Standard Operating Procedure

SC24-09 MIST NETTING FOR CAPTURE OF BIRDS (OCTOBER 2024)

Animal welfare is the responsibility of all personnel involved in the care and use of animals for scientific purposes.

Personnel involved in an Animal Ethics Committee approved project should read and understand their obligations under the *Australian code for the care and use of animals for scientific purposes*.

Version 1.4

October 2024

GOVERNMENT OF WESTERN AUSTRALIA

Department of **Biodiversity, Conservation and Attractions**

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Approved by the DBCA Animal Ethics Committee:

Dr Jacqui Richards
Chairperson, Animal Ethics Committee
Department of Biodiversity, Conservation and Attractions

Contents

1 Acknowledgements

This standard operating procedure was originally developed by Christine Freegard and Vanessa Richter, with contributions from Peter Mawson, Neil Hamilton, Marion Massam, Mark Blythman, Allan Burbidge, Manda Page and Sarah Comer.

2 Purpose

Suspended between two poles, mist nets passively capture birds in flight and hold them securely in loose pockets until trained handlers can safely remove them. The technique is commonly used for studying small to medium sized birds and, when used by skilled handlers, is a safe capture method. Mist nets are easily transported and erected and have proven successful in a variety of habitats. Birds may be safely captured using mist nets for a variety of reasons including survey, population monitoring, pest management and translocations.

Mist netting is one of several possible techniques available to capture birds. Other bird trapping techniques utilise cannon and other propelled nets, walk-in traps, wader-nets, canopy-nets, cage traps, spring traps, nest box traps, Bal-chatri traps, Dho-gaza nets and noose-carpet traps. Depending on the target species and purpose of the project, alternate capture techniques may be more suitable.

This Standard Operating Procedure (SOP) relates to the capture of birds using mist nets only.

3 Scope

This SOP has been written specifically for scientific and education purposes, and approved by the Department of Biodiversity, Conservation and Attractions (DBCA) Animal Ethics Committee (AEC). However, this SOP may also be appropriate for other situations.

This SOP applies to all fauna survey and monitoring activities involving the use of mist nets to capture birds undertaken across Western Australia by DBCA (hereafter department) personnel. It may also be used to guide fauna related activities undertaken by Natural Resource Management groups, consultants, researchers and any other individuals or organisations. All department personnel involved in fauna research and management should be familiar with the content of this document.

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 all AEC approved projects. A copy of the code may be viewed by visiting the National Health and Medical Research Council website (https://www.nhmrc.gov.au/about-us/publications/australian-code-care-and-use-animals-scientific-purposes).

4 Animal Welfare Considerations

To reduce the level of impact of mist netting on the welfare of animals, personnel must consider, address and plan for the range of welfare impacts that may be encountered. Strategies to reduce impacts should be identified during the planning stage to ensure that they can be readily implemented during net set up and checking and contingencies for managing welfare issues have been identified. Ensure that all personnel involved in the project are aware of the range of issues that they may encounter, the options that are available for reducing impacts and improving animal welfare, and the process for managing adverse events.

Department projects involving mist netting or other trapping devices for the capture of birds will require approval from the department's AEC. Key animal welfare considerations that should be considered when mist netting are listed below and highlighted throughout the document.

4.1 Injury and unexpected deaths

If adverse events including injury, unexpected deaths or unplanned requirement for euthanasia occur, then it is essential to consider the possible causes and take action to prevent further issues. Adhering to the guidance in this SOP will assist in minimising the likelihood of adverse events. For projects approved by the department's AEC, adverse events must be reported in writing to the AEC Executive Officer as soon as possible after the event by completing an *Adverse Event Form*. Guidance on first aid for animals and field euthanasia procedures is described in the department SOPs for *First Aid for Animals* and *Euthanasia of Animals Under Field Conditions*. Where infectious disease is suspected, refer to the department SOP for *Managing Disease Risk and Biosecurity in Wildlife Management* for further guidance.

4.2 Level of impact

The impact of mist netting is usually moderate but temporary. If undertaken by a suitable person, any stress to an animal should be short term.

Potential impacts include:

- Predation while in the net or being released
- Hypothermia and hyperthermia (if the animal remains in the net too long)
- Effects on breeding (net proximity to nests and young)
- Dehydration
- Starvation
- Capture myopathy in susceptible species
- Distress (due to confinement, discomfort, social isolation, separating parent and offspring, exposure to predators)
- Conflict and death when re-establishing social status in groups after an absence.
- Damage to or loss of feathers
- Traumatic injury (may arise when hitting the coarser shelf strings, or through predation (typically by ants, other birds or snakes), poor containment, poor handling techniques during extraction and processing).
- Disease transfer

Field planning must involve risk mitigation of the above potential impacts to the fullest extent possible. Note that whilst these impacts are specifically associated with the use of mist nets, an animal may also experience other impacts from associated procedures such as handling and transport. Investigators must be aware that the effects of a series of stressors, such as capture, handling, transportation, sedation, anaesthesia and marking can be cumulative.

5 Procedure Outline

5.1 Setting up the net

A mist net is supported horizontally as net panels or shelves between a series of horizontal shelf strings which are themselves attached to vertical poles via string loops (see Figure 1). The shelf strings are set apart at a distance which will allow enough of a pocket for the bird to fall into after it has hit the main panel of the net (typically around 50 cm shelf string spacing for small passerines).

5.1.1 Net specifications/considerations

Mesh size: optimal mesh size is directly related to the size of the target species. A variety of mesh sizes are available for use depending on the birds being targeted. Mesh size is typically referred to in two different ways. For catching small and medium sized passerine birds, for example, appropriate net sizes are 32 mm and 60 mm square mesh (stretched knot-to-knot) or 16 mm and 30 mm (barn box) which are equivalently the same sized nets. These two sizes are a general guide only. Between manufacturers there are many variations in sizes and their designed target species, which should be considered while planning what nets to use. Mesh size can also be used to avoid catching certain species, particularly small ones where larger birds are the target. If the mesh size is too small the bird may not become entangled enough to stay caught whereas if the mesh size is too large the bird may get through the net.

Number of shelves: most mist nets have four shelves. These are adequate for most bird studies, however some situations achieve more efficient results with single or double shelves (e.g. where the canopy is lower than the mist net).

Length of mist nets: 6 m, 9 m, 12 m or 18 m nets are readily available. Longer nets are more difficult to set up as they require longer runs and are much heavier.

Poles: upright poles may be in the form of aluminium sections that slot together or 4 m lengths of bamboo or similar material (e.g. wooden or metal poles, saplings or galvanised pipes). Two poles are required for each net.

Securing lines (guy cords): braided nylon cord (5 mm diameter) is sufficient. Two ropes should be allocated to each pole with pegs and a mallet to secure them where fixed objects are not available. On a long net run, where nets are joined together, it may be desirable to have a third rope at each end, in line with the net run.

Bird bags: made from calico. Bags must be turned inside out or preferably stitched with seams located on the outside of the bag to prevent injury to birds as they may be entangled in loose cotton when removed from the bag for processing. One clean bag should be used per bird.

Furling stick: hooked sticks which can be used to pull down high shelf strings and prevent damage to the net and birds.

Crochet hook/needle: a 1.5 mm or 1.75 mm crochet hook with a modified handle attachment can be used to aid in the extraction of any birds that get severely tangled.

Net cutting equipment: personnel should have sufficient training to remove birds without having to cut nets. However, where absolutely necessary, always carry something to cut nets (e.g. fine scissors) when extractions are particularly difficult.

Extra equipment required may include: covered holding boxes for birds, head torches if working at night or early morning, pegs and ropes to hold back branches, pruning gear where habitat alteration is permitted, band removing pliers, electrolyte solution or use of sugar sachets to aid recovery (see Section 5.3(k)). A stopwatch may also be useful to monitor intervals between checking nets.

Each net should be numbered and uniquely identifiable. The number of nets in use and their exact locations must be recorded upon set up of nets. Ensure all nets are checked and removed from the field at the end of the session.

ANIMAL WELFARE: Ensure nets are of good quality. Source mist nets from reputable suppliers only. Cheap, poor-quality nets available online are often made from abrasive or ultra fine mesh which can result in injury to the bird.

Specialised mist nets may also be appropriate. If proposing to use alternative mist nets to those mentioned here, e.g. mono-filament nets, the project application must describe the differences in detail, demonstrate their effectiveness, and acceptable levels of impact on animal welfare.

5.1.2 Selecting the sites

Optimal use of a mist net will depend on the target species and habitat characteristics at the study site. It is important to avoid erecting mist nets on sites where the outline of the net is clearly revealed against a monotonous background such as the sky, open water or uniformly coloured fields. It is best to select sites that will remain in shade most of the time as nets can be more obvious in the sun, and avoid windy conditions as this may also make nets more obvious.

ANIMAL WELFARE: The public can be a major hazard to birds caught in mist nets as people passing through the netting area may attempt to release a bird and cause injury due to a lack of the required training. This risk needs to be minimised. The risk of people and other animals walking near or into nets must also be considered e.g. walking past with a fishing rod can potentially tear a net. Post signs if necessary. Personnel must also behave appropriately during the operation of mist nets i.e. always work quietly and avoid raised voices or running.

ANIMAL WELFARE: Nets should not be opened in extreme weather conditions (wet, windy, cold or high temperature situations) to prevent exposure of netted birds to excessive heat or cold, or drowning risk.

5.1.3 Setting up mist nets

ANIMAL WELFARE: The number of animals used in a project must be the minimum necessary to achieve the proposed aims. Consider this when deciding upon the number of nets and frequency of trapping.

ANIMAL WELFARE: It is advised to avoid setting mist nets in areas that may impede safety or social behaviours of birds during breeding season activity. Do not, for example, place netting in close proximity to bird nests as occupants may become stressed and predators may be attracted to the activity associated with trapping in the area.

(a) Two people are generally required to set up a mist net. Pace out the distance or length of the net first to decide on the most appropriate positioning with the least obstructions.

Remove or restrain any unavoidable obstructions.

(b) As a general rule, push the pointed end of the first pole vertically into the ground; do not pound with a mallet as this will damage the pole. Stabilise the pole with two securing lines (guy chords) that angle away at 45° and are tied at least half-way up the pole. Securing lines can be tied to fixed objects (e.g. rocks or bushes) or pegs/stakes can be used.

(c) Find the bunched string loops at one end of the bagged net and carefully run part of the mist net out of its bag. Keep the mist net taut and off the ground to avoid catching on rocks and vegetation.

(d) Arrange the string attachment loops from top to bottom (it is useful if they're numbered) and slide the string attachment loops in order over the pole. Most nets will have one loop that is a different colour to indicate it as the top shelf string.

(e) Unroll the remaining portion of the net, taking care not to let the net drop to the ground or onto anything else where it may get tangled. Take the second pole and repeat the steps with the other end of the mist net ensuring it is pulled taut. If multiple nets are being put up in the same line, the poles can be shared between neighbouring nets. The loops from each net need to be put onto the pole in order as described previously but they need to be alternated with each other.

(f) Tie off each of the securing lines so the mist net is held firmly in place.

(g) The erect mist net should have tight horizontal shelf strings with as little sagging as practicable. The tension on the net material is determined via vertical adjustment of the spacing of the shelf strings. The optimum spacing will be determined by wind conditions, the nature of the target species, and the experience of the operator.

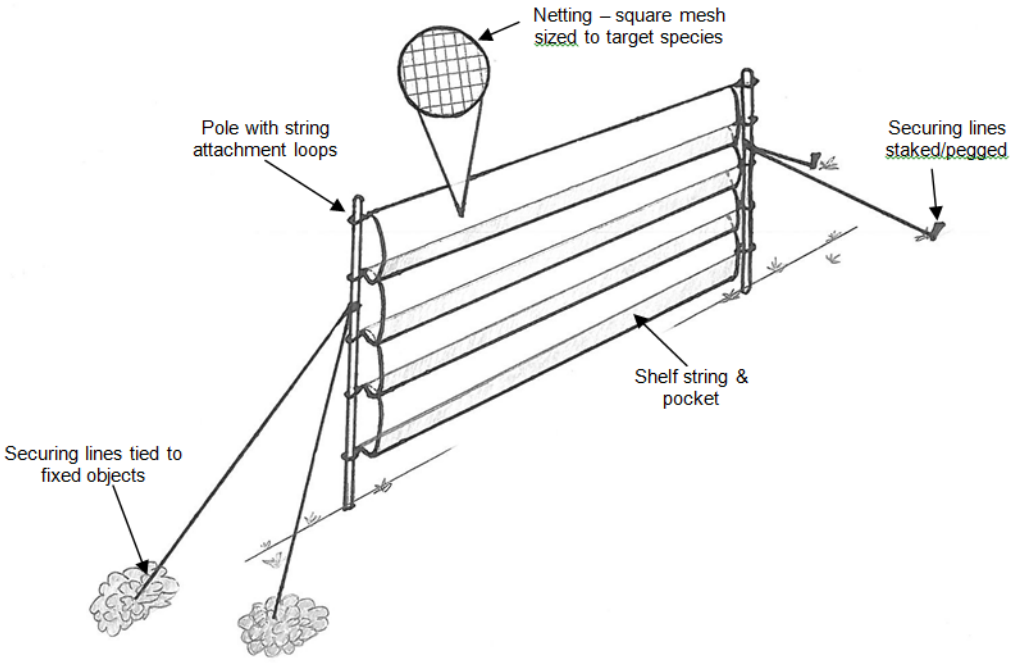

Figure 1 Diagram of a mist net set up adapted from Lowe (1989).

(h) The tautness of the mist net can be controlled by adjusting tension on the securing lines. The depth of each pocket (within each shelf) is controlled by adjusting the distance

between the strung loops. Use an object with a weight similar to that of the species likely to be caught to ensure that a bird caught in the bottom pocket will not reach the ground.

(i) Birds caught in a net close to the ground are more likely to injure themselves. Clear away any twigs or branches that might catch in the fine mesh and interfere with net function. Setting the net 30-40 cm above the ground is ideal when the ground is bare or above the level of the longest grass to prevent ants entering nets from the vegetation (alternatively flatten any grass that is likely to cause problems).

ANIMAL WELFARE: Nets must be monitored at all times to reduce the risk of exposure and vulnerability leading to predation events. Care should be taken to discourage curious predatory species and hence avoid possible entanglement and injury of both the predator and the original trapped animal. Where a predator is obviously residing in an area consider moving to another location.

In the southwest of Western Australia for example, an awareness of the presence of kookaburras, currawongs, swamphens and ravens is particularly important.

(j) Netting over water should be avoided due to the risk of drowning of both target and non-target species. When mist netting over water, it is advisable to use an object with a weight similar to that of the species likely to be caught to test the extent of sag in the net, and to allow a large margin for error in case heavier birds enter the net.

ANIMAL WELFARE: Care must be taken when trapping, particularly near roosting sites and watering points, as a multiple trapping event may occur in a short period of time. Check there are no birds on the ground before tending to the actual net. When removing birds from the net, remove large birds and predatory birds first as their movements can injure smaller birds.

(k) Members of the public, animals such as domestic dogs and non-essential personnel must be kept away from the area whilst the net is in operation. Be aware of wildlife and livestock that may reside in the area. Avoid setting up mist nets along tracks that are used by animals to access food or water.

ANIMAL WELFARE: It is not acceptable to use audio lures (i.e. any call playback devices) for standard mist netting projects approved by the department's AEC. Any project proposing to use audio lures on mist nets must provide adequate justification in an application to the department's AEC, and should consider all potential welfare impacts. Potential impacts to both target and non-target bird species include:

- Interrupting breeding and migration,
- Causing behavioural changes, such as increasing aggressive territorial behaviour,
- Attracting predators to the study site,
- Causing individuals to remain at a study site longer than normal, and
- Causing an influx of individuals that would not normally be found at the study site.

5.1.4 Storage of nets

Mist nets are usually stored in cloth bags with the string loops of each end bunched and tied together and one bunch at the bag's opening. When nets are not in use they are removed or furled (by rolling and tying off with flagging tape at one metre intervals) so that they will not continue to entangle birds or other animals, or unfurl in the wind (see Figure 2). Training in correct, tight furling techniques by an ABBBS licence holder is recommended. Even small

sections of loosely-furled net can entangle flying birds or birds that perch on a furled net. All loose sections must be attended to. Even furled nets should be checked at regular intervals, especially if it has been windy.

Figure 2 A furled mist net. Photo: Sarah Comer/DBCA

5.2 Operating mist nets

Mist nets must only be used where the expected benefit outweighs the potential effects on for the wellbeing of the animals involved, and other less invasive methods have already been rejected as unsuitable. The netting forming the shelf/panel must have sufficient vertical slack in it to form a pocket between the shelf strings. Birds are caught when they fly or walk into the net, becoming entangled or ending up in a pocket of netting supported from a shelf-string. As a general rule, mist nets should not be left any longer than 20 minutes during the day. Consider habitat, time of day, weather conditions and number of birds likely to be caught when choosing how many nets to set up. Nets must be monitored at all times and captured birds removed immediately. Nets must be closed (i.e. correctly furled) when not in use. Checking nets involves walking the full length of the net paying particular attention to the bottom pocket. In low light conditions a head torch may be useful for checking nets and extracting birds. An equipment and processing station should be set up out of sight and some distance away from nets to avoid disturbing birds in the area. This should be in the shade or under a shelter so that birds can be kept out of direct sun while waiting to be processed (see Section 5.3(i)).

Some birds are too large to be caught in standard mist nets and can cause significant damage either to the net or themselves when intercepting a mist net. Field personnel must be prepared to deal with possible by-catch species. Raptors for example have potential to inflict serious injury on themselves and animal handlers. The number of experienced and competent animal handlers should be appropriate for the maximum number of birds which may be expected to be caught. One person should be responsible for making decisions regarding closing nets when too many birds are caught at once and releasing birds without processing if birds are becoming stressed due to extended holding times.

5.3 Extracting birds from the net

ANIMAL WELFARE: To ensure minimal stress to the birds, they should only be handled for as long as required to identify, apply bands and collect any necessary measurements. Extraction should not take longer than 5 minutes. If a bird cannot be extracted safely the net should be cut. Experience with removal of birds from the net is essential to ensure that stress levels are acceptable. Following extraction from the net, birds should be processed and released within ten minutes. Research into the species likely to be caught during field work is essential as some species are more prone to stress than others.

ANIMAL WELFARE: All nets should be checked and cleared at least every 20 minutes to avoid injury to the birds. Personnel should remain out of sight where possible but near enough to check the nets frequently and respond to any unforeseen circumstances. Ideally, birds should be removed from nets within 10 minutes of capture.

On entry to a net, birds can become tangled by wings and feet in addition to their heads passing through the netting. The captured individual is removed by hand.

(a) Remain quiet when checking nets so as not to frighten birds that are in or near the net.

(b) To reduce panic and injury to birds, always approach the nets slowly, particularly when there are birds in the net.

(c) Animals such as dogs and cats and non-essential personnel must be kept away from the area whilst the net is in operation.

(d) Prioritise which birds should be removed first. The presence of larger birds in the net may cause stress or injury to smaller birds, so these are typically addressed first. Additionally, further prioritise those that are most at risk of injury or stress, such as birds in close contact with one another, those at risk of being stepped on, or those exposed to direct sunlight. Remove any objects that may impede extraction or potentially injure birds e.g. binoculars, gloves and hard hats where applicable.

(e) To extract a bird from a mist net, first identify the side on which the bird entered. This can usually be determined by seeing which side of the shelf string the pocket is on. Look for bare bird belly (this is seeing the belly of the bird free of net) (see Figure 3) to confirm that you are trying to extract it from the correct side. Put your hands in the pocket and ensure that if the bird's tongue is protruding, netting is free of the forked projections on the tongue and push the tongue back into the bird's mouth if hanging out. Untangle until it can (1) be taken by the base of the legs and carefully drawn away from the net, clearing feet, wings and head in sequence (the reverse of the order in which the bird entered the net) (see Figure 3) or (2) be cleared of one foot, one wing, the head and then the other wing and other foot. This is known as the 'rolling' method, (for more information on how to extract birds from mist nets see Lowe 1989).

(f) Blowing on the feet may relax the feet and aid disentanglement. Another method for disentangling feet is by reversing the bird's perching reflex. Tendons in the legs of perching birds naturally tighten when a bird lands on a perch, locking the toes closed. By gently straightening out the leg, the tendons relax and the toes open. Blowing on the feathers can assist in seeing net strands against the bird's body.

(g) Hold the bird by wrapping your index and middle finger around either side of the bird's

neck while cradling the body (but not tightly) with the palm of your hand and other fingers (also known as the 'banders grip', see Figure 4). This is suitable for most small birds. Extreme care must be taken with very small delicate species. Refer to the department SOP for *Hand Restraint of Wildlife* for further advice on handling techniques.

(h) Birds should be monitored closely for stress on first approach to the net and during extraction. If the bird is looking unwell or extraction is taking too long (over 5 min) seek assistance from a more experienced person. If there is excessive difficulty in untangling the animal, the net should be cut to prevent undue stress. People often have trouble when a net is caught tightly over the carpal joint. Generally, a cut to a single strand of net under the carpel joint will loosen the net enough for a safe extraction. The bird should be checked before release to ensure no netting remains on the bird.

(i) Birds which are unharmed should either be released immediately at the site of capture or placed into a calico or cloth bag for processing, then released as soon as possible, preferably within 10 minutes. A station should be set up where all birds are to be processed. A 'clothes line' set up is often used to store birds (one bird per bag only) (see Figure 5). Once a bird is bagged it is immediately pegged on the 'clothesline' in order of waiting time and priority. Some species such as gerygones are more susceptible to stress than others. Birds which have had a rough or prolonged extraction should also be prioritised. Never put a bird in a bag down on the ground, chair or banding table for any reason to avoid the bird being squashed or forgotten. The clothesline should not be in the sun and the bags should be separated where possible. At least one person must be responsible for the birds at all times.

(j) If a bird has been handled, do not release it into mid-air (i.e. do not throw it) as it may fall to the ground if injured or in shock. Turn it right side up and allow it to sit on the hand or ground to become oriented. Birds that are unable to fly may be suffering from a slight strain to the wings. Place them on a perch in good cover and they will usually recover rapidly.

(k) Birds which are suffering from thermal stress or shock should receive appropriate attention. This can be determined by signs such as gaping, panting, closed eyes, a drooping head and minimal movement. A bird suffering from thermal stress or shock can initially be placed in a suitable quiet holding area, and protected from extremes of temperature, to allow recovery before release. Honeyeaters and heat stressed birds may be offered an electrolyte and water solution (e.g. Spark) from a teaspoon while they are being held in the hand or in a dish in the birds' holding box to aid recovery. Delivery of fluids via crop tube is not recommended unless the animal handler is competent to do so.

(l) Birds with treatable minor injuries that cannot be released immediately or those failing to recover from thermal stress should be assessed and treated in accordance with the department SOP *First Aid for Animals*.

(m) Birds with injuries that are untreatable or which would compromise their survival in the wild should be euthanased using one of the techniques described in the department SOP for *Euthanasia of Animals Under Field Conditions*.

Figure 3 A singing honeyeater being removed from a mist net. Note the feet being extracted first with netting only remaining around the carpal joint. Photo: Mark Blythman/DBCA

Figure 4 A rufous whistler in the 'banders grip'. Photo: Mark Blythman/DBCA.

Figure 5 A 'clothesline' set-up. Photo: Mark Blythman/DBCA.

6 Net hygiene and maintenance

ANIMAL WELFARE: All handling bags/equipment should be kept clean and disinfected to minimise risk of disease/contamination etc. after each trapping session. Refer to the Department SOP *Managing Disease Risk and Biosecurity in Wildlife Management*.

(a) Nets must be maintained in good working order. Holes in nets can cause birds to become tangled more than usual leading to longer extractions.

(b) Neglect will lead to unnecessary deaths of animals and could lead to prosecution of responsible personnel under the *Animal Welfare Act 2002*.

(c) Any damaged nets requiring attention need to be noted and repaired or replaced as soon as possible, prior to subsequent use.

7 Competencies

A person who is competent has the knowledge, skills, and experiences that allow them to capture and handle animals successfully, and appropriately manage adverse events as required. Department personnel, and other external parties covered by the department's AEC, undertaking projects involving mist nets and other bird trapping devices require approval from the committee and will need to satisfy the competency requirements detailed in Table 1. Other groups, organisations or individuals using this SOP to guide their mist netting activities are encouraged to also meet these competency requirements as well as their animal welfare legislative obligations.

It should be noted that sampling design details such as intensity and scope of the project being undertaken will determine the level of competency required and Table 1 provides advice for standard monitoring only.

Table 1 Competency requirements for Animal Handlers of projects using mist nets and other trapping devices to capture birds

Competency category	Competency requirement	Competency assessment
Knowledge	Broad understanding of the framework governing the use of animals in research and environmental studies in Western Australia	Training (e.g. DBCA Fauna Management Course or equivalent training). In applications, provide details on the course provider, course name and year.
	Understanding species biology and ecology	Personnel should be able to correctly identify the likely species to be encountered in mist nets for the site(s) being studied, and have an understanding of the species' biology and ecology. This knowledge may be gained through sufficient

		field experience and consultation of field guides and other literature.
	Understanding environmental conditions	Personnel should be aware of the environmental and seasonal conditions that may be expected on the project, and understand location-specific animal welfare considerations. In applications, provide details of time spent undertaking similar work in similar locations.
Fauna survey and capture skills/experience required	Experience setting up and checking mist nets	Personnel should be familiar with the animal welfare principles of mist netting (e.g. appropriate locations for net installation, frequency of net checking depending on climatic conditions, considerations for net closure). In applications, provide details on the longevity, frequency & recency of experience.
Animal handling and processing skills/experience required	Experience handling birds	Personnel should be experienced at extracting birds from mist nets and restraint of the range of species likely to be captured. This experience is best obtained under supervision of more experienced personnel. In applications, provide details on experience relating to the expected species or species groups.
	Experience managing disease risk in wildlife management	Personnel should be familiar with hygiene procedures. This knowledge may be gained through sufficient field experience and consultation of literature.

In conjunction with possessing the required understanding and knowledge of mist netting procedures and animal welfare requirements, an animal handler considered competent to capture and handle birds requires relevant endorsement from the Australian Bird and Bat Banding Scheme.

8 Approvals

In Western Australia any person using animals for scientific purposes must be covered by a licence issued under the *Animal Welfare Act 2002*, which is administered by the Department of Primary Industries and Regional Development.

Projects involving wildlife may also require a licence/authorisation under the *Biodiversity Conservation Act 2016* (examples below). Personnel should consult the department's Wildlife Licensing Section for further guidance. It is your responsibility to ensure you comply with the requirements of all applicable legislation.

- Fauna taking (scientific or other purposes) licence (Reg 25)
- Fauna taking (biological assessment) licence (Reg 27)
- Fauna taking (relocation) licence (Reg 28)
- Section 40 Ministerial Authorisation to take or disturb threatened species.

An Australian Bird and Bat Banding Scheme (ABBBS) banding authority is required for birds or bats to be fitted with ABBBS bands.

9 Occupational Health and Safety

The following departmental SOPs for wildlife survey and monitoring activities are relevant to occupational health and safety:

- SOP *Managing Disease Risk and Biosecurity in Wildlife Management*
- SOP *Hand Restraint of Wildlife*

Departmental personnel, contractors and volunteers have duties and responsibilities under the Occupational Safety and Health Act 1984 and Occupational Safety and Health Regulations 1996 to ensure the health and safety of all involved. Fieldwork is to be undertaken in line with the department's corporate guidelines, policies and standard operating procedures, including but not limited to, risk management and job safety analyses. Further information can be found at https://dpaw.sharepoint.com/Divisions/corporate/people-services/HS/SitePages/SOPs.aspx

If department personnel or volunteers are injured, please refer to the departmental Health, Safety and Wellbeing Section's 'Reporting Hazards, Near-misses and Incidents' intranet page, which can be found at

https://dpaw.sharepoint.com/Divisions/corporate/people-services/HS/SitePages/Reporting-Hazards,-Near-Misses-and-Incidents.aspx

A job safety analysis is recommended prior to undertaking any fieldwork.

10 Further Reading

The following SOPs have been mentioned in this advice and it is recommended that they are consulted when proposing to capture birds with mist nets:

- Department SOP *Hand Restraint of Wildlife*
- Department SOP *First Aid for Animals*
- Department SOP *Managing Disease Risk and Biosecurity in Wildlife Management*
- Department SOP *Euthanasia of Animals Under Field Conditions*

For further advice refer also to:

National Health and Medical Research Council (2013) Australian code for the care and use of animals for scientific purposes, 8th edition. Canberra: National Health and Medical Research Council.

Australian Bird Study Association (2021). Bird in the Hand (2nd edition.). https://absa.asn.au/bird-in-the-hand-2nd-edition.

Research Equipment | ABSA

Bird and bat banding | Department of Agriculture, Water and the Environment

Bub, H. (1991). Bird Trapping and Bird Banding. New York, NY: Cornell University Press.

Ralph, C. J. (2005). The Body Grasp Technique: A Rapid Method of Removing Birds from Mist Nets. North American Bird Bander 30(2): 65-70.

Sharp, T. and Saunders, G. (2004). BIR002 Trapping of Pest Birds. NSW: Department of Primary Industries. Retrieved from: http://www.environment.gov.au/biodiversity/invasive/publications/pubs/bir002-trapping-of-pest-birds.pdf

Sharp, T., Saunders, G. and Mitchell, B. (2007). RES001 Live Capture of Pest Animals Used in Research. NSW: Department of Primary Industries. Retrieved from: http://www.environment.gov.au/biodiversity/invasive/publications/threat-abatement-projects/pubs/46217-operating-procedure-1.pdf

Spotswood, E. N., Goodman, K. R., Carlisle, J., Cormier, R. L., Humple, D. L., Rousseau, J., Guers, S. L. and Barton, G. G. (2012). How safe is mist netting? Evaluating the risk of injury and mortality to birds. Methods in Ecology and Evolution 3: 29-38.

Sutherland, W.J., Newton, I. and Green, R.E. (2004). Chapter 4: Birds in the Hand. In Bird Ecology and Conservation. New York, NY: Oxford University Press.

11 References

Lowe, K.W. (1989). *The Australian Bird Bander's Manual*. Canberra, ACT: Australian Bird and Bat Banding Schemes and Australian National Parks and Wildlife Service.

12 Glossary of Terms

Mist net: A fine, lightweight nylon, terylene or polyester net suspended between two poles, often positioned across main flight paths to intercept birds effectively for live capture.

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

Passerines: Also known as perching or song birds belonging to the avian order Passeriformes. Passerine birds generally include small and medium sized birds that have three toes pointed forwards and one back. They are often brightly coloured.

Capture myopathy: A condition associated with the capture and handling of many species of mammals and birds that results in degeneration of skeletal and/or cardiac muscle.

Carpal joint: Highly specialised wrist joint, the foremost point of a folded wing in birds.