

# Standard Operating Procedure

## HAND CAPTURE OF WILDLIFE

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

Prepared for: Animal Ethics Committee

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Department of **Biodiversity,**  
**Conservation and Attractions**

Department of Biodiversity, Conservation and Attractions  
Locked Bag 104  
Bentley Delivery Centre WA 6983  
Phone: (08) 9219 9000

[www.dbca.wa.gov.au](http://www.dbca.wa.gov.au)

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This standard operating procedure was prepared by the Species and Communities Branch, Science and Conservation Division, Department of Biodiversity, Conservation and Attractions.

Questions regarding the use of this material should be directed to:

Principal Zoologist  
Species and Communities Branch  
Department of Biodiversity, Conservation and Attractions  
Locked Bag 104  
Bentley Delivery Centre WA 6983  
Phone: (08) 9219 9511  
Email: [fauna@dbca.wa.gov.au](mailto:fauna@dbca.wa.gov.au)

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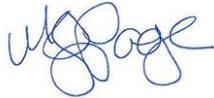
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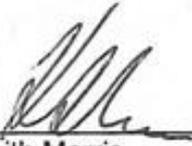
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#### Dr Manda Page

Principal Zoologist, Species and Communities Branch, Department of Biodiversity, Conservation and Attractions

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Approved by:  Date: 27/8/09  
Peter Orell  
Western Shield Zoologist, DEC Environmental Management Branch

Approved by:  Date: 7-7-09  
Keith Morris  
Fauna Program Leader, DEC Science Division

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# 1 Purpose

Hand capture may be required as part of fauna monitoring and research activities and the removal of nuisance, derelict or displaced fauna. Monitoring methods that involve or require the hand capture of animals include the use of nest boxes and undertaking active searches.

There are numerous methods suitable for capturing wildlife by hand, using hands or the use of tools. All methods of hand capture described in this SOP require the presence of a person for the capture of the animal.

Hand capture is stressful to animals and steps must be taken to minimise any distress that is caused to the animal and the population from which they are taken. Careful consideration must be given when choosing which hand capture technique to use, and whether or not a trapping technique or other alternative would be more appropriate.

This standard operating procedure (SOP) provides general guidelines for the various types of hand capture of fauna for research purposes to ensure minimal stress and injury to the animals and handlers

# 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 hand capture of animals 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 hand capture of animals should be familiar with the content of this document.

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.

**Cover board:** A method used to assist in the hand capture of animals by providing an artificial shelter made from pieces of plywood or similar materials aimed at attracting small and medium sized animals to utilise them, and therefore enable them to be captured when the board is lifted.

**Noosing:** A hand capture method where a rope or nylon slip loop is placed around the neck of the animal and pulled tight enough so that the animal cannot escape.

**Raking:** A hand capture method where a rake is used to loosen leaf litter and topsoil to reveal any animals.

**Tonging:** A hand capture method where padded metal tongs are used to grasp the animal tightly enough so that the animal cannot escape.

## 4 Approved Methods

The hand capture of an animal may require the use of a tool that either aids in the capture of the animal such as a net or tongs, or one that protects the captor or animal from injury, such as protective gloves, hand nets and cover boards.

It is important to plan for hand capture by:

1. Having a thorough knowledge of the possible species being caught (behaviour, reaction to stress, ability to defend itself) and the appropriate hand restraint techniques (see Department SOPs for *Hand Restraint of Wildlife* and *Animal Handling and Restraint using Soft Containment*).
2. Having all equipment required for hand capture ready and accessible.
3. Considering the best time of day and year to undertake the procedure.

The rate of success in hand capture is greatly dependent on the skills of the handler/operator. Inexperienced personnel are NOT permitted to hand capture unsupervised until adequately trained to capture and restrain animals.

If at any stage the potential for human and/or animal injury increases to an unacceptable level, the procedure must be stopped.

### 4.1 Capture by hand

Capture by hand involves the capture of individual animals by grasping it with the hands before it is able to escape and is generally only employed when other capture methods are not available. All species can potentially be collected in this manner, but it is most typically applied during the survey of reptiles and amphibians, or for the capture of sick or injured wildlife. The exact technique will depend on the situation and species involved. **The following is general advice only.**

(a) When capturing an animal by hand, the force applied must be appropriate for the species in question. The animal may be at risk of suffocation if pressure is too strong, and limbs may be broken with too much force. Too soft a restraint makes the animal think it has a chance to escape, therefore making it struggle more.

Personnel also need to take care to ensure that they do not injure/kill animals by stepping on them or on objects under which the animal may be hiding (e.g. rocks etc.).

(b) Prolonged pursuit to capture by hand must not be performed. Personnel must use judgement in deciding when an animal cannot be caught quickly or when it is not safe to do so and abandon the capture. Other ways to capture and safely handle the animal may be more suitable to help prevent injury to the animal and handler.

Never continue to chase down an animal if the opportunity for a quick capture has passed.

(c) Plan the capture so that the animal is quickly restrained with minimal stress and injury. Most small or docile animals can be managed by one person. Larger animals may require more than one person in which case planning will also involve allocating clear roles to each person participating in the capture process.

(d) In some cases, this process may disturb or destroy the shelter site, and hence decrease the survival chances of the animal. Researchers should aim to minimise damage to important shelter sites, and wherever possible repair such damage.

(e) Gloves (properly fitted so as not to compromise a good grip on the animal) or other personal protective equipment (e.g. glasses, long sleeve clothing, boots etc.) may be worn if required for added protection against scratches and bites.

(f) Captured animals must be released at point of capture (unless otherwise approved). Animals must be released, or reach an alternate endpoint approved by the Department's Animal Ethics Committee, within 24 hours of capture (unless otherwise approved). Animals should be released at a time when they are normally active.

## 4.2 Hand netting (terrestrial species)

Hand-netting is a technique most commonly used to capture medium-sized ground-dwelling mammals in open terrain but it can also be used for birds, reptiles, frogs and some invertebrates. It has particular application for mammals that are not easily captured in traps or which tend to injure themselves in cage traps.

A long-handled landing net designed for commercial fishing or smaller hand nets are commonly used in this method of capture. The rate of success depends on many factors, the most important of which is the proximity of the animal to cover, as well as the speed and skill of the operator. The benefit of this technique is that it is quick and involves only short-term stress to the animals, compared to cage trapping where an animal can be subject to longer-term stress factors. The following steps are to be used as a guide to assist in the successful and safe capture of an animal using a hand net.

(a) Choose an appropriate net size, handle length and net characteristics to suit the target animal(s). The net should be deep enough so that it can be flipped back on itself or twisted to keep the animal in the net and provide control.

(b) Ensure that the bags/containers in which the animal will be placed post capture are ready and open.

(c) Locate the target animal(s). In the case of nocturnal species, this may be done with the aid of a spotlight or head torch. Give consideration to whether the location can be selected with terrain/vegetation characteristics that will restrict the animal's speed or the distance that the animal can run. The use of a temporary fence made of shade-cloth may help in directing movement of the animal in a preferred direction if practical.

(d) Take care when bringing the net down to not injure the animal. If a chase occurs, a good operator will anticipate the direction of movement and place the net in front so the animal runs into the net. A back up operator may be positioned behind the first operator in case they miss.

Never continue to chase down an animal if the opportunity for a quick capture has passed.

(e) Once the animal is netted, flatten the rim of the net to the ground or twist the handle of the net by at least 90° so that the animal is enclosed within the bag. If a mesh net is used, care must be taken as animals can injure themselves by getting caught or tangled in the mesh. Depending on the circumstances a second person may be required to control the netted animal while the other disentangles it from the net. Remove the animal from the net and place in a holding bag as quickly and gently as possible.

(f) Release captured animals at point of capture (unless otherwise approved). Animals must be released, or reach an alternate endpoint approved by the Department's Animal Ethics Committee, within 24 hours of capture (unless otherwise approved). Animals should be released at a time when they are normally active.

(g) Nets should be properly cleaned and sanitised after use to avoid cross-contamination of disease between sites and animals.

### 4.3 Noosing

Noosing is a technique used to catch larger reptiles (e.g. monitors and crocodiles) and some mammals (e.g. koala) in limited circumstances (e.g. removing an animal from a tree or shelter). Noosing involves the use of a rope or nylon slip loop (usually attached to a solid cylindrical rod), placed around the neck of the animal and pulled tight enough so that the animal cannot escape before it is restrained.

Noosing is a technique that requires highly trained personnel in order for it to be performed safely. For advice on this technique contact the Department's Animal Ethics Committee Executive Officer.

### 4.4 Tonging

Tonging is a technique used to capture snakes (snake tongs) or to retrieve invertebrates from pit fall traps (BBQ tongs or long-handled tweezers) using padded metal tongs to grasp the animal gently but tightly enough so that the animal cannot escape before it can be restrained. If the technique is correctly applied, there is little chance of harming the animal. The following steps should be followed to efficiently undertake hand capture with the aid of tongs.

(a) Ensure that the bags/containers in which the animal will be placed post capture are ready and open.

(b) Grasp the animal with a set of padded metal tongs gently but tightly enough to prevent the animal from escaping. Care should be taken when grasping to ensure death or injury is not caused to the animal.

(c) Animals should only be held long enough to safely grasp them, and if necessary, to remove them from their sheltering site. The animal is then grasped in the hand/s or released into a bag/container.

It is important that the bodies of long animals (e.g. snakes, lizards etc.) are supported once they are firmly but safely grasped with the tongs (provided the safety of the handler is not at risk). Hanging animals from the neck is not acceptable and can lead to injury or death.

(d) It is recommended that larger reptiles, and specifically venomous snakes, are placed into a bag or a bin with a lid via tongs rather than hand restraining, which could result in more damage to the animal from excessive struggling (ASIH, 1987).

(e) Release captured animals at point of capture (unless otherwise approved). Animals must be released, or reach an alternate endpoint approved by the Department's Animal Ethics Committee, within 24 hours of capture (unless otherwise approved). Animals should be released at a time when they are normally active.

(f) Tongs/tweezers should be properly cleaned and sanitised after use to avoid cross-contamination of disease between sites and animals.

## 4.5 Raking

Some small reptiles are difficult to catch via trapping methods and so active searches involving raking through leaf litter and topsoil is sometimes employed. Raking is used to detect burrowing species by disturbing substrate under rocks and other habitats (DEC, 2004). It is not recommended in summer unless it is conducted early morning or evening, but it is very successful during winter and early spring, when most small reptiles are generally inactive and easier to catch (Bush *et al.*, 2007). This method is quite destructive to habitat and consideration should be given to the environmental cost of using the method versus the gain in knowledge of the species sampled. Knowledge of the microhabitat requirements of species can significantly improve catch rates. The following are general steps involved in the hand capture of animals with the aid of raking.

(a) Ensure that the bags/containers in which the animal will be placed post capture are ready and open.

(b) Use a garden rake to gently rake across the top of a patch of soil or leaf litter to expose sheltering animals.

(c) Capture exposed animals by hand and process as required.

(d) Captured animals must be released at point of capture (unless otherwise approved). Animals must be released, or reach an alternate endpoint approved by the Department's Animal Ethics Committee, within 24 hours of capture (unless otherwise approved). Animals should be released at a time when they are normally active.

## 4.6 Cover boards

Many ground dwelling species of wildlife (amphibians, reptiles, small mammals, insects, etc.) seek shelter under surfaces such as rocks, boards, sheets of iron and other flat material. Cover boards (metal or wood) can be intentionally laid and left in situ for months to attract wildlife to the artificial shelter however, the simple concept can be applied in many situations.

(a) Ensure that the bag/container in which the animal will be placed post capture is ready and open.

- (b) Lift the cover board to observe animals sheltering underneath. Take care when lifting and replacing the cover boards to not crush or injure animals underneath. Personal protective equipment may be advisable where venomous species may be encountered.
- (c) Capture exposed animals by hand and process as required.
- (d) Release captured animals at point of capture (unless otherwise approved). Animals must be released, or reach an alternate endpoint approved by the Department's Animal Ethics Committee, within 24 hours of capture (unless otherwise approved). Animals should be released at a time when they are normally active.
- (e) If cover boards are being reused in other locations, they must be properly cleaned and sanitised after use to avoid cross contamination between sites and animals.

#### 4.7 Fish net (aquatic species)

Aquatic invertebrates, tadpoles and fish may be captured using a fish net dragged through the water. Such nets are light, robust and simple to use (Marchant and Hehir, 1999). Alternative methods should be considered for highly mobile species. The following steps should be followed when attempting hand capture of animals with the aid of a fish net.

- (a) Ensure that the bags/containers in which the animal will be placed post capture are ready and open.
- (b) Sweep the net through the water to catch animals. The exact technique used (e.g. rapid or slow sweep) will depend on the species being targeted.
- (c) Release captured animals at point of capture (unless otherwise approved). Animals must be released, or reach an alternate endpoint approved by the Department's Animal Ethics Committee, within 24 hours of capture (unless otherwise approved). Animals should be released at a time when they are normally active.

## 5 Level of Impact

If the animal is captured immediately after it is seen and released within a few minutes (on average five minutes maximum), the impact on the animal is reduced. If the animal needs to be pursued, the effect will be greater.

It is not always possible to tell if an animal is stressed, and therefore at risk of death. Some signs that they may show they are stressed include:

- Obvious increase in heart rate or breathing rate
- Animal is limp or closes its eyes (mammals)
- Animal may feel hot to the touch
- Eyes open, rigid with fright
- Panting, heat stress
- Licking forearms, shoulders and flanks (Macropods)
- Hypersalivation (drooling, slobbering and frothing in Macropods)
- Shivering
- Vocalising
- Struggling that does not settle down
- Throwing pouch young

## 6 Ethical Considerations

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

### 6.1 Capture and handling

Incorrect capture techniques can injure animals therefore hand capture is only to be used by people with recognised appropriate training and/or experience. Capture must be fast and as stress free as possible. If at any stage during hand capture the circumstances increase the potential for human or animal injury to an unacceptable level, the procedure should be stopped.

Animals should only be handled during capture for as long as it takes to secure them in a holding bag/container to reduce stress. They must be released within 24 hours of capture (unless otherwise approved). Improper restraint, especially when dealing with a stressed and frightened animal, can lead to major physiological disturbances (hyperthermia, stress, capture myopathy). It is usually preferable that handling is conducted during the cooler periods of the day (dawn/dusk).

### 6.2 Pursuit

An animal must never be actively pursued if the opportunity for a quick capture has passed. A new operator must be instructed and supervised by experienced personnel for sufficient time to establish that the new operator understands the dangers and boundaries of active pursuit.

### 6.3 Capture myopathy

Capture myopathy is a condition associated with the capture and handling of mammals and birds that results in degeneration of skeletal and/or cardiac muscle (Shepherd *et al.*, 1988). The condition can result in sudden death or death weeks after capture as a result of complications including abnormalities to posture and gait, damage to internal organs such as the kidneys and increased susceptibility to predation (Abbot *et al.*, 2005).

Prevention of the condition by minimising stress to animals is essential as treatment options are prolonged and have low success rates. Records of animals suspected to be suffering from capture myopathy need to be reported to the Department's Animal Ethics Committee. Any animal that dies from capture myopathy must be sent for autopsy and a copy of the report provided to the Department's Animal Ethics Committee with an *Adverse Events Form*.

### 6.4 Injury and unexpected deaths

It is possible to injure animals during hand capture. Experience is needed to accurately and confidently judge the required speed, grip positioning and pressure to be applied. Particular care should be taken when raking and this activity should be conducted in a gentle manner to reduce the chance of injuring any animal.

Refer to the Department SOP *First Aid for Animals* for further advice on basic treatment for common injuries and conditions.

If injury, unexpected death or euthanasia occurs 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.

## 6.5 Pouch young

Ejection of pouch young is common in some members of the Potoroidae and Peramelidae families. Persons that may encounter members of these families during capture must be familiar with the Department SOP *Care of Evicted Pouch Young*.

Records need to be kept on orphans, their care and fate for annual reporting requirements of the Department's Animal Ethics Committee approved projects.

## 6.6 Spread of disease or parasites

Personnel must be aware of the possibilities of transferring disease or parasites from animal to animal as well as from one location to another if handling animals at multiple sites. For example Amphibian Chytrid Fungus is an infectious disease and appropriate hygiene procedures (see DEC, 2008) must be followed to reduce the risk of spreading the disease. Good hygiene practices should be maintained to reduce the risk of spreading pathogens between animals and sites. Refer to Department SOP for *Managing Disease Risk in Wildlife Management* for further advice.

## 6.7 Habitat disturbance

Hand capture may involve disturbance or destruction of shelter sites and therefore may decrease the survival chances of the animal. Such damage should be avoided or minimised and repaired wherever possible.

All logs and rocks that have been displaced during the hand capture should be restored to their original position.

# 7 Competencies and Approvals

Department personnel, and other external parties covered by the Department's Animal Ethics Committee, undertaking monitoring projects involving hand capture 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 hand capture 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 involving the hand capture of wildlife*

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 <i>Note: Suitable levels of skills/experience can substitute for formal training requirements</i>	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 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.
Animal handling and capture experience	Depending on the proposed study, personnel may be required to have training and experience in the chosen method of hand capture for the target (or similar) species	Personnel must be confident at the different techniques of hand capture likely to be used in fauna monitoring and surveying. This experience is best obtained under supervision of more experienced personnel.  Estimated total time in field: Min 2-5 years involved in similar projects with target/similar species.

## 8 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.

### 8.1 Animal bites, stings and scratches

Care should be taken when handling animals to avoid bites, stings or scratches. 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](http://intranet/csd/People_Services/rm/Pages/ReportingHazards,Near-MissesandIncidents.aspxZoonoses).

## 8.2 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*

## 8.3 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.

# 9 Further Reading

The following SOPs have been mentioned in this advice and it is recommended that they are consulted when proposing to hand capture wildlife.

- Department SOP *Hand Restraint of Wildlife*
- Department SOP *First Aid for Animals*
- Department SOP *Humane Killing of Animals under Field Conditions*
- Department SOP *Managing Disease Risk in Wildlife Management*

# 10 References

Abbott, C.W., Dabbert, C.B., Lucia, D.R. and Mitchell, R.B. (2005). Does muscular damage during capture and handling handicap radiomarked northern bobwhites? *Journal of Wildlife Management* 69: 664-670.

American Society of Ichthyologists and Herpetologists, The Herpetologists League and the Society for the Study of Amphibians and Reptiles. (1987). Guidelines for use of live amphibians and reptiles in field research. *Journal of Herpetology*, Supplement 4.

Bush, B., Maryan, B., Browne-Cooper, R. and Robinson, D. (2007). *Reptiles and Frogs in the Bush: Southwestern Australia*. Perth, WA: UWA Press.

Charles Darwin University Animal Ethics Committee. (2006). *Guidelines for field research on vertebrates*.

DEC. (2004). *Threatened Species Survey and Assessment: Guidelines for developments and activities* (working draft). Hurstville, NSW: NSW Department of Environment and Conservation.

Marchant, R. and Hehir, G. (1999). A method for quantifying hand-net samples of stream invertebrates. *Marine Freshwater Research*. 50: 179-182.

NHMRC (2004). *Australian code of practice for the care and use of animals for scientific purposes* (7<sup>th</sup> ed.). Canberra: National Health and Medical Research Council.

Department of Environment and Climate Change (NSW)(2008). *Hygiene protocol for the control of disease in frogs Information Circular Number 6*. Sydney, NSW: DECC.

Shepherd, N.C., Hopwood, O.R. and Dostine, P.L. (1988). Capture myopathy: two techniques for estimating its prevalence and severity in red kangaroos, *Macropus rufus*. *Australian Wildlife Research* 15: 83-90.