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Initial treatment and care guidelines for rescued native birds

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Cover photo: Shining bronze-cuckoo (*Chalcites lucidus*). Kathryn Johnson/ZoosSA

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1. Introduction

The purpose of this document is to standardise the initial treatment of native birds requiring rescue or rehabilitation, in line with the *Code of Practice for Injured, Sick and Orphaned Native Birds* (the 'Bird Code') (DPIE 2021).

Understanding that each case is different and should be assessed individually, this document aims to provide guidance for licensed wildlife rehabilitators in New South Wales on initial assessment and first aid treatment principles for rescued native birds.

There are numerous species of native birds found in New South Wales. This document encompasses all species of birds found in New South Wales except birds of prey from the orders Accipitriformes, Strigiformes and Falconiformes, covered by the *Initial treatment and care guidelines for rescued birds of prey*, and seabirds and shorebirds of the orders Procellariiformes, Pelecaniformes, Sphenisciformes and Charadriiforme. It should be noted that the advice in this document is of a general nature, and further species-specific information should be sought where necessary.

Orders of birds covered in this document include:

- Psittaciformes – parrots
- Passeriformes – songbirds and perching birds
- Columbiformes – pigeons, doves
- Galliformes – quails, malleefowl (*Leipoa ocellata*), Australian brush turkey (*Alectura lathami*)
- Anseriformes – ducks, geese, swans
- Ciconiiformes – storks, herons, egrets, ibis, spoonbills
- Gruiformes – coots, moorhens, rails
- Coraciiformes – kookaburras, kingfishers, bee-eaters
- Casuariiformes – emu (*Dromaius novaehollandiae*)
- Cuculiformes – cuckoos, eastern koel (*Eudynamys orientalis*)
- Podicipediformes – grebes
- Caprimulgiformes – frogmouths, nightjars.

This document provides guidance on the initial care and management of native birds following rescue, from capture to physical examination, initial stabilisation and treatment before presentation to a veterinarian. It provides advice on how to manage the more common rescue encounters in birds, including trauma, burns, orphaned chicks and disease syndromes (including beak and feather disease, throat worm, oral plaques, poxvirus, lorikeet paralysis syndrome, botulism) and unusual mortality events. It also advises on quarantine procedures and the management of infectious diseases, zoonotic diseases and record keeping.

For more information regarding a decision-making process for the rescue and rehabilitation of native birds, see Figure 1.

2. Capture, restraint and physical examination

As outlined in the Bird Code, rescuers must arrange for the native bird to be assessed by a veterinarian or experienced wildlife rehabilitator within 24 hours of rescue to ensure accurate diagnosis and prompt treatment or euthanasia. If this is not possible due to the remoteness of the location, expert advice must be sought (e.g. via phone or video conference).

Figure 1 provides an outline of the initial decision-making process for native bird rescue cases.

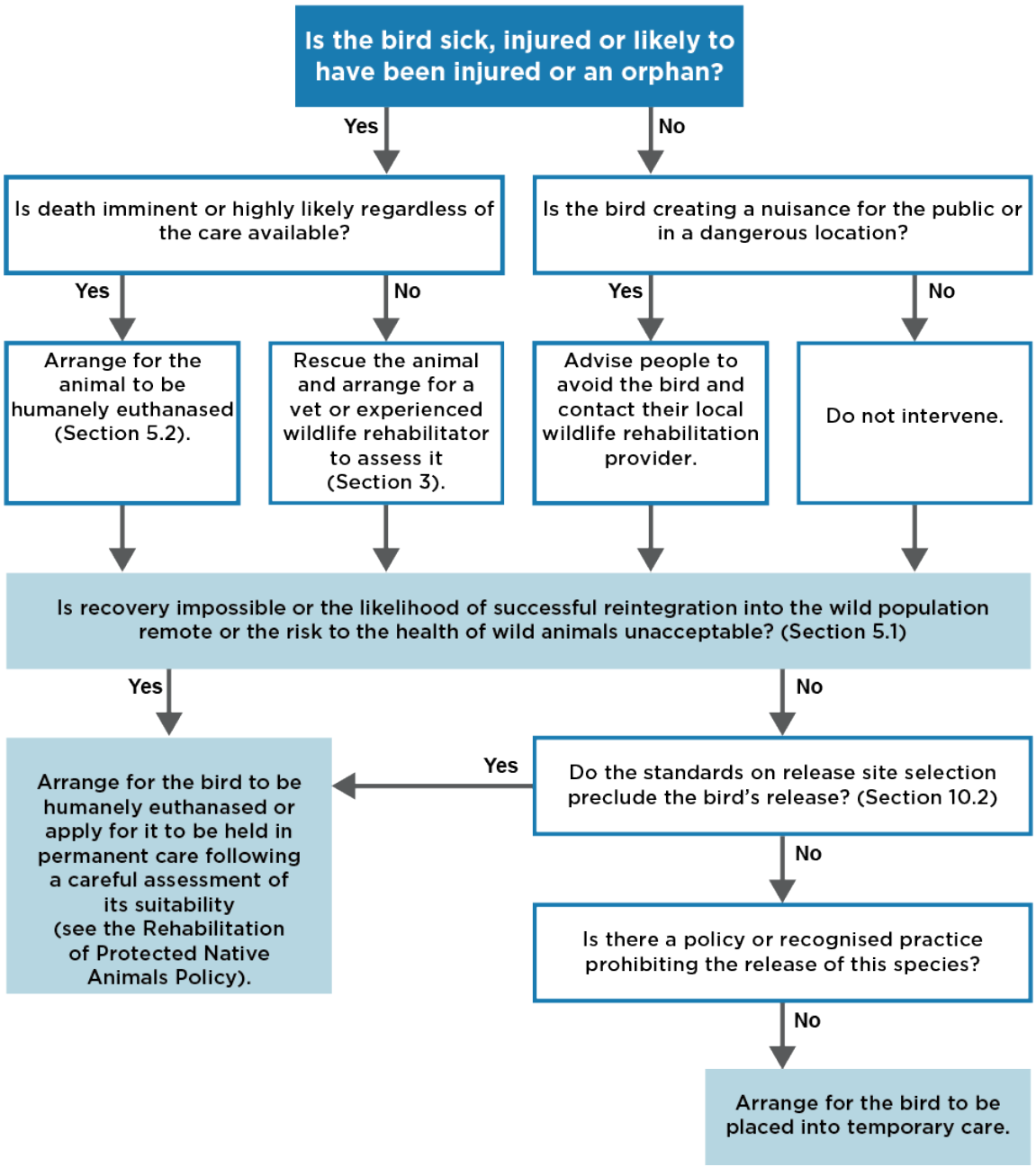

Figure 1 Decision tree directing the course of action for native bird rescue encounters

(From the Bird Code. Section numbers refer to numbering used in the Code.)

It is important to keep in mind that the ultimate goal of rescue and rehabilitation is to ensure successful reintegration of the individual into the wild population.

Considerations prior to rescue:

- Are you adequately trained, and do you have the necessarily skills and experience?
- Are there enough adequately trained rescuers to undertake the rescue (e.g. multiple people to corral a bird in some situations and with particular species)?
- Have you got the appropriate equipment, including personal protective equipment (PPE) to complete the rescue (e.g. nets, towels, transport cages/boxes)?

Personnel safety

Before handling birds, rescuers should be aware of possible safety risks to themselves, other people involved in the rescue and the animal. Frightened, cornered, sick or injured birds can cause injury, and disease transmission is possible both to and from humans (see Section 7 ‘Zoonotic disease’).

An important consideration when rescuing and handling wildlife is to assess and minimise the risk to the humans (rescuers and bystanders), as human safety should always be the first priority.

- Protect yourself and the animal by using appropriate PPE.
- Avoid handling wildlife if it is not necessary or you do not feel confident and capable to do so.
- Wear appropriate clothing – robust long sleeves, covered shoes, long pants.
- Wear a dust mask if available and particularly if the animal is showing signs of disease.
- Wash your hands before and after handling animals and removing gloves (or use alcohol-based hand sanitiser).
- If bitten or scratched, clean the injury with warm water and soap (or disinfectant), and seek medical advice. Always tell medical staff that you have been handling wildlife.
- When rescuing birds from heights (e.g. roofs or trees), care must be taken to prevent injury. If climbing trees, you must have undertaken certified ‘working at heights’ training.

PPE and rescue equipment

Appropriate equipment should be sourced before attempting to rescue a bird, including PPE and capture equipment (nets, towels) (Figure 2). This will vary depending on the species, size and condition of the bird and may include:

- binoculars
- sturdy, appropriately sized transport containers
- towels – provide a barrier between the handler and the bird and protect the bird’s feathers. The exception is when handling small species such as silvereyes (*Zosterops lateralis*) or finches which are easier to handle cupped in a hand. Using towels when handling smaller species may increase the chance of the bird escaping the handler’s grip
- head torch or alternative light source
- bird identification guide
- safety glasses or goggles – use eye protection when handling birds with long necks that use their beaks to stab food (e.g. herons and darters)

- protective gloves (gardening or welding gloves) – useful when handling birds with sharp beaks (e.g. large parrot species), however, be aware they may reduce dexterity
- protective helmet or hat to protect rescuers from parent or flock birds displaying defensive behaviour, when rescuing a chick or fledgling
- nets (various sizes depending on species) – nets should be made using soft material with small diameter mesh to avoid causing damage to feathers. Lining the rim of the net with padding can also help prevent injury to the bird during capture.

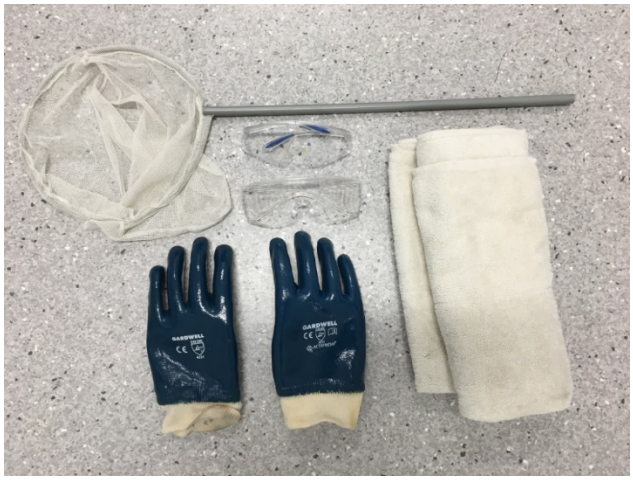

Figure 2 Example of PPE and capture equipment for rescue of native birds
Photo: Shelly Butcher

Distance examination

Assessment of a bird should begin before it is captured. This is particularly important in birds, as it can be more difficult to identify subtle signs of injury or illness once captured. For example, a drooping wing can be more easily identified on distance examination and may not be readily identified when the bird is physically restrained.

As part of its preservation reflex, a bird will attempt to look normal when it feels under threat; for example, by being stared at or approached by a human. It is important to try and observe the bird from an indirect location and to observe it for at least a few minutes. It may appear normal at first but after some time, show behaviours and signs consistent with its health status.

Where possible, observe the bird from a safe distance and assess:

- **Wounds or injuries:** Observe the bird's feather condition and for the presence of blood, wounds, obvious musculoskeletal injuries (e.g. broken bones), ocular (eye) injuries or any evidence of entanglement. Fishing line or foreign material may be identifiable from a distance in entangled birds.
- **Gait and posture:** Assess the bird for signs of wing droop, lameness, inability to perch and abnormal head position. If the bird attempts to fly, assess if the wings are extending symmetrically, if the wings can elevate above the horizontal plane, if the bird uses its tail for balance and if the bird is able to gain height. An abnormal gait, including lameness or posture can indicate musculoskeletal or neurological injuries or disease.
- **Interactions with environment:** Watch the bird and assess its demeanour. Is the bird alert and responsive, or dull and not vigilant to surrounding dangers? A dull demeanour and closing the eyes are considered abnormal behaviours in birds.

- **Respiration:** Observe the bird's breathing. Observe the breathing rate as well as the effort used. Open-mouth breathing, tail-bob, blood or secretions from the nose/mouth can indicate respiratory abnormalities.
- **Plumage:** Feathers should be neat and lie flat against the body. Fluffed feathers indicate illness or injury as the bird is trying to maintain body heat, damaged tips of wing and tail feathers indicate the bird has been on the ground for some time, and soiled feathers around the vent may indicate diarrhoea.

As part of the distance examination, assess the feasibility of capture, to plan for a safe capture.

Capture and handling

Before attempting to capture and restrain wild birds, it is important to consider the species' principal defence mechanisms and take appropriate precautions. For example:

- Restrain the head in birds that can cause injury with their beaks (e.g. parrots, herons, egrets, kookaburras, magpies and currawongs).
- Restrain the feet of birds with sharp claws (e.g. wattlebirds and honeyeaters).
- Swans, ducks, geese and pigeons use their wings as a defence mechanism. Ensure their wings are held against their body.
- When approaching an injured emu, rescuers must be aware that emus can inflict serious damage with their legs and feet. Emus can kick forwards and sideways, but not backwards, and therefore it is best to approach the bird from behind. An emu rescue will require at least 2 people.

Birds do not have a diaphragm and breathe by expanding their chest. When handling and restraining birds, ensure you are not inhibiting respiration.

In larger species, it may not be possible or safe to restrain the body part most likely to cause injury (e.g. feet of emus), but it is important to always be aware of the location of this body part in relation to other people involved and avoid putting personnel in a position where they are at high risk of injury. Seek advice from an experienced wildlife rehabilitator before attempting to handle an unfamiliar species.

Prior to a rescue attempt, the rescuer must assess the risks to the native bird from environmental hazards and capture.

Capture and restraint can be very stressful for wild birds, so it is important to consider ways to minimise stress where possible. Wild birds that can be easily approached and captured, or birds showing signs of open-mouth breathing are often compromised and may not cope with prolonged or repeated capture events. Planning and preparation are vital to ensure capture can be undertaken swiftly and efficiently.

Following an unsuccessful capture event, assess the bird and its condition. If there is no immediate danger, consider giving the bird time to rest undisturbed before capture is reattempted. If the rescue is adjacent to a waterbody (river, lake, sea), rescuers should position themselves between the water's edge and the bird where possible to prevent the sick or injured bird from entering the water.

Methods of capture

Towels are a very useful tool when capturing and handling birds. Covering the head with a towel will reduce stress and help keep the bird calm. Wrapping the bird with a towel also helps to contain its wings and can avoid damage to the bird's feathers. Maintaining feather structure and integrity during rescue and throughout rehabilitation is vital as feathers are key to flight and thermoregulation.

Hand capture

Grounded birds can be captured by hand with minimal difficulty by appropriately trained rescuers. The bird should be approached slowly, observing its behaviour to determine whether it is likely to attempt escape. For wary birds, consider approaching the bird indirectly from another angle and avoiding direct eye contact. Once within reach, place a towel over the bird ensuring its head is covered. Small to medium-sized birds can be wrapped in the towel to contain the wings and feet, and placed into a transport container. Identify the part of the bird that can cause injury and ensure the head, wings or feet are restrained as appropriate for the species.

Head restraint can be achieved by either a 2 or 3-finger grip (Figure 3). The fingers are spaced either side of the head (not around the neck as this may cause discomfort and interfere with breathing, or too far forward such that the handler gets bitten). In smaller birds, the remaining fingers can wrap around either side of the body, taking care not to inhibit breathing.

- Two-finger grip: the thumb and index finger are placed on either side of head below the eyes.
- Three-finger grip: the thumb and middle finger are placed on either side of the head and the index finger on top of head to control head movement.

Figure 3 **Two-finger grip for head restraint of a galah (*Eolophus roseicapilla*) (left) and three-finger grip for head restraint of a rainbow lorikeet (*Trichoglossus haematodus*) (right)**

Photos: Kathryn Johnson/ZoosSA

Leg and feet restraint can be achieved by gripping the bird's legs above the hocks, with an index finger in between both legs and the thumb and third finger curled around the legs on either side.

For birds that use their wings as their principal defence mechanism, these should be wrapped in a towel with their wings folded against their body.

Use of nets

Nets can be very useful when capturing injured or sick birds that are still able to fly or move swiftly along the ground when approached for capture. Ensure the net is large enough in volume and diameter for the species and size of bird being rescued. A key consideration when using nets is the potential for feather damage caused by the netting. Nets must either be made using soft material or, if using mesh, must have small mesh diameter. Lining the rim of the net with soft foam can also reduce the risk of injury during capture. Birds must be moved out of the net and into a suitable transport container as soon as possible.

Rescuing chicks

Displaced nests, fledgling misadventure and predator attacks are a few of the reasons nestlings and fledglings may require rescue. The ideal outcome for rescued chicks is to be reunited with the parent birds. Prior to rescue, discreetly monitor the chick and its environment to determine if rescue is required. If the chick appears injured or sick, it may need to be taken into care.

When deciding if rescue is required, consider the following:

- stage of development of the chick. It is normal for fledgling birds of some species to spend some time on the ground. Fledglings found on the ground should be monitored for the presence of adult birds nearby and for any signs of illness or injury
- can the nest and parent birds be identified? Some parent birds can be absent for hours at a time. If the chick is in a relatively safe location, keep a regular watch from a good distance to monitor for the presence of parent birds
- whether the chick is in immediate danger, for example, from predators (e.g. cats) or traffic
- physical condition of the chick and the presence of injury or disease. Perform an initial assessment (see ‘Physical examination’) to identify any injuries or signs of disease. Injured, sick or hypothermic (low body temperature) chicks will need to be taken into care for further assessment and treatment.

Rescued hatchlings, nestlings and branchlings must be assessed by an experienced avian rehabilitator.

Transport

Birds should be transported in a suitable transport container, appropriate for the size and condition of the bird. The container should be big enough for the bird to stand. Containers should be well-ventilated and secure, ensuring ventilation holes do not permit escape or injury.

Many species can be transported for a short distance in a cardboard box with small air holes for ventilation, however, these are not suitable for parrots as they can easily chew their way out. A non-slip mat or towel should be placed at the bottom, and a rolled-up towel can be provided for the bird to grip during transport. For birds that are unable to perch, they should be supported by placing them in a rolled-up U-shaped towel. Nestlings can be placed within a makeshift nest within the transport container created using towels.

Corflute boxes and larger carry cages are suitable for transporting small to medium-sized birds as they provide adequate space, are easy to clean and disinfect, and can be reused (Figure 4).

Figure 4 **Corflute box (left) and large pet carrier (right) with towel substrate and rolled-up towel perch**

Photo: Shelly Butcher

When transporting birds by car, boxes should be safely secured to minimise movement during travel. Avoid loud conversation and using the radio, prevent contact with pets and young children (where possible) and ensure the bird is not exposed to cigarette smoke or strong smells.

Ensure ambient temperature appropriate to the species and stage of development is maintained during transport (see Table 1). Supplementary warmth can be provided using hot packs, ensuring the heat source is not in direct contact with the bird. A thermometer can be used to monitor temperatures during transport.

Table 1 **Ambient temperatures to be maintained during transport of native birds (adapted from the Bird Code)**

	Ambient temp
Fledglings, juveniles, immature, adults (most species)	28˚C
Hatchlings, nestlings, branchlings	28–32°C*
Ducklings, small waterbirds	28–30°C

*Range depending on stage of development and feather cover, with higher temperatures required if there is less feather coverage.

Physical examination

The aim of a physical examination is to assess the severity of injuries, wounds or disease to determine the most appropriate immediate course of action. This should include identifying the species of bird, its stage of development (e.g. hatchling, nestling, branchling, fledgling, juvenile, immature or adult) (Appendix 1 of the Bird Code), and where possible, the sex of the bird.

Within 24 hours of rescue, all native birds must be assessed by a veterinarian or an experienced wildlife rehabilitator.

Restraint for physical examination

In most species, a towel can be useful to wrap and restrain the bird for a physical examination. Keeping the bird's head covered with a towel will help reduce stress during handling. Manipulate the towel to expose parts of the body for examination (Figure 5). In medium and large birds, it is useful to have two people present when performing a physical examination, one to hold the patient, and the other to perform physical examination. In the case of very small birds (e.g. silvereyes and finches), it can be easier for a single person to restrain and examine the bird.

Physical examination of a bird should be thorough and methodical with minimal stress to the animal. Handling should be tailored to each individual animal based on its health status and temperament.

Figure 5 **Photos showing restraint technique, using a towel, for physical examination of a rainbow lorikeet**

Note: Birds often feel more comfortable when they can grip onto an object with their feet, such as a towel.
Photo: Beverley Langley/Minton Farm.

Birds should be monitored closely during the physical examination to ensure they are coping with the handling. Signs of stress are not readily recognisable, and birds are very good at masking these signs. Signs of stress can include:

- rapid breathing and open-mouth breathing
- sudden reduction in activity (i.e. going quiet or limp, or alternatively going stiff and non-responsive to stimuli)
- dropping feathers
- vocalisation.

Birds should be handled for the minimum time required, and handling should only be for the purpose of physical assessment or treatment.

If concerned that the bird is showing signs of stress during handling, place the bird back into a secure container (e.g. incubator or transport container) in a warm, quiet location and contact a veterinarian or an experienced wildlife rehabilitator to advise on the best approach to examine the bird.

Species identification

Identifying the species and developmental stage in birds is vital to providing optimal husbandry and care for each animal. Species identification in chicks can be particularly difficult. Use tools such as bird identification guides and consult with experienced avian rehabilitators and local birding groups to assist with species identification.

Body condition score and body weight

Body condition scoring is subjective and should always be assessed in conjunction with body weight. Body weight should be measured on admission and monitored daily in the initial stages of care. Body condition scoring should also be determined on admission and periodically checked while the bird is in care. It is assessed by palpating the pectoral muscle mass either side of the keel. There are a number of grading systems, but a simple one is to grad from 1–5, with 1 referring to an emaciated bird, 3-4 ideal condition and 5 an obese bird (Figure 6). Birds that are in very poor body condition and underweight may have an underlying chronic disease or have been unwell or injured for some time before capture. It will be important to take this into consideration when determining the prognosis for survival and release, which should be done in consultation with a veterinarian.

On admission, native birds must be weighed and the species and stage of development identified.

Chicks that are not yet flighted will have poorly developed pectoral muscles, so this is not necessarily an indicator of poor body condition. Instead, palpation of the muscle coverage over the spine and pelvis may be useful to assess body condition.

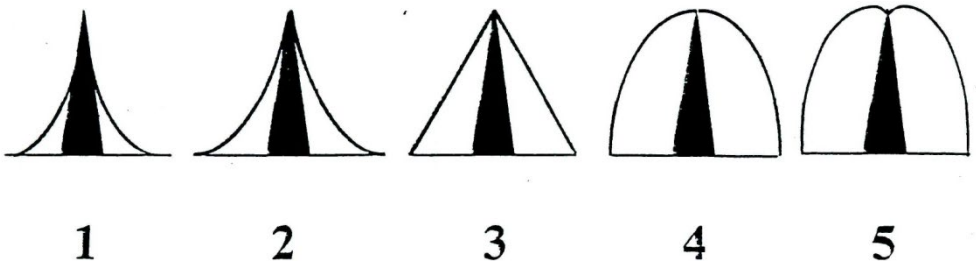

Figure 6 Guide to body condition scoring in birds

The diagram depicts the keel (black) and pectoral muscle on either side of the keel (white) (adapted from De Voe & Reininger 2006).

Respiration

Respiration is best assessed during the distance examination, as it can increase during handling due to stress. Normal respiratory movements of birds are subtle and difficult to observe. Signs of open-mouth breathing, a noticeable tail-bob or audible respiratory noises (with or without a stethoscope) may indicate respiratory compromise, and the bird should be

taken to a veterinarian as soon as possible. In the interim, place the bird in a secure container to rest, in a warm, dark and quiet location.

Note, some species (tawny frogmouths and kingfishers) will open their mouths as a threat display, and this should not be confused with open-mouth breathing.

Hydration status

Hydration status can be difficult to determine in birds through physical examination alone. Hydration status is assessed by checking for skin turgor (elasticity) and assessing the mucous membranes. Bird skin has reduced elasticity compared to mammals, meaning a mild skin tent can be normal. Severe skin tenting, where the skin remains in a tented position, can indicate dehydration, as can subjective 'stickiness' of the skin over the keel and pectorals. In a hydrated bird, the skin should glide easily over the underlying keel and muscle.

Pale, tacky mucous membranes in the mouth and sunken eyes are also indicators of dehydration. It is generally assumed any rescued wild bird that is injured or unwell is dehydrated.

Droppings

The droppings of a bird can provide valuable information regarding its health. A bird's dropping is made of 3 components: faeces, urates and urine (Figure 7). Faecal colour and consistency can vary with diet. The faecal component should be formed, with the exception of nectar feeding species (e.g. lorikeets and honeyeaters), which have a softer faecal component. The excretion of substances from the urinary tract is divided into 2 components: an insoluble urate part, which should appear white and chalky, and a clear, watery urine part.

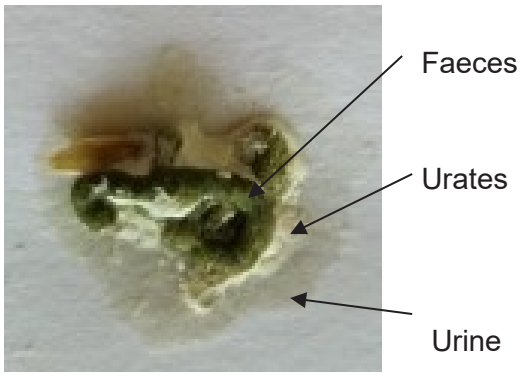

Figure 7 **Droppings of a bird, showing formed green faeces, white urates and clear urine**
Photo: Lynnette Drabsch

Birds can pass mutes when stressed, and stress-induced droppings can be watery and may not contain faeces or urates. Changes to the colour of the urates can be indicative of dehydration, underlying disease or trauma. Birds with green or yellow urates should always be assessed by a veterinarian to rule out possible underlying disease. Take a sample of, photograph or leave droppings in the transport cage when taking the bird to a veterinarian or experienced wildlife rehabilitator for assessment, so that this can be considered when assessing the patient.

Pellets

Some species of birds will produce pellets (or casts) of indigestible food material, such as bone, cartilage, fur, feathers or chitin from insect exoskeletons (Figure 8). These are formed

in their ventriculus (gizzard or grinding stomach) and expelled orally. Examples include carnivorous, insectivorous and piscivorous (fish-eating) birds, such as kookaburras, magpies and kingfishers. Frugivorous (fruit-eating) birds are also capable of producing casts from the hard coatings of fruits and seeds (Klasing 1998).

Figure 8 **Pellets from an Australian magpie (*Gymnorhina tibicen*)**
Photo: Meredith Ryan/FAWNA

Limbs and body – musculoskeletal and neurological assessment

Assessment of the musculoskeletal and neurological function should begin when examining the bird from a distance. This includes assessing the bird for abnormal gait, wing droop, lameness, and incoordination or lack of balance. It is important to note that not all fractures are palpable. For example, fractures to the coracoid bones (part of the shoulder girdle) are difficult to palpate and identify during physical examination. Coracoid injuries in birds may present as a bird that is unable to gain lift when attempting to fly (Gartrell 2012), and radiographs are required to make an accurate diagnosis.

If any abnormalities in the musculoskeletal or nervous system are observed on distance exam, the bird must be taken to a veterinarian for assessment and provision of pain relief. Traumatic injuries can be painful when examined and may even be made worse during physical examination.

> Birds with suspected or identified fractures must be transferred to a veterinarian as soon as possible for further assessment and provision of pain relief.

Once the bird is in hand, the wings and legs should be visually assessed and gently palpated to check for injuries. Gently palpate the wings and limbs from the tips towards the body and assess for swelling, bruising or haemorrhage under the skin, instability and crepitus (grating sounds or sensation), which suggests more serious injuries such as dislocations or fractures. Take care when examining wings. If they are extended above the horizontal plane, there is a risk of injury if the bird struggles. It is best to extend the wings in a more forward direction – towards the front of the bird. Palpate the keel for any deviations or abnormalities and part the feathers in this region to investigate any signs of bruising or wounds. Front-on collisions commonly result in injury to the keel and coracoid bones.

Birds should also be checked thoroughly for wounds over the body, limbs and head. Puncture wounds can be difficult to identify as they can be masked by the feathers. Look for areas where the feathers are matted (from blood or predator saliva) and gently blow against the direction of the feathers to expose the skin underneath. Avoid plucking feathers as it is

painful and bird skin is very thin. Plucking feathers close to wounds can result in tearing of the skin and inadvertently increasing the size of the skin wound.

Observe whether the bird can stand and grip normally (shown by normal perching or strength when grasping a pen or pencil). A 'withdrawal test' is used to assess neurological function to the wings and legs. This is performed by gently pinching the tips of the wings or feet. A normal reaction would be for the bird to pull the wing or limb away. Stress can override this response, and this test can be difficult to interpret in some birds. Abnormalities observed using these tests may indicate an underlying neurological or musculoskeletal condition, and veterinary attention should be promptly sought.

Skin and feathers

Birds should be checked for missing or damaged feathers on admission. This should be documented and periodically monitored. Most flighted birds have 10 primary feathers on each wing, and usually a total of 12 tail feathers (Figure 9). Missing feathers may be a result of trauma or underlying disease.

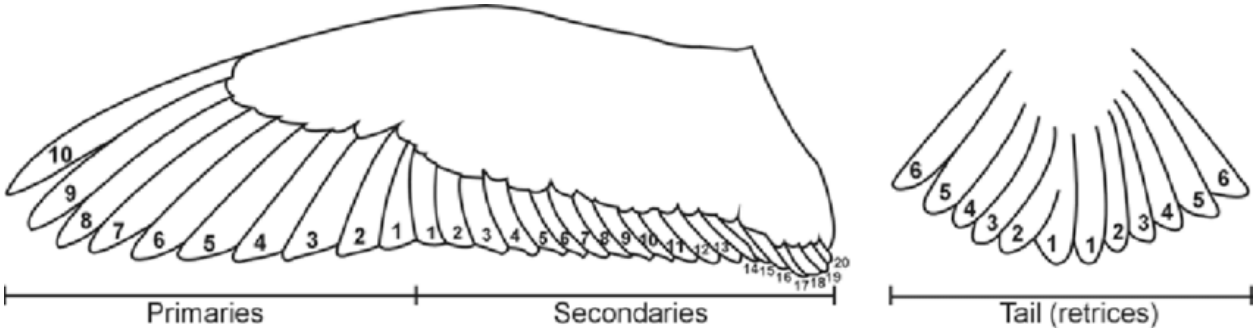

Figure 9 Diagram illustrating the primary wing and tail feathers in birds (McInnes 2006)

Assess the condition of the feathers:

- Broken or tattered tail feathers may indicate the bird has been unable to fly for some time. Birds that are unable to preen due to an injury or illness may also present with poor feather condition.
- Abnormal feather colouring may indicate underlying disease processes such as beak and feather disease virus (e.g. galahs (*Eolophus roseicapilla*) having pink feathers in areas that would usually be grey, sulphur-crested cockatoos (*Cacatua galerita***)** with feathers that appear dirty).
- External parasites such as lice are often found in higher numbers in debilitated birds, and occasionally mites, ticks, fleas and flies.

Eyes, nares, ears, mouth

Eyes should be assessed for discharge, swelling of surrounding tissue, reddening of the conjunctiva (inside of the eyelids) or damage to the cornea (outer surface of the eye), as these may be signs of infectious disease or trauma. Compare the 2 eyes and check for asymmetry in the size of the pupil, which can indicate head trauma. Birds can voluntarily control pupil size; therefore, in stressed birds there may be little to no change of pupil size in reaction to light. Closed or partially closed eyes may be indicative of an unwell bird or a painful eye. Any bird presenting with ocular abnormalities requires a thorough examination by a veterinarian.

The nares (nostrils) should be examined for symmetry and discharge. They can sometimes be occluded by blood or debris. Any birds showing signs of upper respiratory disease (ocular

or nasal discharge, sneezing or conjunctivitis) could be carrying an infectious disease (e.g. *Chlamydia*) and must be isolated until assessed by a veterinarian (see Section 7).

Birds do not have external ears, but instead have an ear cavity that can be seen just behind the eye. Blood or discharge from the ear cavity can indicate head trauma.

Assess the beak for signs of injury and alignment. Traumatic incidents such as window collision and motor vehicle accidents can result in injury to the beak. If safe to do so, the mouth can be carefully opened and the oral cavity assessed for plaques, presence of blood, parasites (e.g. throat worm in susceptible species) (see Section 5) and mucous membrane colour (gum colour). Oral mucous membranes should appear pink in all birds, except those with pigmented mouths, such as sulphur-crested cockatoos, which appear grey–black. Pale mucous membranes may indicate anaemia, dehydration and severe compromise, and these patients should be immediately assessed by a veterinarian.

Crop

The crop is located at the base of the neck and is an enlargement of the oesophagus. In some species, it is a large, distinctive structure. It can be gently palpated in the middle-lower region of the neck. Gently palpate the crop and check for the presence of food, which suggests the bird has been recently feeding or that there may be a problem with the crop emptying. Trauma can result in rupture of the crop. Gently part feathers in the area of the crop and assess for the presence of wounds, blood or food material, suggestive of crop injury.

Vent

Check the vent and surrounding feathers for soiling. This may indicate diarrhoea, abnormalities with gut function or that the bird has been on the ground for some time. Check for the presence of prolapsed tissue, masses or blood; all of which require immediate veterinary attention.

3. Euthanasia

As stated in the Bird Code, euthanasia is indicated when a bird is:

- likely to die regardless of treatment
- suffering from chronic, unrelievable pain (e.g. osteoarthritis)
- missing or has permanent damage to a limb or body part (e.g. wing, leg, foot, spine, tail, eye, ear or beak)
- carrying an incurable disease that poses a risk to other wildlife (e.g. beak and feather disease)
- imprinted.

Refer to the Bird Code for further standards and guidelines on euthanasia.

> Euthanasia should be performed by a veterinarian where possible.

Euthanasia must involve rapid loss of consciousness immediately followed by death. Death should be confirmed by the absence of a heartbeat and the loss of the corneal reflex.

If there is no access to a veterinarian, euthanasia can be performed by blunt force trauma to the base of the skull or, in larger birds, gunshot to the brain. Shooting should only be

undertaken by a licensed, skilled and experienced wildlife rehabilitation provider or an appropriate agency such as the NSW National Parks and Wildlife Service (NPWS), RSPCA or NSW Police Force.

Refer to the Bird Code for acceptable methods of euthanasia.

4. Initial treatment – stabilisation

Rescued native birds are generally hypothermic, dehydrated and depending on the duration and severity of illness or injury will likely be malnourished and in pain. The aim of initial treatment is stabilising the bird's condition before it can be thoroughly assessed by a veterinarian.

To reduce unnecessary handling time and subsequent associated stress, ensure all equipment required for initial treatment is prepared and readily available before handling the bird.

Warmth

On admission, most species will benefit from supplemental heat. Ideally, they would be placed in an incubator, set at an appropriate temperature for the developmental stage and species (28°C for most adult birds). Supplemental heat can also be provided using heat lamps or heat packs, ensuring the bird is not in direct contact with the heat source. Birds with neurological signs consistent with head trauma (head tilt, circling or uneven pupil size) are an exception to this, as higher ambient temperatures can be associated with poorer outcomes in these birds. It is best to maintain these birds at an ambient temperature of 21–23°C (Jolly 2015). Incubator temperatures should be monitored using a thermostat or thermometer, as the actual temperature can vary from the set temperature.

Fluids

The majority of sick or injured wild birds will be dehydrated on initial presentation, and will require some fluid supplementation. In cases of mild dehydration, oral (PO) or subcutaneous fluids (SC) will be sufficient to correct fluid deficits. Severely dehydrated patients should be referred to a veterinarian for intravenous (IV) fluids.

Rehydration is a vital part of initial treatment, and is necessary for the proper functioning of organs.

Oral fluids

Oral fluids can be provided to birds by means of syringe feeding, crop tubing or stomach tubing. The bird may be safely restrained by wrapping it in a towel and holding it upright, whilst ensuring it has control of its own head. Small volumes of water or electrolytes (e.g. Spark©, Vytrate©, Lectade©, Hartmann's solution©**)** can be dripped slowly onto the tongue by syringe, allowing the bird to swallow periodically to ensure the bird does not aspirate (inhale fluids).

Do not give oral fluids to a bird that cannot hold its head up or swallow, due to the increased risk of accidental aspiration.

Only those who are trained and skilled in the technique should administer oral fluids to birds using a crop or stomach tube, as inappropriate technique or equipment selection can cause significant harm or even death to the patient.

Subcutaneous fluids

Fluids can also be given subcutaneously (under the skin) for effective rehydration of birds. Subcutaneous fluids must only be delivered by personnel who are adequately trained, as it requires sterile technique and knowledge of anatomical locations to safely administer fluids. It is a suitable method of rehydration in patients that are unable to hold their head up or swallow and are unable to be given oral fluids. The two preferred sites for subcutaneous fluids administration in birds are the interscapular region (between the shoulder blades) and the skin fold in the inguinal region (groin area). The volume administered depends on the size of the bird and the amount that can be injected without causing excessive pressure on overlying skin.

Intravenous fluids

This is the recommended route for rehydrating a moderately or severely dehydrated animal. However, it requires a qualified and experienced veterinarian, sterile techniques and appropriate equipment.

If severe dehydration is suspected, and in cases where oral or subcutaneous fluid supplementation is not possible or inadequate, urgent referral to a veterinary facility for IV fluids is warranted.

Pain relief

Birds may not always show outward signs of pain. For this reason, pain relief should be provided based on the assessment of injuries, and in consultation with a veterinarian. Failure to provide adequate pain relief in the instance of substantial injury will significantly compromise animal welfare. Birds do not respond to all forms of pain relief, and there can be considerable species differences, so the most suitable choice should be determined in consultation with a veterinarian.

In most rescue cases, especially with signs of trauma, pain relief is **crucial** for the welfare of the animal. The provision of pain relief must be a priority and must be prescribed by a veterinarian.

Wound management

All birds with wounds should be assessed by a veterinarian as soon as possible. Due to the unique respiratory system of birds, some wounds and fractures may connect with the respiratory tract and flushing these wounds could inadvertently result in fluid in the

respiratory tract. It is best for a veterinarian or experienced avian rehabilitator to first assess the wounds before considering flushing wounds.

Prior to assessment by a veterinarian, wounds can be carefully wiped with a swab soaked in saline, 0.05% chlorhexidine or 1% povidone iodine, with much of the moisture squeezed out. Non-adherent wound dressings (e.g. melolin) can be placed on wounds to prevent drying and further contamination until veterinary assessment. Avoid using chlorhexidine near eyes, as it can be an irritant. If accidental contamination occurs, flush the eyes immediately with sterile saline, with the bird's face directed downward to prevent aspiration.

Bandaging can be useful to provide support and stability to fractures; however, significant damage can result from incorrectly applied bandages. Where a fracture is suspected, veterinary assistance must be sought as soon as possible to relieve pain, confirm the diagnosis and prognosis and, where appropriate, provide the correct treatment. In the interim, try to restrict movement by placing the bird in a warm, secure container and ensure it is in a dark and quiet location prior to being assessed by a veterinarian.

> Only personnel trained and skilled in applying bandages (e.g. figure of eight bandages) should attempt to do so. Incorrectly applied bandages can exacerbate injuries and result in significant trauma.

Bleeding

Due to the relatively small size of most bird species, they do not have a significant blood reserve and can quickly lose significant volumes of blood leading to death. Pressure can be applied directly to the site of bleeding wounds to stop bleeding. If bleeding does not stop after holding pressure for a few minutes, a bandage can be applied using an absorbent material (e.g. a gauze swab) and Vet Wrap©, such that it is applying pressure but not constricting. If you can still pass a finger between the skin and the bandage, that is adequate pressure. This should be checked every 10 minutes until bleeding has stopped, while transporting the bird to a veterinarian. Ensure breathing is not affected by any bandaging.

> It is imperative in birds that bleeding is stopped as soon as possible.

Damage to a growing feather (blood feather) can also result in major bleeding. Some of these feathers are firmly attached to bone, and removing them can result in damage to the follicle, pain and trauma. Apply pressure to the feather shaft to minimise bleeding and seek veterinary attention as soon as possible.

Nutrition

It is vital that birds are assessed, stabilised (dehydration corrected, temperature normalised), and veterinary treatment provided where necessary before initiating feeding. The exception to this is small birds with high metabolic rates that consume diets high in sugar (e.g. silvereyes) as they can quickly become hypoglycaemic (low blood glucose). Provided these birds can swallow, they need to be supplemented with food shortly after admission. Nectar or 5% glucose fluids can be provided orally from a syringe, and many birds will actively drink from the syringe after a drop is placed at the end of their beak (Figure 10).

Figure 10 **A silvereye restrained by hand actively drinking nectar provided via syringe**
Photo: Pauline Nijman

Similarly, nestlings and hatchlings also have a high metabolic rate and may require nutritional support within the initial 24-hour period. Contact an experienced avian rehabilitator for advice on the type of food and techniques for providing nutrition to these individuals before they can be transferred into their care.

Native birds have species-specific diet requirements, and given the stress of rescue and handling, most are unlikely to self-feed in the initial period following rescue. If unsure about what and how to feed, it is best to avoid offering food and instead contact an experienced wildlife rehabilitator for advice.

Native birds must be provided with a balanced and complete diet that supports growth and development and is appropriate for the species, size, stage of development, mobility and physiological status of the animal.

Food that is available in the wild or items that mimic food in the wild (e.g. artificial nectar or insectivore supplements) must form the basis of the native bird's diet. Home-made recipe diets are rarely nutritionally balanced and are not advisable in place of a well-researched commercial food product. Appendix A provides an overview of the various diet requirements of native birds.

Husbandry

Husbandry requirements for native birds in the initial period following rescue differ to requirements for birds in longer-term care and should be adapted to each individual, depending on its developmental stage, injuries and health status. Birds are prone to stress associated with human presence and captivity. The following section provides guidelines on housing in the initial period following rescue.

Housing

Housing requirements will vary depending on the species and condition of the bird. Rescued birds should be housed individually until their injury and disease status is assessed by a veterinarian or experienced wildlife rehabilitator.

Intensive care housing must be large enough to enable the bird to stand fully erect or lie fully extended.

Birds should be housed in a warm, dark and quiet environment free from stressors, including loud noises, domestic pets and noxious smells.

Use towels as a substrate and provide a stable perch for birds that are able to perch. Any bird unable to perch should be provided with appropriate substrate, including padding (rubber or foam matting) and supported in a ‘U-shaped’ towel (Figure 11).

Figure 11 **A crested pigeon in an intensive care unit, supported using a rolled-up U-shaped towel**
Photo: Kathryn Johnson/ZooSA

5. Common rescue encounters

Trauma

Trauma is the most common reason wild birds are presented for rehabilitation (DPIE 2020) and can result from collision with a motor vehicle, injuries from dog or cat attacks, accidental collision with a window or entanglement.

All birds with suspicion of or signs of trauma should be assessed by a veterinarian to determine the full extent of injuries, internally and externally. Underlying factors predisposing injury should also be considered. For example, fractures in Australian magpie (*Gymnorhina tibicen*) fledglings may be caused by an underlying nutritional deficiency.

Pain relief is crucial for birds with evidence of traumatic injury. If there are injuries requiring immediate medical attention (e.g. fractures, head trauma), treatment should not be delayed, and the animal referred for veterinary care as soon as possible.

Cat, dog, bird attacks

Predation events by birds, cats, dogs and other animals can result in significant internal injury that may not be readily apparent on physical examination. Externally, signs of predation may be limited to missing feathers, blood-stained matted feathers or musculoskeletal injuries (lameness, inability to fly). On closer examination, puncture wounds, bruising or more severe trauma such as fractures may be identified. Birds with a focal area of feather loss (e.g. from a single wing, tail or area on the body) should be closely examined for underlying trauma and puncture wounds. Cat attacks can result in infections, and any birds suspected to have sustained injuries by a cat should be presented to a veterinarian for examination.

Birds suspected to have injuries due to predation should be taken to a veterinarian for thorough assessment.

Intraspecific aggression (same species) or interspecific aggression (different species) may occur between some species of birds, particularly territorial species such as magpies, mudlarks, kookaburras, butcherbirds and whipbirds. Birds should be checked for wounds, particularly around the head, especially if an incident of aggression was observed.

Figure 12 **Puncture wound on the inner wing of a sacred kingfisher consistent with a cat attack**

Photo: Kathryn Johnson/ZoosSA

Crop injuries in pigeons

Pigeons have a very distensible crop, which can be prominent after feeding. During collisions with windows or motor vehicles, the front of the chest is often the site of impact and can result in crop rupture. In birds with traumatic injury, the crop should always be palpated, and the surrounding area closely examined for wounds, food protruding through the skin in the neck or pocketing of food underneath the skin. If there are any concerns the crop may have been ruptured, the bird should immediately be taken to a veterinarian for further assessment.

Beak and tongue injuries

Beak injuries can occur due to trauma, disease or an underlying nutritional deficiency (e.g. metabolic bone disease resulting in beak deformity). Possible presentations include missing or damaged sections of the beak, visible fractures or instability and misalignment of the upper and lower beaks.

The beak is a complex structure with a hard outer layer, and deeper tissue layers containing blood vessels, nerves and bone. Beak injuries involving only the outer keratin layer are likely to have better outcomes compared to injuries involving the bone or deeper tissues. Injuries such as those resulting in bone exposure (e.g. open fractures), have a much poorer prognosis. Missing significant sections of the upper or lower beak will affect the bird's capability to catch and handle food, and euthanasia should be considered in these birds, in accordance with the Bird Code.

Nectar feeders, including lorikeets and honeyeaters, have a specialised brush tip at the end of their tongue to extract pollen and nectar from plants (Speers 2016). Damage to the end of the tongue from trauma, resulting in a loss of function of this specialised tip, carries a poor prognosis for survival in the wild, as it will impair the bird's ability to feed. These cases

should be assessed by a veterinarian to establish the severity and extent of injury and to determine prognosis.

Abandoned young

Chicks are commonly rescued due to fallen nests, misadventure or may be picked up by concerned members of the public. It is not uncommon for chicks to be cared for by a member of the public before being brought to a licensed wildlife rehabilitator. In such cases, collecting a thorough history, including information about the location of rescue, is vital as it informs and directs the health assessment of the chick.

It is very common for people to be concerned about nestling and fledgling birds found on the ground. The decision to intervene and how to intervene will depend on a variety of factors (see 'Rescuing chicks'). If unsure, consult with an experienced avian rehabilitator to determine the most appropriate intervention for each rescue.

> Reuniting chicks with adult birds is a complicated process requiring species-specific knowledge, and time is critical. It is always advisable to contact an experienced avian rehabilitator for further direction.

Rescued hatchlings and nestlings must be assessed by an experienced avian rehabilitator. Chicks should be examined for obvious signs of illness or injury (e.g. punctures, blood, bruising, internal bleeding or fractures), demeanour and condition (hypothermia). If injuries are present, the bird should be taken to a veterinarian for further assessment. It is important that young birds go to an experienced rehabilitator, as they require specialist care and usually benefit from crèching with other young birds of the same species.

Glue boards

Small–medium sized birds may present stuck to glue boards, or their feathers may be contaminated with glue. Some products may contain insecticides or petroleum based adhesive products that can be harmful to birds. Birds can be carefully removed from these traps by first sprinkling cornmeal (e.g. dried polenta) to reduce further sticking, before applying a light oil (e.g. canola oil) to the area where the bird is stuck, to help soften the glue (Duerr & Gage 2020). The bird should be stabilised prior to any attempt to wash the glue off, which may take several days. Advice should be sought from a veterinarian or an experienced wildlife rehabilitator before attempting to wash affected birds.

Diseases

Beak and feather disease

Beak and feather disease is caused by avian circovirus. It is a highly infectious virus that is predominantly transmitted between birds through feather dander, faeces or regurgitation of crop contents.

Common signs of this disease in birds include:

- loss of primary, tail or crest feathers (Figure 13)
- abnormal growth of feathers (e.g. thickened feather sheaths, twisted or curled feathers, abnormal feather colour)

- loss of powder down in species with powder down feathers (e.g. cockatoos and galahs). Affected birds may have a shiny beak and the appearance of dirty feathers as a result
- elongated, brittle beak.

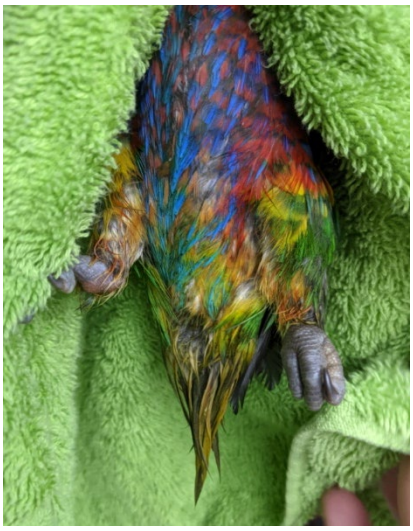

Figure 13 A juvenile rainbow lorikeet with absent tail feathers

Note: Although suspicious of beak and feather disease, other possibilities should be considered (e.g. predation, trauma and other infectious causes of feather loss).
Photo: Kathryn Johnson/ZoosSA

Rainbow lorikeets (*Trichoglossus haematodus*) are often carriers of the disease, and are a common source of infection for other species. Sulphur-crested cockatoos are particularly susceptible to this disease, and it is inevitably fatal in these birds.

Although originally believed to only infect parrots, this virus has been found to infect birds from a range of orders in recent years, including Passeriformes, Coraciiformes, Caprimulgiformes, and Ciconiiformes, Anseriformes, Strigiformes and Accipitriformes (Amery-Gale et al. 2017; Phalen 2019). There are still many uncertainties around its transmission and significance in non-psittacine species; hence it should be assumed that all species of birds may be susceptible.

Any bird suspected to be infected with the virus should be isolated from **all** birds until assessment by a veterinarian or experienced bird rehabilitator.

This virus is very resistant to disinfectants and highly contagious, and hence current recommendations for disinfection are to use Virkon S© at 2% concentration (higher than label concentration) with at least 10 minutes contact time (Department of Environment and Heritage 2006).

Throat worm

Throat worm (*Cheilospirura gymnorhinis***)** is a roundworm that can be seen in the mouth, throat and upper oesophagus of Australian magpies. Similar parasites (presumed to be the same species) are also seen in the mouths of magpie larks (*Grallina cyanoleuca*), currawongs, black-faced cuckoo-shrikes (*Coracina novaehollandiae*), butcherbirds, painted firetail finches (*Emblema pictum*) and rufous whistlers (*Pachycephala rufiventris*) (Hall & Rose 2021). Nodules and adult worms may be observed on examination of the oral cavity in affected birds. Worms are more commonly seen in juvenile birds and are approximately 10 millimetres long and cream-coloured (Hall & Rose 2021; De Chaneet & Robertson 1983).

Small numbers of these worms may be insignificant; however, large numbers can cause an obstruction of the glottis (airway opening) or prevent the swallowing of food.

Birds with throat worm burden should be presented to a veterinarian for treatment, which involves medical therapy (antiparasitic medication) and may include manual removal of worms. Take care when removing worms as this can be painful and cause tissue damage and bleeding.

It is important to note that throat worm is not the same parasite as gapeworm (*Syngamus trachea*), although it is often confused with this species. Gapeworm, which may also be seen in magpies, is a red-coloured roundworm found lower in the respiratory tract (i.e. in the trachea) and is not visible within the mouth.

Figure 14 **A juvenile Australian magpie with proliferative nodules (blue arrow) and adult worms (yellow arrow) in the mouth**
Photo: Bob Donnelly

Oral plaques

The mouths of all birds should be examined for the presence of oral lesions, at the time of admission and periodically during care.

Plaque-like lesions in the oral cavity (Figure 15) can be caused by a range of infectious agents, including:

- bacterial infections (e.g. *Salmonella* in passerines)
- viral infections (e.g. poxvirus)
- parasitic infections (e.g. trichomoniasis)
- fungal infections (e.g. candidiasis).

Each of these agents requires specific medical treatment and an accurate diagnosis is key to ensuring the appropriate treatment is provided. This involves taking the bird to a veterinarian for examination, and diagnostic testing that may include examination of a sample of the lesion microscopically (cytology). Veterinary advice should be sought promptly as these infections are often painful and may be invasive.

Figure 15 **Multiple yellow/white plaque-like lesions in the oral cavity of a channel-billed cuckoo; diagnostic testing confirmed trichomoniasis**
Photo: Bob Donnelly

Poxvirus

Poxvirus is a disease that has been reported in wild magpies, pigeons and raptors in Australia (Hall & Rose 2021), often in juvenile or immunocompromised birds. It causes raised blisters or nodules on non-feathered regions of the skin (e.g. around the face, wings, legs and cloaca), or within the oral cavity. It can resolve spontaneously. After lesions fall off and the skin underneath has healed, birds are no longer regarded as infectious.

> All birds with suspicious lesions should be isolated from other birds and housed in mosquito-proof enclosures, until diagnosis is confirmed. They should remain in quarantine until all lesions have fully resolved.

Suspected cases should be assessed by a veterinarian, as similar skin lesions can also be caused by other agents (e.g. avian tuberculosis, papillomavirus, tumours). Some birds develop secondary bacterial infections, and the lesions can invade deeper structures, including bone. Severe cases may require euthanasia.

Birds affected with poxvirus may become debilitated and emaciated, and often come into care as a result. They should only be released when they have made a full recovery, after all skin lesions have resolved.

Lorikeet paralysis syndrome

Lorikeet paralysis syndrome is a recently recognised neurological condition causing a flaccid (floppy) paralysis predominantly in rainbow lorikeets, and occasionally scaly breasted lorikeets (*Trichoglossus chlorolepidotus*). It has been reported in south-eastern Queensland and northern NSW, mainly between October and June, and is very uncommon in the winter months. All birds present unable to fly and demonstrate a range of signs depending on the severity of the disease (see Table 2), including ataxia (unsteadiness), an inability to swallow, blink or stand, or a change of voice. Birds presenting with less severe clinical signs (i.e. higher grades) have a much better prognosis for recovery and release. All lorikeets

presenting with these signs should be examined by a veterinarian as soon as possible to rule out other causes such as trauma, which can present similarly.

Table 2 Grading of lorikeet paralysis syndrome based on clinical signs (adapted from the descriptions in Lacasse et al. 2021)

Grade	Description
1	Unable to stand, blink or swallow
2	Unable to blink, can swallow and stand but ataxic
3	Able to blink, stand, swallow and walk, but ataxic when hopping
4	Able to blink, swallow, hop and walk but unable to fly

Despite extensive testing, the cause has not yet been identified, although a plant toxin is suspected. It should be noted that this is not the same condition as 'clenched claw syndrome', reported in rainbow lorikeets in southern NSW and Victoria. Clenched claw syndrome presents as a more rigid paralysis, is noted all year round and is caused by a viral infection (avulavirus).

Botulism

Botulism is a neurological disease caused by the ingestion of a toxin produced by the bacteria *Clostridium botulinum*. Birds present with a flaccid (floppy) paralysis of the neck, wings and limbs. They are often unable to stand or hold up their heads and may have difficulty swallowing. Outbreaks are usually seen in summer, as warm weather and anaerobic (low oxygen) conditions, created by decaying plant or animal material, are required for the bacteria to proliferate. It is not contagious and cannot be spread to other birds or humans directly. To acquire infection, a bird needs to ingest the toxin (usually from a food source). It is common to see multiple birds in an area affected, and sometimes affected birds may number in the thousands.

Birds with botulism require a substantial amount of supportive care, including padded bedding that is changed at least three times a day.

Birds with neurological signs or suspicion of botulism should be taken to a veterinarian for assessment and supportive care. They should be closely monitored for signs of deterioration, as many birds may succumb to respiratory paralysis.

In the event of an outbreak, it is important to liaise with your species coordinator and contact the Department of Primary Industries (DPI) Emergency Animal Disease hotline, as diagnostic testing is required to confirm the cause and rule out other diseases.

6. Biosecurity

Biosecurity practices are vital in controlling and preventing infectious disease being transmitted between birds, to birds in the wild, from birds to humans and from humans to birds.

Wildlife rehabilitators should implement good biosecurity practices, including hygiene, isolation and diagnosis, and treatment of sick or diseased individuals (WHA 2018). The National Wildlife Biosecurity Guidelines provide detailed information on understanding biosecurity risks associated with wildlife, assessing the risk and applying appropriate risk management.

It is important to consider that bringing a range of sick and injured wild birds together in close proximity has the potential for significant disease spread.

Treat all birds as potentially infectious and take precautions to minimise disease transfer between patients.

- House birds separately until disease status is determined by a veterinarian or experienced avian rehabilitator. Chicks from the same clutch can be housed together.
- If a bird shows any signs of disease (feather or beak abnormalities, sneezing, discharge from the eyes or nostrils, skin nodules, oral lesions or diarrhoea), it must be isolated and managed as potentially infectious until assessed by a veterinarian.
- Birds in quarantine must have their own cleaning equipment, feeding equipment and perches, which are not to be shared with other birds.
- Thoroughly clean and disinfect all transport carriers, enclosures, food and water bowls, and artificial perches.
- Ensure towels are thoroughly cleaned before and after use.
- Ensure biological material, such as branches, are disposed of after use to prevent contamination between animals. Permanent perches in enclosures should be thoroughly cleaned.
- Wash hands thoroughly before, after and between treating and handling individual birds.
- All wild birds in care should be kept separate from domestic pets. This includes domestic birds, which may inadvertently spread diseases, despite appearing healthy.
- Use PPE as required: disposable gloves, covered clothing, alcohol-based hand sanitiser, dust mask, eye protection (see ‘Personal safety’ in Section 2).

A range of disinfectants are available, with varying levels of efficacy against different pathogens. Follow the manufacturer’s instructions when using disinfectants as contact time and dilution rates vary between products. Only surfaces that are impervious to water and completely free of organic material can be disinfected. Before disinfection, ensure surfaces are cleaned to remove organic debris. Take care when using these products in close proximity to birds, as they can be very sensitive to strong odours.

If an unusual disease or mortality event is suspected, the wildlife rehabilitator must immediately contact their species coordinator to notify the DPI Emergency Animal Disease hotline (24 hours) on 1800 675 888 for immediate assessment of emerging health threats.

7. Zoonotic disease

Zoonotic diseases are diseases transmissible from animals to humans. As a group, wildlife rehabilitators are at increased risk of zoonotic disease due to regular and close contact with wildlife (Hulst 2019). Knowledge of the disease, appropriate PPE, hygiene practices and vaccination where available are vital in reducing the risk of disease transmission. Zoonotic diseases of specific importance to native birds are listed below. Further information on zoonotic diseases can be found on DPI’s Zoonoses – animal diseases that can infect people webpage.

Psittacosis

Transmission: Psittacosis (also known as chlamydia) is caused by infection with the bacteria *Chlamydia psittaci.* Although originally believed to only infect parrots, it has also been found in a range of orders of birds, including Anseriformes, Columbiformes and Galliformes. The organism may be spread by inhalation or ingestion of contaminated respiratory secretions or faeces and may occur through direct contact, aerosols or fomites (inanimate objects that can transfer infectious pathogens).

Signs in birds: Birds most commonly present with respiratory signs (sneezing, ocular or nasal discharge, reddened conjunctiva, swelling of the tissue around the eye, difficulty breathing) or gastrointestinal signs (including diarrhoea and green urates). Chlamydia should be suspected in any emaciated wild bird (Hall & Rose 2021). Infected birds can also be asymptomatic carriers, whereby they do not develop clinical signs but are still capable of shedding bacteria into the environment.

Symptoms in people: Headache, fever, chills, muscle aches, dry cough, chest pain and breathlessness (NSW Health 2018).

Prevention: Personal hygiene and the use of appropriate PPE (gloves, mask and eye protection) when handling birds or cleaning enclosures. If you are concerned you may have contracted psittacosis, it is important to inform your doctor that you work in close contact with birds.

Avian mycobacteriosis

Transmission: Also known as avian tuberculosis. Most commonly caused by infection with the bacteria *Mycobacterium avium subspecies avium*. Disease occurs by ingestion, inhalation, biting insects or entry via skin wounds. The organism is spread in gastrointestinal or respiratory secretions, or from infected skin lesions. Reports of disease in people are rare. Immunocompromised people are at higher risk of infection.

Signs in birds: Symptoms in birds can vary as the bacteria can affect a range of tissues. Affected birds are commonly emaciated and lethargic. Some birds may have granulomas, appearing as lumps on the body (WHA 2013).

Symptoms in people: Immunocompromised people (young, elderly, immunosuppressed) are at higher risk of infection. Clinical signs include fever, weight loss, fatigue, diarrhoea, shortness of breath, abdominal pain.

Prevention: The use of appropriate PPE (gloves, dust mask and eye protection) when handling birds or cleaning enclosures, isolation of affected birds, hygiene and disinfection of equipment and enclosures.

Salmonellosis

Transmission: *Salmonella* is a bacterium that is spread in the faeces of some individuals, and is contracted by accidental oral ingestion directly or indirectly via fomites.

Signs in birds: Some birds can be asymptomatic carriers, showing no clinical signs, and others can present with diarrhoea, vomiting, lethargy, anorexia or sudden death. Yellow nodules may be seen in the throat of passerines infected with this disease.

Symptoms in people: Can include diarrhoea, nausea, vomiting, abdominal pain, fever.

Prevention: Hygiene and PPE are vital in protecting against salmonellosis and includes hand washing, regular disinfection of equipment and isolation of affected birds.

8. Record keeping

Accurate records must be maintained to track the progress and outcomes for native birds in care. If the bird is referred for veterinary treatment or transferred to another wildlife rehabilitator, these records provide vital clinical information useful in determining continued treatment and outcomes. They are also a useful resource for research and government organisations.

Records to be maintained include:

- encounter details – date, circumstances, incident location, name and details of people involved
- individual identification of native bird – species, stage of development, sex, identification (microchip) if present
- initial physical examination findings
- daily notes – including treatments provided, progression or development of symptoms, weight, food intake, faecal output, etc. Maintain daily record sheets while the bird is in care
- outcome – record the outcome for each individual coming into care; for example, whether the bird was transferred to a wildlife rehabilitator or veterinarian, if the bird was euthanased or died while in care or if the bird was released.

9. References and further reading

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10. More information

- DPI Emergency Animal Disease
- National Wildlife Biosecurity Guidelines (PDF 2.3MB)
- Zoonoses – animal diseases that can infect people

Appendix A: Nutritional guidelines for native birds

The diet specifications of the avian species that could potentially come into care in New South Wales is complex. Although the ideal circumstance would be to replicate the bird's natural diet wherever possible, this may not always be feasible and nutritional data may be deficient. It is reasonable to classify birds into various groups according to their predominant diet preference for their initial stages of care. This includes nectivores, insectivores, carnivores, granivores, omnivores, herbivores, frugivores and piscivores.

This document outlines some important considerations for each diet type. It should be used as a general guide, and species-specific information should always be sought in addition.

Nectivores (e.g. lorikeets, honeyeaters, silvereyes)

Nectivores should be offered a good quality commercial nectar supplement. This must be made up according to label instructions, as incorrect formulation can cause dehydration (i.e. too thick) or result in weight loss (i.e. too watery). Wet nectar supplements are preferred over dry, as dry diets can cause dehydration and slow gut transit time (Speers 2016). Nectar can be provided in 'nectar feeders', which slowly distribute a small amount of nectar as the bird drinks, or in bowls. When initially placed in the enclosure, birds should be 'shown' how to use the feeder by picking the bird up and carefully placing the end of its beak in the nectar. In most cases, the bird will taste the nectar with its tongue and continue to drink itself. Nectar should be replaced frequently, particularly in hot weather, before it spoils.

A small amount of fruit can also be offered. Ideally this would be native fruits, although alternatively orange, grapes, blueberries can also be offered. Nectivores should be offered native flowers of usual foraging plants, to provide them with a natural nectar and pollen source.

Insectivores (e.g. swallows, wrens, robins, wagtails, fantails, most cuckoo species, masked lapwings [*Vanellus miles*], nightjars, tawny frogmouths, Australasian shoveler [*Spatula rhynchotis*], pink-eared ducks [*Malacorhynchus membranaceus*])

There are a wide variety of insectivorous bird species, from numerous orders, that may come into care. Live worms and insects (e.g. earthworms, crickets, wax moth larvae, mealworms) gut-loaded with calcium are preferable to provide the main source of nutrition. It is often unfeasible to provide enough insects to meet the total daily energy requirement, so supplementation with commercial insectivore diets may be required. These should be mixed according to label instructions, either with water into liquid slurry, or combined with raw lean meat that is minced (e.g. ox heart). Assisted feeding may be required if the bird does not recognise the supplements as food. Tube feeding slurry or assist-feeding 'meatballs' should only be undertaken by an appropriately trained rehabilitator. Some species can be reluctant to self-feed in care (particularly species that hunt on the wing such as fantails and welcome swallows), and adult birds don't tolerate assist-feeding well. Some birds (e.g. nectivores, granivores, frugivores and herbivores) may become temporarily insectivorous when feeding young, to meet the additional nutrient requirements for growth (predominantly higher levels of protein and calcium).

Carnivores (e.g. kookaburras)

Carnivores should be offered whole prey where possible to provide a nutritionally balanced diet (i.e. inclusive of bones, organs and fur). The exact choice of prey (e.g. day-old chicks, mice, rats) will depend on the size of the bird and the type of prey it is more likely to eat in the wild. Prey can be offered for the bird to self-feed, or can be assist-fed, ensuring the items are cut to a size that facilitates swallowing, and in such a way as to avoid sharp ends of bone protruding, which may damage the gastrointestinal tract. Prey should be inspected before feeding to ensure it was in good health prior to death, and any product of questionable quality or health status should be discarded.

Granivores (e.g. pigeons, finches, most parrots)

Granivorous birds predominantly eat seed for most, if not all, of the year. Many have mixed feeding strategies for times of the year when food is short (e.g. also eating fruits, vegetables and insects). The types of seed offered should be appropriate for the size of the bird; for example, canary seed should be provided to finches, pigeon mix to granivorous native pigeons and small parrot mix to most parrot species. Seed mixes with a large proportion of oily seeds (e.g. sunflower and safflower seeds) should be avoided. Seeding grasses can be offered to birds when available, provided they have not been sprayed with pesticides, which can be harmful to birds. Most species will benefit from being offered fruits and vegetables in addition to seed. Although commercial pelleted diets (designed for pet birds) offer a more nutritionally balanced diet when fed in combination with a variety of seed, fruit and vegetables, it is highly unlikely that wild birds will consume this food, given its unfamiliarity. Branches of native plants provide good enrichment and can act as a supplemental food source (e.g. sheoak for large parrots).

Omnivores (e.g. currawongs, cuckoo-shrikes, pacific black ducks [*Anas superciliosa*], grey teal [*Anas gracilis*], chestnut teal [*Anas castanea*], hardhead [*Aythya australis*], freckled duck [*Stictonetta naevosa*], blue-billed duck [*Oxyura australis*], brush turkeys [*Alectura lathami*])

Omnivorous birds are defined as birds that consume both plant and animal matter on a daily basis, rather than a species that switches prey seasonally. It is important that they are provided with both types of food to ensure they meet their daily nutritional requirements. Many omnivorous ducks consume both insects and plant material. Currawongs and black-faced cuckoo-shrikes require insects, as well as fruits and seeds. Brush turkeys consume insects and larger prey (including frogs, snakes and mice), along with fruits, seeds and roots.

Herbivores (e.g. swans, Australian wood ducks (*Chenonetta jubata*), shelducks, geese).

Herbivorous birds should be provided with a diet that replicates the wild diet as closely as possible. Ideally, fresh green grasses would be offered as the majority of the diet, with some additional supplementation provided by vegetables where required. Spoilt food should never be offered. Some dark leafy green vegetables and legumes can be provided, but should not form the entire bulk of the diet, particularly in young birds, as excess protein levels can predispose to angel wing (Fowler 2018).

Frugivores (e.g. Australasian figbirds [*Sphecotheres vieilloti*], eastern koel [*Eudynamys orientalis*], channel-billed cuckoo [*Scythrops novaehollandiae*])

Wild-type fruits are preferable to cultivated fruits when available, due to the substantially different nutritional profiles. For example, many native fruits are higher in lipid and fat content compared to cultivated fruits, which tend to be higher in simple sugars (Speers 2016). Some birds have a particular preference for certain fruits, such as figbirds which (as the name suggests) predominantly eat figs. More generalist feeders can be offered a wider variety of fruit species. Avocadoes should never be fed to birds, as they contain toxic substances that can be fatal if consumed.

Piscivores (e.g. grebes, herons, egrets)

Piscivorous birds predominantly eat fish. The variety of fish species readily available is often closely related to local commercial fisheries. Oily and non-oily fish species have vastly different nutrient components (particularly fat levels) and should be fed out according to the bird's natural diet where possible. Fish should be of a good quality, and should be inspected for signs of illness or disease (e.g. sunken eyes, mucous-covered gills, slime on scales, protruding vent, discolouration of the skin or broken skin). They should feel elastic and firm when touched such that the flesh bounces back. Fish of questionable quality or displaying signs of disease should be discarded.

The process of freezing fish causes it to become depleted in vitamin B1, and some species of fish also contain substances that degrade this vitamin; therefore, a good quality vitamin supplement (e.g. Vetafarm Sea Bird Tablets©) should always be provided, in accordance with label instructions. Fish should never be thawed in hot water, as this may partly cook the flesh. It can be slowly thawed in a refrigerator or under running cold water, with care taken to remove fish from the water as soon as it is thawed to stop nutrient leaching.