



This Standard Operating Procedure (SOP) is applicable to all UniSQ Research Workers who care for and use Animals for Scientific Purposes. The procedure must only be performed by those persons who have been deemed competent, and who believe they remain competent to do so. Access to supervision by suitably qualified staff whilst undertaking this procedure is encouraged, where required.

### Species

- *Crinia* and related species
- *Limnodynastes* species
- *Litoria* species
- *Platyplectrum ornatus*
- *Rhinella marina*
- Other frog species captured

### Purpose

The purpose of this SOP is to provide information to people considering the use of pitfall traps in surveys and research on amphibians, how to remove amphibians from the pitfall trap, process them and then release them.

Population surveys and monitoring play a key component to many ecological research projects. Population data is obtained through ecological survey techniques such as camera, cage, Elliott and pitfall trapping. Pitfall trapping is one of the most well-established techniques for ecological surveys, having been used for decades with many variations in designs (e.g. Woodcock, 2005; Ribeiro-Júnior et al., 2011) relating to size and depth of the pitfall trap and use of preservatives and fences. The success of a pitfall trap relies on the activity and locomotion of the target species; however, pitfall traps function as an opportunistic method of trapping any vertebrate or invertebrate species that drop in (Friend et al., 1989; Ribeiro-Júnior et al., 2011; Palmeirim et al., 2019). Trapping is an effective method of obtaining species diversity and abundance data, calculated from the number of species (and individuals in each species) caught over a set trapping period. This data becomes the foundation for conservation project development, aids in understanding wildlife ecology, and improving current research practices. Typically, you decide the length of time that trapping will take place prior to the start of trapping, which can be as short as three days or extend to weeks. Depending on environmental conditions (typically rainfall and temperature) pitfall trapping capture rates can be 0% (no animals caught; typically in prolonged dry and cold conditions) or infrequently over 100% (e.g. over 100 animals caught per 100 traps in each day of trapping; this can occur on warm nights in spring/summer after regular rainfall for several years).

Pitfall traps are typically made from plastic, and two main types are commonly used for small terrestrial vertebrates, i.e. amphibians, reptiles (e.g. dragons and skinks) and small mammals (e.g. native and introduced mice). These are a 10 or 20-litre bucket buried in the ground or 150 mm diameter PVC pipe buried 0.5 m in the ground with the opening of the bucket or PVC pipe flush with the ground. Both buckets and the PVC pipe (capped at the bottom), have 1 mm holes drilled in the bottom for drainage. Within the pitfall trap are typically placed a floatation device (a piece of polystyrene) and shade (half a plastic pie dish); both offer protection from the sun (at midday depending on the time of year), and the polystyrene allows animals to float on if unexpected rainfall occurs.

Once installed, pitfall traps are often left in the ground to conduct surveys at different times of the year or annually to record seasonal or annual changes in species diversity and abundance. If left *in situ* and not in use 150 mm diameter PVC pipe pitfall traps are always sealed and covered with a solid cover. For these PVC pitfall traps the top of the trap is closed with a tight-fitting 150 mm galvanised metal cap/lid covered with a 300 mm square 20 mm thick concrete slab to protect the metal lid. For 10 or 20 litre buckets left *in situ* and not in use they should be filled with local soil. Before and after use of the pitfall trap it is emptied of soils and cleaned (using a cloth such as a dish cloth/chux), so it is obvious there are no animals in the trap.

Pitfall traps can be left open to capture diurnal and nocturnal animals, and if so, they must be checked each day at dawn to remove nocturnal animals and dusk to remove diurnal animals. If only capturing nocturnal animals, then pitfall

traps are opened at dusk and closed after any caught animals are removed at dawn. To improve the capture rate of pitfall traps, depending on the landscape, drift fences can be installed. Drift fences are typically made of wood, plastic or metal between 0.2 and 0.5 m high, partly buried, that may extend over 20 m from the pitfall trap to direct animals to a gap in the fence where the pitfall trap is placed. Drift fences can be difficult to use depending on the substrate, e.g. with the presence of large rocks, and involve clearing of vegetation to install with consequential environmental impacts.

Where there is no confirmed plan for future pitfall trapping – the traps should be removed, or filled in with local soil and the GPS location of each trap recorded and a steel post e.g. 1.5 m star picket placed within 0.5 m of the pitfall trap with the trap number recorded e.g. painted on the picket.

Definitions	
<b>AEC</b>	Animal Ethics Committee
<b>GPS</b>	Global Positioning System – the location on earth
<b>PVC</b>	Polyvinylchloride is one of the world's widely produced synthetic plastic polymer and used in a wide range of products
<b>SD</b>	Secure Digital memory card for portal devices

Linked SOPs	
SOP ID number	SOP title
WL002	Pipe trapping (arboreal species)
WL003	Photographing small vertebrates
WL006	Removing small reptiles from pitfall traps
WL007	Removing small mammals from pitfall traps
WL009	Microchipping cane toads
WL010	Handling cane toads
WL011	Euthanasia of cane toads
WL012	Dry pitfall trapping for vertebrates

### Potential hazard to Research Workers

UniSQ Risk Management Plan ID number	UniSQ Management Plan title
RMP_2020_4960	Wildlife research and teaching fieldwork

### Personal Protective equipment required

- Field appropriate clothing (e.g. long sleeve shirt, long pants, hat)
- Enclosed footwear
- Sunscreen
- Insect repellent
- Gardening gloves – for closing pitfall traps on the last day of trapping
- Disposable examination gloves

### Animal wellbeing considerations

Perceived stressors	Management strategy
Extreme weather	Avoid trapping or close traps in extreme weather conditions. Close pitfall traps if there is excessive rain or heavy rain is forecast. Plan ahead and monitor long-range and daily weather forecasts.
Exposure in traps	Always ensure appropriate and adequate shelter in the bottom of pitfall traps to offer protection for animals against exposure to environmental conditions and predation or attack from other animals, i.e. half pie dish and float.

Trap located near ant nest	Pitfall traps should not be placed in the vicinity of ant nests. Move trap to an area with no ant nest.
location of trap in drainage area or low lying area	Pitfall traps should not be placed in drainage channels or low-lying areas – and if found to be in such an area, it must be relocated to a nearby location not experiencing potential flooding.
Disease risk from bags and equipment	All handling bags and equipment should be kept clean to minimise the risk of disease.
Handling of animals	Animals will be handled so as to cause minimal stress and, under normal circumstances, released as soon as processing is completed.
Stressed animal particularly associate with wet and cold conditions	Any signs of stressed animal particularly associated with wet and cold conditions will be immediately dealt with as a priority. In the event of extreme wet and cold conditions, traps will be shut down to prevent animals from entering.

**The overall perceived level of risk to an animal undergoing this procedure is:**

High                       Medium                       Low

**Substances to be administered**

Substance	Dose	Route	Purpose
Not applicable			

**Equipment/ materials required**

- Boxes of different size disposable examination gloves
- Range of scales (10 g, 40 g, 100 g, 200 g, 1 kg, to weigh animals)
- Ruler (wood or steel) measured to 1 mm accuracy
- Permanent markers to label containers, i.e. plastic bags
- Zip-lock plastic sandwich or larger food-grade zip-lock plastic bags
- Microchip scanner
- Plastic bags for rubbish
- Datasheets
- Alcohol and alcohol wipes
- Cloth such as a dish cloth/chux

**Site specification or location requirements**

At locations/ fields outlined in UniSQ AEC approved application that includes the use of this SOP.

**Waste disposal**

Nil.

**Procedure**

1. Locate the position of the pitfall trap from flagging tape with trap number written on it.
2. Using a stick longer than the pitfall trap, gently lift the plastic shelter and float to confirm an animal is in the pitfall trap.
3. Pre-fill trapping data sheet with non-animal related details such as trap number /day/date/bag weight (see attached data sheet for amphibians).
4. Put on clean disposable gloves (ensure they are not loose fitting).
5. Gently remove plastic shelter from pitfall trap using a stick.

6. With a permanent marker pen, label a new zip-lock sandwich bag with the trap number, and weigh and record the weight of the plastic bag on the data sheet in the row where you wrote the trap number, in the column labelled 'Wt bag (g)'.
7. Turn plastic zip-lock sandwich bag inside outside out and use zip-lock bag as an additional glove; reach down into the pitfall trap and cup the amphibian in the palm of your hand such that the amphibian is held within the zip-lock bag.
8. Remove your hand containing the amphibian from the pitfall trap and close the zip-lock bag fully over the amphibian and close the bag using the zip-lock such that the amphibian is secure in the zip-lock bag. Record the species of the animal in the first column of the data sheet in the row where you wrote the trap number in the column labelled 'Species name'.
9. Weigh the amphibian in the zip-lock bag and record weight on the data sheet in the row where you wrote the trap number, in the column labelled 'Wt bag + animal (g)'. From this, you can determine the weight of the animal and write this number in the column labelled 'Wt animal (g)'.
10. While the animal is still in the zip-lock bag, measure the snout-vent length (from the tip of the nose to the cloaca = head and body length) to the nearest millimetre using the ruler while the animal is placed on a flat surface (e.g. clipboard) and record this number in the column labelled 'Head and body (mm)' (Figure 1).
11. While the animal is still in the zip-lock bag, measure the hind leg length (groin to the tip of the longest toe but do not include the nail) to the nearest millimetre using the ruler while the animal is placed on a flat surface and record this number in the column labelled 'Leg (mm)'. The nail is not included in this or foot length as they can be of varying length due to wear etc. If the leg is straight this is one measurement; if the leg is bent then add the tibia and femur to obtain leg length (Figure 1).
12. While the animal is still in the zip-lock bag, measure the hindfoot length (heel to the tip of the longest toe but do not include the nail) to the nearest millimetre using the ruler while the animal is placed on a flat surface and record this number in the column labelled 'Foot (mm)' (Figure 1).

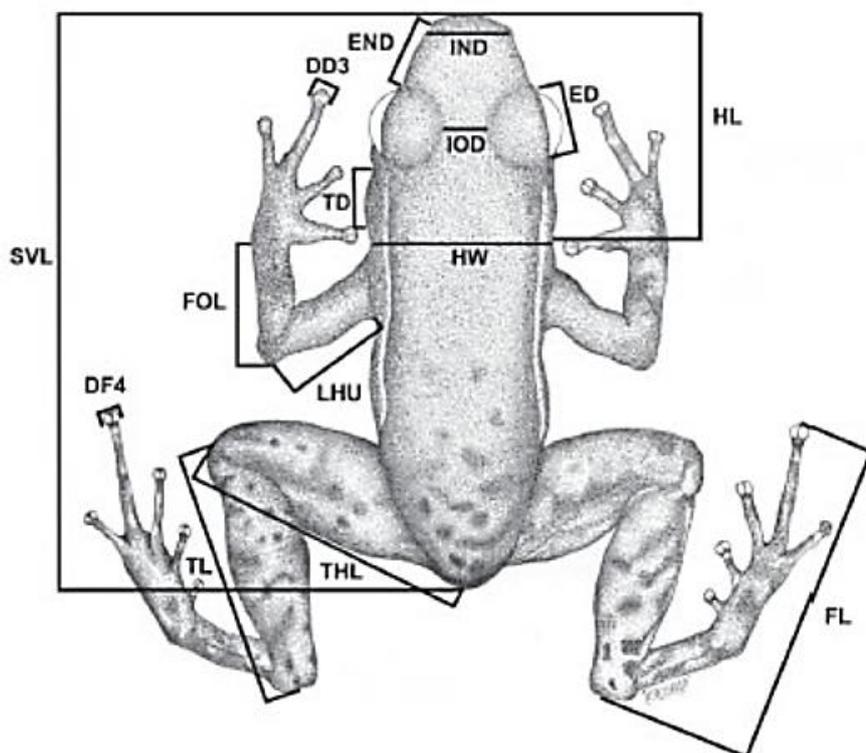


Figure 1: The dorsal surface of a frog. Anatomical features (SVL = snout-vent length; HL = head length; HW = head width; IOD = inter-orbital diameter; IND = inter-nostril distance; ED = eye diameter; DD3 = disc diameter of the finger three; DF4 = disc diameter toe four; END = eye-nostril distance; TD = tympanum diameter; LHU = length of the humerus; FOL = forearm length; THL = thigh length; TL = tibia length; FL = foot length). Modified from Tolosa et al. (2014).

13. If there is a possibility that the animal has been microchipped previously (under SOP 'Microchipping cane toads'), then using the microchip scanner scan the length of the animal while it is still in the zip-lock bag and if

present record the microchip number in the column labelled 'Microchip #'. If the animal has a microchip, write Y in the column labelled 'Recapture (Y/N)'; if the animal has no microchip, then write N in this column.

14. The last data to be recorded is in the column labelled 'Fate (1-4)' write the appropriate number; where Fate: 1 = released unharmed; 2 = escaped while being handled; 3 = died in a trap or while handling; 4 = to be euthanised. For frogs, this should be 1, unless the frog has escaped, died or has a reason to be euthanised (e.g. obvious major trauma or evidence of fungal infection). Under most circumstances, cane toads (as an introduced pest species) would have Fate 4 (SOP Euthanasia of cane toads) unless they were being released as part of a study that involved them being released. Animals that die in traps or during handling must be reported to the UniSQ AEC.
15. In the vicinity around the pitfall trap (ideally within a 1 to 2-metre radius), find vegetation that would offer safe refuge to the amphibian and undo the zip-lock bag and release the animal into that vegetation. Being an amphibian, the animal may sit for a few minutes and then move into the vegetation or alternatively disappear into the vegetation the moment it is released. Observe the animal until it has moved into the vegetation and if there appears to be a problem, e.g. unstable movement or jumping, record this and any other observations, e.g. missing the second toe on the left hind leg in the column labelled 'Remarks'.
16. If there was more than one amphibian in the pitfall trap, replace gloves and repeat steps 6 to 15 for each additional animal until the trap is empty of amphibians. If there are any reptiles or small mammals, follow their respective SOP's for removing them from Pitfall traps.
17. If there are no more animals in the pitfall trap, place all zip-lock bags in the rubbish bag, remove gloves and put them in the rubbish bag. It is important not to use the same gloves/bags between amphibians to prevent the spread of diseases. Ensure all equipment is cleaned after use.
18. Move onto the next pitfall trap and repeat this procedure until all pitfall traps have been checked and all animals processed.

**Note:** All equipment, e.g. rulers, need to be cleaned with alcohol wipes between sites to reduce the risk of transmission of pathogens and parasites.

## Training, qualifications or competencies required

Researchers with relevant experience or qualification can only undertake this SOP to complete the procedures required.

Student researchers must receive appropriate training and supervision from UniSQ research supervisors or qualified individuals prior to undertaking procedures.

## References

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- PALMEIRIM, A., BENCHIMOL, M., PERES, C. & VIEIRA, M. 2019. Moving forward on the sampling efficiency of neotropical small mammals: insights from pitfall and camera trapping over traditional live trapping. *Mammal Research*, 64, 445-454.
- RIBEIRO-JÚNIOR, M. A., ROSSI, R. V., MIRANDA, C. L. & ÁVILA-PIRES, T. C. S. 2011. Influence of pitfall trap size and design on herpetofauna and small mammal studies in a Neotropical Forest. *Zoologia (Curitiba)*, 28, 80-91.
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## Licences and permits

Any required licences and/or permits to undertake the procedure(s) under this SOP must be obtained before undertaking this SOP.

SOP approval and review history			
Date	Version	Review Pathway	Notes
17/12/2020	0.0	<b>3/12/2020</b> UniSQ AEC "Subject to Modifications". <b>17/12/2020</b> Reviewed and approved by the UniSQ AEC Executive.	Approved
23/06/2021	0.1	<b>23/06/2021</b> Inserted under "Licences and Permits", the words: "Any required licences and/or permits to undertake the procedure(s) under this SOP must be obtained before undertaking this SOP."	Update
18/10/2022	0.2	<b>18/10/2022</b> Converted SOP to new UniSQ branding and revised all reference of 'USQ' to 'UniSQ' (no 'waste disposal' or 'procedure time' included in previous version)	UniSQ 2022 Rebrand
18/08/2023	1.0	<b>03/08/2023</b> UniSQ AEC "Subject to Modifications" with the revised SOP to be reviewed by the UniSQ AEC Executive. <b>18/08/2023</b> Revised SOP reviewed and approved by the UniSQ AEC Executive.	Approved