance.

8 Competencies and Approvals

Department personnel, and other external parties covered by the Department's Animal Ethics Committee, undertaking monitoring projects involving funnel traps require approval from the committee and will need to satisfy the competency requirements detailed in Table 1. This is to ensure that personnel involved have the necessary knowledge and experience to minimise the potential impacts of funnel traps on the welfare of the animals. Other groups, organisations or individuals using this SOP to guide their fauna monitoring activities are encouraged to also meet these competency requirements as well as their basic animal welfare legislative obligations.

It should be noted that details such as intensity of the study being undertaken will determine the level of competency required and Table 1 provides advice for basic monitoring only.

Table 1 Competency requirements for Animal Handlers of projects using funnel traps to capture terrestrial fauna

Competency category	Competency requirement	Competency assessment
Wildlife licences	Licence to take fauna for scientific purposes (Reg 17) OR Licence to take fauna for educational or public purposes (Reg 15)	Provide licence number
Formal training *Note: Suitable levels of skills/experience can substitute for formal training requirements*	Department Fauna Management Course or equivalent training	Provide course year
General skills/experience	Relevant knowledge of species biology and ecology	Personnel must be able to correctly identify the likely species to be encountered in funnel traps for the site/s being studied. This knowledge may be gained by sufficient field experience and/or consultation of field guides and other literature. Estimated total time in field: Min 1 year involved in similar projects in similar locations.
Fauna survey and capture skills/experience	Experience in setting and use of live traps	Personnel must be confident setting funnel traps and associated drift fences. This experience is best obtained under supervision of more experienced personnel.
	Training and experience in trap hygiene, disease	Personnel must be familiar with hygiene procedures. This knowledge

Competency category	Competency requirement	Competency assessment
	transmission	may be gained by sufficient field experience and/or consultation of literature. Estimated total time in field: Min 1 year involved in similar projects.
Animal handling and processing skills/experience	Experience in handling fauna	Personnel must be confident at hand capture of the range of mammal species likely to be captured including species that may pose a risk/harm to handlers. Personnel must be able to correctly identify the likely species to be encountered in funnel traps in the area. This knowledge may be gained by sufficient field experience and/or consultation of literature. Estimated total time in field: Min 1 year involved in similar projects.

9 Occupational Health and Safety

Always carry a first aid kit in your vehicle and be aware of your own safety and the safety of others as well as the animals when handling.

A job safety analysis is recommended prior to undertaking any monitoring which involves hand capture. This safety analysis should include the following considerations.

9.1 Animal bites, stings and scratches

Venomous snakes can be lethal. Personnel with appropriate first aid training and experience identifying and treating snake bites must be present where there is a risk of venomous snakes in the trapping area. Spiders, scorpions and other invertebrates may also be disturbed when checking funnel traps and can inflict irritating stings or bites. All inflicted injuries (even superficial ones) should be appropriately treated as soon as possible to ameliorate possible allergic reaction, prevent infection and promote healing.

To improve safety, field personnel should be aware of the treatment for snakebite and carry appropriate pressure bandages. Personnel should also have up-to-date tetanus vaccinations. Department personnel must not capture bats unless fully vaccinated against Australian Bat Lyssavirus.

If Department personnel or volunteers are injured, please refer to the Department's Health and Safety Section's 'Report a Hazard, near-miss or incident' intranet page, which can be found at http://intranet/csd/People_Services/rm/Pages/ReportingHazards,Near-MissesandIncidents.aspxZoonoses.

9.2 Zoonoses

There are a number of diseases carried by animals that can be transmitted to humans (i.e. zoonoses such as Toxoplasmosis, Leptospirosis, Salmonella). All personnel must take precautions to minimise the risk of disease transmission to protect themselves, their families and wildlife populations.

Advice on minimising disease risk is contained in the Department SOP for *Managing Disease Risk in Wildlife Management*

9.3 Allergies

Some personnel may develop allergies when they come in contact with animal materials such as hair and dander. Personnel known to develop allergies should wear gloves when handling animals and long sleeved pants/shirt.

People with severe allergies associated with animals, with immune deficiency diseases or on immunosuppressant therapy should not engage in the handling of wildlife.

10 Further Reading

The following SOPs have been mentioned in this advice and It is recommended that they are consulted when proposing to use funnel traps.

- Department SOP *Hand Capture of Wildlife*
- Department SOP *Animal Handling and Restraint using Soft Containment*
- Department SOP *Hand Restraint of Wildlife*
- Department SOP *Humane Killing of Animals under Field Conditions*
- Department SOP *First Aid for Animals*
- Department SOP *Managing Disease Risk in Wildlife Management*

For further advice refer also to:

Environmental Protection Authority and Department of Environment and Conservation (2010) *Technical Guide - Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment* (Eds. B.M. Hyder, J. Dell and M.A Cowan). Perth, Western Australia.

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