

DERM Animal Ethics Committee

Standard Operating Procedure

Wildlife Surveys

1. Preamble

As the Department responsible for nature conservation in Queensland, the Department of Environment and Resource Management is involved in identifying and assessing the living parts of the state's natural resources — plants, animals and ecosystems. Research, survey and monitoring programs provide a means of collecting important information in relation to the condition and trends of our wildlife and ecosystems and how best to protect these precious resources.

The primary goals of a wildlife survey are to estimate the species richness (the number of different species) and species abundance (the number of individuals within a species) within a particular area. A survey may also have important secondary objectives. Often, a survey may be undertaken to obtain information for a specific purpose, such as the comparison of wildlife communities between areas, characterising the wildlife community on a protected area, determining the impact or response of a wildlife community to some disturbance or management action or assessing the health or to support conservation or management of particular species.

In Queensland, the welfare of animals used for scientific purposes is protected by the *Animal Care and Protection Act 2001*. Wildlife surveys are considered a scientific use of animals and are therefore subject to the provisions of this Act. The legislation also requires that the conduct of the scientific use must be consistent with the provisions of the *Australian code of practice for the care and use of animals for scientific purposes* (seventh edition, NHMRC 2004), hereafter referred to as the Code of Practice. Wildlife surveyors and AEC members should be conversant with the legislation and the Code of Practice.

In addition to the legislation and the Code of Practice, investigators should be aware of other material available on the Department's Intranet.

2. Objectives and purpose of proposed procedure

This procedure has been written to provide guidance for members of the Animal Ethics Committee (AEC) and activity leaders who carry out wildlife surveys.

There are no general texts which describe the ethical capture and handling of Australian wildlife in the field, although some have been published overseas (Refer to Section 7 and Appendix 2). There is Australian information on the care of captive wildlife [for example, National Health and Medical Research Council (NHMRC) 1990] and on first aid for injured wildlife (for example, Walraven 1990).

This Standard Operating Procedure is not intended to be exhaustive or prescriptive. Its aim is to provide some general principles for reducing the impact on wildlife during surveys, to promote good practice and to raise issues which AECs need to consider when discussing such proposals. The information they contain is taken from the scientific literature and from animal care statements provided by existing licence holders.

A list of terms used in the text is provided in Appendix 1.

3. Detailed Description of Procedure

3.1 General ethical considerations and wildlife surveys.

The Code of Practice advances three fundamental concepts for improving the welfare of animals used for scientific purposes. These are known as the Three Rs and are:

- The *replacement* of animals with other methods
- The *reduction* of the number of animals used.
- The *refinement* of the techniques used to reduce the impact on animals.

The Three Rs are as relevant to wildlife surveys as to laboratory studies of animals, and this section provides examples of their implementation through good survey planning and design and appropriate methodology. Specific wildlife survey methods are discussed in later sections.

3.2 Survey planning

The existing knowledge of the fauna in the proposed study area should be used to determine if a new survey is both *necessary and justified*. Sources of such information include:

- Published records in scientific journals and the newsletters of scientific and natural history societies.
- Reports by QPWS and other government entities.
- The WildINet Database.
- Queensland Museum records.
- Birds Australia *The New Atlas of Australian Birds* (Barrett *et al.* 2004).
- Recovery Plans, Species Management Profiles and Biodiversity Planning Assessments.
- Local knowledge (local councils, land management groups, land holders).

The outcome of this background research will reveal the extent of the proposed survey that is necessary to meet the project objective. For example, there may already be sufficient information about some species, in which case there will be no need to re-survey these, thus *reducing* animal usage.

Reduction in animal usage by the application of existing knowledge depends on the availability and accessibility of that knowledge. For that reason, wildlife surveyors are encouraged to publish survey information whenever possible, and to lodge results where they can be accessed in the future. Examples of such repositories include the Queensland Museum and the WildNet Database.

3.3 Survey design and methodology

It is not the purpose of these guidelines to provide detailed technical advice about the design and methodology of wildlife surveys. Rather, the intent is to show how welfare impacts on animals can be minimised during surveys by employing appropriate design and methodology. This section is a general discussion of these issues. In later sections more specific suggestions are made.

The following points should be considered when designing a wildlife survey:

- It should be appropriate to the objectives of the project
- It should be based on sound scientific and statistical principles so that the results are valid
- It should minimise the impact on animals
- Sample sizes should be kept to the minimum required and that number justified.

The following general points should be considered when determining the methods to be used in a wildlife survey.

- Surveyors must have practical training and be experienced and competent in all the techniques they intend to use.
- Whenever possible, methods that do not require animals to be captured should be used. For example, spotlight counts, AnaBat™ detectors, hair tubes and playback calls.
- If animals must be captured, the least stressful methods available should be used. Consider the biology of the animal in relation to the time of year of the survey and the time of day of capture and release of the animals. Avoid periods when there are high environmental stresses. Ensure that animals are captive in traps for the minimum time.
- Animals that have to be handled should be restrained gently and the procedures completed as quickly as possible.
- Animals that have to be temporarily held after capture should be housed in a way appropriate to their biology and as free from environmental stresses as possible.
- If identification is necessary, methods used should be non-invasive and temporary whenever possible, and must not adversely interfere with the normal functioning of the animal.

Careful selection of survey design and methodologies can greatly improve the welfare of animals during wildlife surveys. As examples, a good experimental design can *reduce* the number of animals necessary to achieve a valid result; the use of indirect survey methods such as spotlight counts, AnaBat™ detectors, hair tubes and playback calls *replace* and *reduce* the number of animals used while the use of the least intrusive methods and short handling times *refines* the use of animals.

3.4 Voucher specimens

A Voucher specimen is any specimen, usually, but not always, a dead animal, which serves as a basis of study and is retained as a reference. A "type" specimen is a particular voucher specimen that serves as a basis for taxonomic description of that taxon.

The collection of voucher specimens is an integral part of scientific research. However, it is a practice of concern to some sections of the community. Wildlife surveyors intending to collect voucher specimens should consult the AEC's Standard Operating Procedure for the Collection of Voucher Specimens. Briefly, some important points are listed below.

- The collection of voucher specimens must be fully justified, the number of specimens collected kept to a minimum and the collection of animals from more than one site must be justified.
- Voucher specimens should not be routinely collected for species that are readily identifiable in the field. Where only confirmation of the field identification is necessary, this might be possible by other means. Examples include hair samples, photographs and sound recordings.
- The AEC must consider the potential conservation impact as part of the justification for collection of voucher specimens.
- The animal welfare requirements for the capture of voucher specimens are no different from those for animals that will be released.
- Euthanasia of animals to be used for voucher specimens must be by an approved method (see section 3.5 below).
- Voucher specimens must be fully and correctly documented and lodged with a publicly accessible scientific collection.

3.5 Emergency procedures

All applications to an AEC for wildlife research require a detailed description of emergency procedures. The purpose of this is to ensure that threats to the welfare of animals resulting from

emergencies are mitigated. In the context of wildlife surveys, emergencies include events such as injuries to animals, inclement weather, floods, bushfires and the illness or injury of the surveyor.

- Issues particularly relevant to wildlife surveys include the following.
- Arrangements must be made to clear and close all traps in the event of inclement weather, floods and bushfires.
- Arrangements must be made to clear and close traps in the event that illness or injury removes the investigator from the field.
- Investigators should have the appropriate skills and equipment to euthanase seriously injured animals in the field should this be necessary. Euthanasia must be by an approved method (see section 3.5 below).
- Arrangements must be made to appropriately transport seriously injured animals to the nearest veterinarian for treatment, noting that injured animals should be taken to veterinarians initially rather than to wildlife carers.
- Any unexpected problems should be reported to the AEC as soon as possible, including mortalities and injuries to animals. Future surveys may need to be modified in the light of these problems.

3.6 Euthanasia

Emergency euthanasia or killing of specimens for vouchers may need to be carried out by surveyors in the field. Investigators should be conversant with the Code and the Queensland Health Regulations, which details the legal requirements for using sodium pentobarbitone. The following points about euthanasia need to be considered.

- Methods must be humane and produce a quick and painless death.
- Methods which are acceptable are described in Reilly (2001) and AVMA (2007).
- Methods which are not acceptable include car exhaust fumes, cervical dislocation in animals larger than 150 g, drowning and freezing. Note that cooling reptiles and amphibians to make them easier to handle is acceptable but, even after cooling, freezing is not an acceptable method of euthanasia.
- Surveyors must be fully trained and adjudged by an authority to be competent in the use of the acceptable methods of euthanasia.

3.7 Diseases

Zoonotic diseases (those which affect both animals and humans and may be passed between them) are known to be present in Australian native animals e.g. Australian bat lyssavirus. Diseases may also be transferred between animals. Surveyors should therefore take basic precautions to prevent animal–animal, animal–human and human–animal transfer of disease. Such precautions include the following:

- High levels of personal hygiene.
- Not eating, drinking or smoking whilst handling animals.
- Washing field clothes and equipment that has come into contact with animals' blood or body fluids and cleaning all survey equipment between surveys.
- Basic first aid for treatment of cuts, bites and scratches.
- Observance of any established protocols to avoid transmission of known wildlife pathogens such as chytrid fungus.

- Obtaining vaccinations and/or maintaining adequate titre levels against Australian bat lyssavirus / rabies before handling microbats and/or flying foxes. Knowledge and familiarisation with C3 Bat protocol (person bitten or scratched by bat) Queensland Health.
- Should anyone who handled animals become ill within 2 months of a survey, the attending medical practitioner should be informed of the potential exposure to zoonoses. Further information on zoonoses can be obtained from Qld Health.

3.8 Surveys of terrestrial and arboreal mammals.

Catling et al (1997) provides general information on surveying mammals.

3.8.1 Methods not involving animal capture

3.8.1.1 Animal signs

Some mammal species leave signs (scats and tracks) sufficiently distinctive to provide positive identification. The sign of many Australian mammal species is described in Triggs (1996). Signs which indicate the presence of species or groups of species should be used in surveys wherever possible.

3.8.1.2 Hair tubes

The use of hair tubes is described by Scotts and Craig (1988), Lindenmayer et al (1999) and Mills et al (2002). Points to consider are as follows:

- Ensure that the floor of the tube is free of adhesive tape to prevent small lizards and frogs becoming stuck.
- If an animal does become stuck to the tape, do not try to pull the tape off, as this may seriously damage the skin. Either carefully trim the tape on the animal to as small a size as possible (the remaining tape will be shed during normal skin replacement) or gently ease vegetable oil under the tape and slide it off.
- Slope hair tubes with the entrance pointing slightly downwards to ensure drainage.

3.8.1.3 Spotlight counts

When spotlighting animals:

- Avoid prolonged exposure to the light for more than 2 minutes.
- Use a light with a narrow beam.
- When practical, use a red filter or, preferably, a dimmer switch to reduce light intensity for prolonged observations once the animal has been spotted.

3.8.2 Methods involving animal capture

3.8.2.1 Trapping—general

In general, the following points apply to the use of traps:

- Use the trapping method with the least impact.
- Whenever possible, avoid trapping at times of the year when animals may be susceptible to greater stress, such as during breeding seasons or droughts. If animals are breeding, minimise their time in traps by checking more frequently and releasing pregnant or lactating females as a matter of priority.
- Select the type of trap which is appropriate to the species being targeted.
- Ensure all traps are in good working order and checked immediately prior to use.
- Limit the number of traps set per field worker to that which can be cleared in two hours.

- At any one site, unless justified otherwise, limit trapping periods to no more than four consecutive nights with a minimum of three nights between trapping periods to avoid continually trapping the same individuals.
- Use bait appropriate to diet of the target species. The bait should not only lure the animal into the trap, but should also replace the food and moisture it would have consumed had it not been trapped. This is particularly important for small mammals which have high metabolic rates.
- Locate each trap to reduce exposure of trapped animals to the sun, wind, rain etc (for example, place traps under shrubs or beside logs).
- Avoid placing traps in areas of high ant activity.
- Do not trap during periods of inclement weather.
- Ensure all traps are located and checked each time a trap line is checked and that all traps are removed from the field or closed at the end of the trapping period. If individual traps are numbered and set in order, it makes it easier to ensure that all traps are checked.
- For nocturnal species, begin clearing traps at first light and where practical leave the traps closed until late afternoon. During periods of extremely cold weather, cease trapping completely or clear and close traps by 0200 hrs each day.
- For diurnal species, have an inspection schedule which minimises the impact on any trapped animals and locate the traps so as to minimise the possibilities of heat or cold stress.
- Release animals as soon as possible and where they were caught. Consideration should be given to the habits of the animals and potential threats associated with exposure to predators or unusual circumstances at the time and site of release.
- Cease trapping immediately if there has been an unusually high mortality of animals.

3.8.2.2 Box traps (also known as Elliott traps)

In addition to the general points in 3.8.2.1 above, the following need to be considered:

- Provide bedding in the traps. Dry leaf and other naturally occurring biodegradable organic material are suitable. Materials such as Dupont Hollofill and raw wool sometimes wrap around the animals' feet. Cotton wool should not be used because it absorbs moisture, increasing the risk of hypothermia.
- In areas with wetter climates place traps in a plastic bag taking care to ensure adequate drainage by sloping traps at 10° to the horizontal to allow drainage during rain.
- Close traps during the day during periods of high temperatures in areas where traps cannot be sheltered from the sun.
- Traps set in trees should be on the opposite side of the tree to the morning sun.

3.8.2.3 Cage traps

In addition to the general points in 3.8.2.1 above, the following need to be considered.

- Set traps in sheltered positions.
- Provide shelter for trapped animals by covering the trap with opaque plastic in cooler areas or with shade cloth in hotter areas.
- If traps cannot be sheltered from the sun they should be closed during the day if temperatures are high.

3.8.2.4 Dry pitfall traps

The AEC has adopted a procedure for the use of pitfall traps which should be observed.

In addition, consider the following points:

- To minimise drowning from flooding, a flat cork disc, at least 2-3 cm thick, may be used which is slightly smaller than the diameter of the pit and placed at the base. As the water level rises the disc floats and the animal will escape if the water level rises high enough. Alternatively, use a flat piece of wood or bark or a small stick.
- Use suspended lids to reduce predation and close lids during adverse weather conditions.
- Provide dry leaf and/or other naturally occurring biodegradable organic material and soil or 35 mm PVC tubing to protect trapped animals.
- Providing material for shelter may result in snakes using the traps as refuges. In these areas, traps without shelter material may be used if they are at least 400 mm deep (so that there is sufficient shade inside throughout the day).
- On the first day of setting pitfall traps, a small amount of water should be added to the trap as appropriate to provide moisture for trapped animals.
- Consider the need for insecticides to prevent ant attacks of trapped animals in drier areas. For example, use Rid Roll-on or Coopex residual ant killer around the rim of the trap. However, insecticides should be used with caution bearing in mind that the toxic effects of insecticides on most native species are unknown. Move the trap if ants start entering in numbers.

3.8.2.5 Funnel traps

Funnel traps used in conjunction with or without drift fences (or set against natural features such as rock walls) are specifically used to catch reptiles and amphibians, but are known to catch ground-dwelling birds, small mammals (which may chew their way from traps leaving holes in the mesh) and arthropods such as centipedes and beetles (that will also chew their way from a trap if left in for too long). Funnel traps are useful for targeting reptiles that are unlikely to be caught in pit traps or as a substitute to pit traps where the terrain makes the digging of pits difficult or ants are a problem where pits are concerned.

- Consider the appropriateness of funnel trapping for the target species. Consult appropriate references, e.g., Thompson, G.G. and Thompson, S.A. (2007). Usefulness of funnel traps in catching small reptiles and mammals, with comments on the effectiveness of the alternatives. *Wildlife Research* **34**, 491-497.
- Provide adequate cover over the funnel trap as insulation to prevent dehydration or exposure. For example, shade cloth of the highest density weave, silver foil roofing insulation or vegetation piled on traps.
- Do not place traps in an area that could flood during your trapping session.
- Place funnel traps with zip opening top side so that the zip can be opened (if necessary) with minimal handling of traps. This can be particularly useful where snakes are caught. If a snake can be identified in the funnel trap it can be released without handling, by opening the zip and left for a short period near cover; this way the snake will find its way out of the trap without having to expel with force. Training in snake handling is essential. Snake bite is possible through the walls of the trap so care should be exercised when picking up traps.
- Frequency of trap checks should be conducted according to prevailing conditions so as to minimise any impacts on animals due to heat or cold excesses. Traps should be checked more frequently if there is a risk of catching small quail during cold weather to prevent exposure related death. It is essential that traps are picked up and examined in full light to avoid overlooking individual animals and thus leaving them in traps for too long.

- Animals should be released as near to the site of capture as possible. Release away from drift fence lines to minimise the chance of recapture. Release at an appropriate time in appropriate micro-habitat, e.g., nocturnal gecko needs to be released under bark/log during the day.
- Review trapping methodology (e.g., amount of cover provided, location of traps) if there is mortality of animals. Cease trapping if there is an unusually high mortality of animals.

3.8.2.6 Radio-tracking

Radio transmitters are rarely necessary for general wildlife surveys so their use is not covered here in depth.

3.9 Surveys of bats

A description of bat survey methods can be found in Helman and Churchill (1986). Surveys for bats should be carried out by an experienced bat investigator as apart from fruit bats little is known of their biology or taxonomy and species can be difficult to identify.

3.9.1 Methods not involving animal capture

Ultrasound detectors (for example, the AnaBat™) can be used to detect bats without any impact and should be used whenever possible.

3.9.2 Methods involving animal capture

3.9.2.1 General

The following general points need to be considered when trapping bats:

- Whenever possible avoid trapping during the breeding season.
- Bats should be released at the point of capture as soon as possible. However, they should not be released in daylight. Those which cannot be released before dawn should be held until the following dusk.
- When necessary, bats should be held separately in suspended cloth bags in a dark, quiet and warm place.
- Bats may go into torpor in the trap or while held in bags and will need to be re-warmed before release.
- Care should be taken when handling both flying foxes and microbats, due to the zoonotic disease Australian bat lyssavirus (see Section 3.7).

3.9.2.2 Harp traps

A description of the use of harp traps can be found in Tidemann and Woodside (1978). Points additional to those in 3.9.2.1 that need consideration are:

- Set traps in a sheltered spot in potential flyways.
- Clear within two hours of dusk and again after dawn, but before the sun begins to warm the hessian.
- Harp traps must not be used where large numbers of bats could be caught to avoid them overheating in the collection bag. For example, they should not be used to catch bats at entrances to roost sites.

3.9.2.3 Mist nets

Points additional to those in 3.9.2.1 that need consideration are listed below:

Because of the high risk of injury and death to bats, mist nets should only be used where other methods have already been rejected as unsuitable.

Mist nets must only be used by trained and competent personnel. An appropriate authority for the use of mist nets by the Australian Bird and Bat Banding Scheme (ABBBS) is preferred.

- Only use mist nets after dark to avoid catching birds.
- The net must be attended at all times and captured bats removed immediately.
- Mist nets should not be used in areas where large numbers of bats could be caught, for example, at entrances to roost sites.
- Nets should be closed when not attended and during the day.

3.9.3.4 Trip lines

Note that trip lines are ineffective for bats that can take off from water such as fishing bats. Points additional to those in 3.9.2.1 that need consideration are:

- Due to the risks of injury to bats, use other methods whenever possible.
- Monitor continually whenever the line is deployed.
- Be prepared to enter the water to rescue bats if necessary.
- Have at least one low-powered torch to collect bats since they will swim away from bright lights.

3.10 Platypus

- Platypus are known to be particularly sensitive to stress associated with capture and handling and hence before any trapping is undertaken, the likelihood of platypus being present should be ascertained from other sources and the requirement for trapping versus other indirect methods of survey be fully justified.
- In deep water habitats, lightly weighted gill nets should be used to allow trapped platypus to swim to the surface.
- Trapping must not be carried out during the months of October-March, when females are laying eggs and raising young, unless justified to the AEC's satisfaction.
- Gill nets should be manned continuously to detect when a platypus is caught, for example, by checking for splashing.
- Gill nets should be lifted every hour to check for snags and entrapped large fish.
- Nets should have a stretched mesh size of at least 150 mm, or be fitted with an entrance grill with a mesh size of less than 35 mm, or be set so that there is an air space available along the length of the net.
- Due to the potential to cause deaths of platypus and turtles, note that it is illegal to use opera-house style traps in some Queensland waterways; check with QPIF before deployment.
- Captured platypus should be transferred to a clean bag or secure box and held in a quiet place until all nets are closed for the night, to minimise the likelihood of hypothermia, attack by predators or by other platypus (particularly between males in the breeding season).

3.11 Surveys of birds

3.11.1 Methods not involving animal capture

3.11.1.1 Direct Observation

- Avoid close range inspection during breeding and feeding.

- Carry out searches for nests, mounds, display areas, characteristic scrapes and scratchings using visual and auditory searches such as playing breeding calls.

3.11.1.2 Playback calls

- Avoid prolonged exposure by limiting calling sessions to two 15 minute periods per night within an individual animal's territory to avoid significant disturbance to normal behaviour. Each 15 minute period should consist of a series of short periods of recorded calls.
- Use of play back calls during the species' breeding season should be minimised and conducted in a manner so as not to disrupt the behaviour of birds in a way that might impact on breeding, nesting or care of young by resident birds.

3.11.1.3 Spotlighting owls

Examples of techniques to census owls can be found in Kavanagh and Peake (1993). See also section 3.8.1.3 *Spotlight counts* of mammals.

3.11.2 Methods involving animal capture

3.11.2.1 Mist nets

Guidelines for using mist nets can be found in the Australian Bird Banders Manual (Lowe 1989).

- Because of the high risk of injury and death to birds, mist nets should only be used where other methods have already been rejected as unsuitable.
- Mist nets must only be used by trained and competent personnel. An appropriate authority for the use of mist nets by the Australian Bird and Bat Banding Scheme (ABBBS) is preferred.
- Mist nets should be attended at least every 30 minutes and captured birds removed immediately.
- Nets must be closed when not attended.

3.12.0 Surveys of reptiles and amphibians

3.12.1 General

A summary of survey methods for reptiles can be found in Blomberg and Shine (1996). Choosing the correct season is critical for effective surveys of amphibians (and to a lesser extent reptiles). Most amphibian species are active only during the warmer months of the year (Spring–Summer–Autumn), although there are some which are active only during the cooler months (Autumn and Winter). Outside of their active season many frogs aestivate or go into torpor, usually in burrows, hollows in trees, crevices in timber or rocks or under loose soil. When in torpor, they are undetectable. To a lesser extent this may also occur during the active season when weather conditions are unsuitable, for example, when conditions are dry.

3.12.2 Surveys not involving animal capture

3.12.2.1 Spotlighting amphibians with or without using playback

- Avoid excessive foot traffic around the water body.
- Keep exposure to a minimum to prevent overheating.
- Use a lower intensity light held at a distance for further observations.

3.12.3 Surveys involving animal capture

3.12.3.1 General

- Consider that hand searches carried out by experienced personnel under suitable conditions will locate nearly all species of reptiles and amphibians in an area within a short period of time which may mean that fewer traps or no traps at all need be set.
- Frogs should be handled as little as possible because handling removes skin secretions and predisposes the frog to fungal infections (White 1990), while continuous holding in the hand can result in overheating.
- Hygiene precautions as detailed in NSW National Parks and Wildlife Service (2001) must be observed when handling frogs and tadpoles, including the use of gloves.
- Gloved hands should be wetted in the local water or in wet grass/vegetation so that loss of skin secretions is minimised when frogs are first picked up.
- Frogs should be moistened with rainwater or water from the stream being surveyed after holding or can be held separately temporarily (up to 24 hours) in a new moist plastic bag containing some vegetation (although, in the dark, vegetation will absorb oxygen).
- Reptiles should be held separately in appropriately sized secure bags or boxes with some vegetation, or a moist paper towel, as appropriate, in a cool place.
- Tadpoles are often easier to find than adults and provide important information about habitats used and other measures of environmental quality. However, care needs to be taken when handling tadpoles as handling can result in a high level of injury and death of the tadpoles. See Anstis (2002) for identification keys.

3.12.3.2 Hand searching for reptiles and amphibia

- Take care to uncover and reposition rocks and logs to prevent animal injuries and to avoid causing habitat disturbance which may affect the subsequent abundance of the species.
- Wash hands without soap in the water of the water body being surveyed or with rainwater to reduce contamination from chemicals.
- Noose type devices to catch large reptiles should be used with care, and sticks to pin snakes need to be padded to avoid causing damage.
- While all personnel must use gloves to handle frogs, smokers must use gloves when handling amphibians to prevent absorption of nicotine through the animals' skin.

3.12.3.3 Pitfall traps

Note that the DERM Standard Operating Procedure for the use of pitfall traps should be followed. See also section 3.12.2.5 Dry pitfall traps.

- PVC tubing or objects such as a piece of wood, may be placed at the bottom to provide a perch or shelter for trapped animals. Burrowing animals prefer loose soil and, in western areas when trapping for lizards, provide a layer of sand.
- To minimise drowning from flooding, a flat cork disc, at least 2-3 cm thick, may be used which is slightly smaller than the diameter of the pit and placed at the base. As the water level rises the disc floats and the animal will escape if the water level rises high enough. Alternatively, use a flat piece of wood or bark or a small stick.
- Use a saturated sponge to provide high moisture levels for trapped amphibians or provide water plus a dry area by using a rock or by tipping the trap so that the bottom has a dry and a wet area.

- Insecticides may be used where ants are prevalent (for example Rid Roll-on or Coopex residual ant killer around the rim of the trap). However, insecticides should be used with caution, bearing in mind that the toxic effects of insecticides on most reptiles and amphibians are unknown. Move the trap if ants start entering in numbers.
- Check twice a day.

3.12.4 Surveys of turtles

3.12.4.1 Freshwater turtles

- Set traps with an air space to prevent drowning of turtles or by-catch such as platypus, water rats or water birds. The air space can be maintained by use of a float such as an empty drink container or by tying the trap to an overhanging tree or log. Opera-house style traps can be tied to a stake on the bank.
- Traps should be checked at least at dawn and dusk. They should be checked more frequently if turtle numbers are high and during summer.
- Transport animals separately to avoid the risk of shell damage and hence infection. Keep cool during transport to avoid heat stress.

3.12.4.2 Marine turtles

- Marine turtles are very susceptible to heat stress, especially during transport. They can be cooled by the use of wet hessian bags.
- Confining the animals in small spaces increases the risk of abrasions, and hence infections. Marine turtles are best restrained by placing them on their backs in a cool place.
- During transport, insulate from heat and also from vibration. They are best transported within a vehicle rather than in the tray of a utility.

3.12.5 Spider burrows

- Small drainage holes should be placed in the bottom.
- Keep handling time to a minimum.

3.13.0 Surveys of fish

General information is available in Barker *et al.* (2002) and Merrick 1990.

- Consider that fish are usually in their best condition in spring and early summer and will be able to cope with the shock of capture and recover more quickly than in the winter or in mid-summer after spawning.
- Use nets with soft mesh such as cotton or nylon to avoid harming the fish.
- Use appropriately sized and weighted traps to reduce the risk of non-target animals being caught.
- Fyke nets should have an air space by being set partially out of the water to prevent drowning of trapped mammals such as platypus, water rats or waterfowl. Otherwise they should have a means of escape.
- If possible, avoid using gill nets because fish caught in these often die (or are so damaged during removal that they are unlikely to survive) and because they have the potential to trap many non target species.
- Check and empty traps regularly.
- Handle the fish as little as possible.

- Minimise the removal of the fish's protective mucous covering and reduce temperature shock by wetting hands first in the water from which the fish was caught.
- If electro fishing is being used for sampling, operators should have appropriate training and follow guidelines set out in NSW Fisheries (1997).

4. Animal treatment/withdrawal and euthanasia decisions

In the event that animals are either injured during trapping or are considered unfit for release due to health, stress or unknown causes they will immediately be assessed by an experienced field officer. The following actions would be taken based on the assessments of this officer.

The animals should be:

- Humanely euthanased if the injury or health concern is considered untreatable and is likely to significantly compromise the animal's survival prospects on release. An appropriate euthanasia technique would be adopted for different sized animals based on the NHMRC guidelines.
- Treated on site by an appropriately experienced person with knowledge and skills in the treatment of such injuries. This should only occur where there are sufficient resources and experience to treat the animal on site and the injury/health concern is considered minor and unlikely to significantly compromise the animal's survival prospects on release. Once properly treated the animals should be closely monitored prior to release,
- Transported for assessment and treatment by an experienced veterinarian.

5. Routine Animal Monitoring and Management

Animals will be handled so as to cause minimal stress and under normal circumstances released as soon as identification is completed. Trapped animals will be released after identification early each morning. Any signs of stress particularly associated with wet and cold conditions will be immediately dealt with as a priority (refer to Section 4 in relation to Animal Treatment/Withdrawal and Euthanasia decisions). Small mammals will be kept in a warm dry calico bag with cotton wool and held in the field worker's jacket for a short period of time or until the animal recovers. This method is very successful in assisting small mammals to recover from cold wet conditions. In the event of extreme wet and cold conditions traps will be shut down to prevent animals entering. If trapping is to be conducted during cold dry conditions some form of insulation such as leaf material or other naturally available organic material shall be placed inside traps to ensure animals caught do not experience undue stress. Details of specific protocols for different survey techniques and species groups are provided in preceding sections.

6. Qualifications, Competencies and Training

The procedures detailed above must be undertaken either by or under the direct supervision of a person with significant previous experience in this technique and in the handling and care of the species likely to be captured during the activity. Details of specific qualifications, training and authorities for different survey techniques are provided in preceding sections.

7. Sources and References Used

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8. Authorities consulted in relation to the development of this procedure

This standard operating procedure has been substantially drawn from an equivalent guideline prepared by the Animal Research Review Panel (ARRP) and the Animal Welfare Unit of the NSW Department of Primary Industries Animal Welfare Branch. That guideline was developed from contributions made by the following authorities:

- Dr Dan Lunney,
- Mr Walter Boles,
- Dr Burt Sheridan,
- Dr Jack Giles,
- Dr Andrew Braid,
- Dr Leslie Reddacliff,
- Associate Professor Margaret Rose
- Dr Alan York,
- M. Murray,
- P. Burcher,
- Adair,
- K. Kendall,
- L. Lim,
- ERM Mitchell McCotter,
- Mr Bob. Harden,
- The Australian Platypus Conservancy,
- The Victorian Department of Natural Resources and Environment,
- Mrs Amanda Paul,
- Dr G Kortner,
- Prof F Geiser,

The document has been reviewed and accepted by the DERM Animal Ethics Committee.

Appendix 1: Definitions

Anabat™ detector

An electronic device designed to record the echolocation calls of bats (which are usually beyond human hearing) and analyse the characteristic calls of specific species. There are some limitations to this equipment such as inability to distinguish all species. For example it will not detect fruit bats which do not use echolocation. Direct observation can be used for these species.

Box trap

A box made from sheet metal with an open door that is released and closes when an animal interferes with the bait in the trap. Sizes vary from quite small (for catching mice) to traps large enough to bandicoots. Because the most commonly used brand is Elliot, these are often referred to as Elliot traps.

Cage trap

Similar to a box trap except that the trap is made from steel mesh. Sizes vary from quite small (for catching mice) to traps large enough to trap dogs. The most commonly used size is 60 x 30 x 30 cm.

Direct observation

Standing and watching or walking in a particular direction for certain lengths of time using binoculars or a spotting scope to detect the range and number of birds or large mammals.

Distress

An acute or chronic response of an animal caused by stimuli that produce biological stress, which manifests as observable, abnormal physiological or behavioural responses.

Elliott trap

See box trap.

Fyke net

A net constructed of hoops decreasing in size with webbing between to form a cone shape and one or more funnels inside which prevent trapped fish from swimming out, (ie a 'hoop net') and which also has wings of one or two pieces of netting at the first hoop which are anchored into position with poles. These wings guide the fish into the net. Also known as wing, frame, trap or hoop nets.

Gill net

A net of diamond shaped mesh which is set vertically. The fish is unable to back out because its gill covers get caught in the mesh.

Hair tubes

Small PVC tubes lined with double sided sticky tape with an internal compartment where bait is placed. They may be more efficient and cost effective than the other methods for some rare or trap shy mammals.

Harp trap

An array of thin nylon fishing lines tensioned between two horizontal poles with an escape-proof hessian pocket located below. Bats fly into the lines, fall down undamaged into the pocket and crawl up to roost under a hessian flap.

Hoop net

See fyke net.

Mist net

Large very fine nylon nets which are strung across potential flyways close to the ground between the vegetation in order to catch birds or bats which fly into them. It is very easy for both birds and bats to injure themselves or become distressed whilst being disentangled from these nets.

Pitfall trap

A glass, metal or plastic container sunk into the ground so that the mouth is level with the soil surface. Ground dwelling animals fall into the trap and are unable to escape.

Scientific purposes

All those activities performed to acquire, develop or demonstrate knowledge or techniques in any scientific discipline, including activities for the purposes of teaching, field trials, environmental studies, research, diagnosis, product testing, and the production of biological products.

Spider burrows

Small PVC tubes installed into the ground, covered by a metal or canvas roof. Tubes are checked for sheltering individuals which can be captured by hand for identification.

Trip line

A single nylon line stretched 1.5-3cm above the surface of a body of water where bats are likely to fly, causing bats in flight to fall into the water and swim out where they are captured. These have much greater potential for damage to the animal than harp traps.

Voucher specimen

Any specimen, usually, but not always, a dead animal, which serves as a basis of study and is retained as a reference. A "type" specimen is a particular voucher specimen that serves as a basis for taxonomic description of that subspecies.

Appendix 2: Overseas guidelines

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