HUSBANDRY GUIDELINES FOR THE WEDGE-TAILED EAGLE

Aquila audax
Aves: Accipitridae

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DISCLAIMER

These husbandry guidelines were written by the author studying at TAFE NSW – Western Sydney Institute, Richmond College, N.S.W, Australia, as part of an assessment for the completion of Certificate III in Captive Animals, Course number ACM30310. Since this husbandry manual is the result of a student project work, care should be taken when interpreting and using the information presented. No responsibility is assumed for any loss or damage that may result from the use of these guidelines in the workplace. Husbandry manuals are utility documents and are effectively a ‘work in progress’ so any additions or enhancements are encouraged.
OCCUPATIONAL HEALTH AND SAFETY RISKS

Caution should be taken when working with birds of prey, especially ones of this size. Wedge-tailed Eagles, *Aquila audax*, can be aggressive or territorial towards each other. They can even show this towards keepers when kept in captivity (Cherriman, Foster & Debus 2012). This animal can be seen as a medium to high risk of hazard. Wedge-tailed Eagles have very sharp talons and beak used for ripping and shredding their prey (Simpson & Trusler 2004). Whilst working in and around the enclosure, you must know the bird’s behaviour. It is suggested that a lock-away area is used to isolate the animal using food or reward while in the enclosure. A scratch or bite from a Wedge-tailed Eagle can cause serious harm as they usually swoop down with great speed while using their talons to attack or defend their territory (Cherriman, Foster & Debus 2012). They could potentially rip and shred the human skin and cause serious injury. There are no human deaths recorded by Wedge-tailed Eagle attack and there are very few reports of attacks on humans at all. However, they have the potential to do serious damage. The level of danger will differ between individuals but keepers should never underestimate the Wedge-tailed Eagles full potential, i.e. strength or speed (Olsen 2005).

Enclosures holding Wedge-tailed Eagles should have proper signage or be built in a way that prohibits any contact between visitor and animal. A sign should be present for staff and keepers outlining the risks of handling or being in contact with this bird of prey and the safety protocol that is being used (Cherriman, Foster & Debus 2012). If necessary, personal protective equipment (PPE) can be used when handling this animal, such as thick gloves and protective clothing i.e. hard hats, thick long-sleeved clothing. There are a few workplace risks involved when working with Wedge-tailed Eagles and maintaining their enclosure, including biological, chemical, environmental, ergonomic, physical and psychological risks.

**Biological**

Zoonotic diseases (disease that can be transmitted to humans) are a potential biological risk, such as bacterial infection (e.g. avian tuberculosis), fungal infection (e.g. ringworm), viral infection (e.g. avian influenza) and other illnesses (e.g. giardia). The risk of contamination can be avoided by using appropriate hygiene methods such as hand washing, footbaths, disinfectant spray and protective clothing (face mask etc.) when necessary.

**Chemical**

Exposure to certain chemicals can occur while cleaning the enclosure and anything associated with the animals. This can include F10 (disinfectant spray), WD40, iodine, betadine, flagyl etc. It can also include supplements to the Eagles diet if necessary, such as calcium powder, vitamins etc. To reduce this risk the appropriate PPE should be worn when using chemicals, such as gloves and face mask. It is important to use the correct dilutions, read and follow labels/instructions and appropriate safety procedures.

**Environmental**
Exposure to the sun when working around and with the eagles can cause over exposure to ultraviolet radiation. Wet and cold weather can cause health problems for keepers if excessively exposed to it. This can be avoided by wearing appropriate clothing to protect one’s body from the weather, such as a hat, sunglasses, jumpers, scarves, long pants, long shirts and closed in footwear. Additionally, sunscreen is recommended when working outdoors in the sun.

**Ergonomic**

The enclosure design or layout should be built to provide a safe and comfortable area for keepers and the animals to work in. For example: correct bench heights, correct door heights, ease of access to areas and doors, slip proof flooring, walls and signs indicating risk/instruction. If the enclosure does not work efficiently and comfortably for the keepers or animals, modifying the enclosure is suggested.

**Physical**

Wedge-tailed Eagles have sharp talons and beaks as well as an incredibly strong body and fast flight speed which can cause serious damage and harm to keepers when handling or restraining the animal. A person may be knocked over, scratched, bitten or grabbed which can cause lacerations to the skin and hits to the body. This can be avoided by using PPE such as thick and long-sleeved clothing as well as hard hats, gloves or protective equipment such as a hard rake to protect oneself. It is recommended that if the individual animal is hazardous, to have no contact with the animal at all and the use of a lock-away or airlock area in which the animal can be isolated from the enclosure.

**Psychological**

The diet of Wedge-tailed Eagle’s is majorly made up of small mammals which have to be euthanised in order to be delivered to the Wedge-tailed Eagles as a food source in captivity. Some birds may need medical attention which involves administering medicines as well as the possibility of having to euthanise the bird in your care. Also, the risk of losing a colleague or fellow keeper. This can cause psychological discomfort for some people and can be avoided by not being involved with the sensitive task or seeking counselling if necessary. Support should be given to all staff members in the event of euthanasia or mental discomfort.
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1. INTRODUCTION

1.1 ASMP Category

No regional program

1.2 IUCN Category

Least concern version 3.1, last assessed 01/10/2016, listed on Appendix II of CITES

1.3 EA Category

_Aquila audax_ listed as Least Concern, _Aquila audax fleayi_ listed as Endangered

1.4 NZ and PNG Categories and Legislation

Not found in New Zealand and is categorised as least concern under Papua New Guinea Legislation

1.5 Wild Population Management

_Aquila audax_ is widespread and is of least concern to becoming threatened in the wild. However, it is a protected species in Australia and it is illegal to kill, trap, poison or capture them under the National Parks and Wildlife Act, 1974. It is also illegal to trade this species internationally under the Convention of International Trade in Endangered Species (CITES). _Aquila audax fleayi_ is part of a recovery plan and also protected. Their behaviour and biology is monitored in Tasmania as the population is under a program to boost their population numbers by the Australian Government Department of the Environment and Water Resources.

1.6 Species Coordinator

There is none listed for this species

1.7 Studbook Holder

There is none listed for this species
2. TAXONOMY

2.1 Nomenclature

Class : Aves  
Order  : Accipitriformes  
Family : Accipitridae  
Genus  : Aquila  
Species : A. audax  

The genus Aquila refers to all true eagles such as the Tawny Eagle or the Golden eagle (Simpson, Day & Trusler 2004 pg.120). The word is Latin for eagle and could possibly be derived from the word aquilus which means dark in colour (Brooker & Ridpath 1980). The species name audax is latin for bold or daring but the Wedge-tailed Eagle was originally described, in 1801, by the Englishman John Latham as Vultur audax (Simpson, Day & Trusler 2004 pg.120). Vultur is an Anglo-Norman French word that means a large bird of prey that feeds as a scavenger on carrion and will wait in groups for the death of a dying animal or person (Brooker & Ridpath 1980).

2.2 Subspecies

The Tasmanian subspecies (Aquila audax fleayi)  
The Australian subspecies (Aquila audax audax)

2.3 Recent Synonyms

The Wedge-tailed Eagle is also known as Vultur audax (Simpson, Day & Trusler 2004 pg.120). As mentioned above, this was the name given to it in 1801 and has since changed to Aquila audax to help further distinguish it from its fellow eagles (Brooker & Ridpath 1980).

2.4 Other Common Names

The Australian Wedge-tailed Eagle is also known as bunjil, eaglehawk, mountain eagle and Tasmanian wedge-tailed eagle (Simpson, Day & Trusler 2004 pg.120). The aboriginal word ‘bunjil’ in their mythology is the creator of the earth and people making it a symbol of their culture hero (Brooker & Ridpath 1980). The
Wedge-tailed eagle is part of a bigger group of ‘booted eagles’ and can sometimes be called the booted eagle or true eagle (Simpson, Day & Trusler 2004 pg.120). Booted refers to the plumage of feathers around the legs and chest of this group of eagles.

3. NATURAL HISTORY

The Wedge-tailed Eagle (A. audax) is the largest bird of prey in Australia and belongs to a group containing 12 ‘true eagles’ or large, dark coloured eagles that are ‘booted’, having feathers around their legs (Simpson, Day & Trusler 2004). Some birds in this group are the Golden Eagle, the Tawny Eagle or the Bonelli’s eagle (Cherriman, Foster & Debus 2012). The distribution of the Wedge-tailed Eagle is unique to its group members as it is found in Australia, Tasmania, Southern New Guinea (Papua New Guinea) and Indonesia (Simpson, Day & Trusler 2004). It is found in many different habitats as it has evolved to survive in almost all areas, with a recorded preference for less densely packed woods or open country and grassland (Cherriman, Foster & Debus 2012). There are only 2 subspecies of the Wedge-tailed Eagle, one being the Australian Wedge-tailed Eagle (Aquila audax) and the Tasmanian Wedge-tailed Eagle (Aquila audax fleayi) which was only recognised as a separate subspecies to the Australian type in the 1950’s (Condon & Amadon 1954).

There is limited knowledge of how the Wedge-tailed Eagle evolved into what it is today but it is known that this large bird of prey has been in Australia for hundreds of years (Simpson, Day & Trusler 2004). Over time the Wedge-tail has had to adapt to an ever-changing source of prey. From only Australian animals to feed on, ranging from rodents to a kangaroo, to the introduction of pest species which now make up a lot of their natural diet, such as rabbits (Cherriman, Foster & Debus 2012). The Wedge-tailed eagle feeds on both carrion and hunts live prey but is being pushed further and further into human inhabited areas due to habitat destruction (Simpson, Day & Trusler 2004). For years now farmers have seen the huge bird of prey as an enemy and they have been given a ‘bad reputation’ for preying on young lambs (Cherriman, Foster & Debus 2012). As a result, last century a bounty was offered for dead Wedge-tailed Eagles and thousands were lost to baiting or being shot (Brooker & Ridpath 1980). Even though an adult Wedge-tailed Eagle could easily carry and attack almost any small vertebrate, in 1970, Leopole and Wolfe found that only 7% of a Wedge-tailed Eagles diet is made up of livestock and it is unknown what percentage of that is carrion. This is further evidence to show how much the human population has affected the population numbers and evolution of this magnificent bird.

The Wedge-tailed Eagle plays an important part of Australian history as it was featured in many dreamtime stories for Aboriginal Australians (Olsen 2005). The Kulin people of central Victoria see the eagle as the creator of the earth and beings, named ‘Bunjil’ (Olsen 2005). One story tells us of a time of great separation and conflict among the people, so they went to Bunjil for help as the bird represents a strong, bold and wise ancestral being (Olsen 2005). The Kaurna people of Adelaide Plains see a constant reminder of ‘Bunjil’ and his story in the constellation that is well known as the Southern Cross, which is said to be an eagle’s claw (Olsen 2005).
Aquila audax has a staggering wingspan of 2.8 metres, giving it its name of Australia’s biggest bird of prey (Simpson, Day & Trusler 2004). Their weight can vary from 2kg to 5.3kg with females being the biggest and their body length can reach up to 1.06 metres (Olsen 2005). It has feathers on its legs all the way to the base of its talons, a cream or pale pink bill, eyes that range from light to dark brown, white feet and its most characteristic feature, the wedge-shaped tail (Simpson, Day & Trusler 2004). This unique long wedge-shaped tail is commonly used to identify the bird as it soars overhead (Olsen 2005). The juvenile Wedge-tailed Eagle starts off completely white and then progressively gets darker until it is a dark blackish brown in adulthood (Simpson, Day & Trusler 2004). Sexual dimorphism is seen in this species as the females are bigger (3kg - 5.3kg) than the males (2kg – 4kg). They are also lighter in colour than the males, especially around the neck area (Olsen 2005).

The Tasmanian subspecies, Aquila audax fleayi, evolved from the mainland subspecies and so can be very difficult to tell apart (Olsen 2005). It is said that the Tasmania Wedge-tail has white, cream or paler plumage around the head, neck and shoulders as opposed to the dark or golden brown in Australian Wedge-tails (Cherriman, Foster & Debus 2012). Fleay (1952) claimed that the Tasmanian subspecies are larger and have bigger talons as well. The areas in which the Australian Wedge-tailed Eagle is found can overlap with the White-bellied Sea Eagle (Simpson, Day & Trusler 2004). This sea bird is similar in shape and size meaning it often gets confused. They share the wedge-shaped tail however the White-bellied Sea Eagle has a different underside colour, rounder wings, no feathers on its legs and its tail is smaller and less obvious (Fleay 1952).

3.2 Distribution and Habitat

Wedge-tailed Eagles (Aquila audax) are found throughout Australia and southern Papua New Guinea in almost all habitats. They appear to have a preference for less densely packed woods or open country and grassland (Cherriman, Foster & Debus 2012). These big birds of prey are sedentary and do not migrate however juveniles can fly up to 800km away from their nest site in their lifetime (Olsen 2005). Only in more recent years has their history of distribution changed when the Tasmanian Wedge-tailed Eagle (Aquila audax fleayi) was found in Tasmania in similar habitats (Condon & Amadon 1954). There has been no change in the distribution of the Wedge-tailed Eagle since then however the Tasmanian subspecies population is under threat and their habitats are getting smaller (Olsen 2005). There is no recorded change in their distribution in response to seasonal variation however pairs will seek out adequate places to nest when the breeding season begins, such as cliff faces and forks in trees (Simpson, Day & Trusler 2004).

Figure 1. Distribution of both Aquila audax (Australian Wedge-tailed Eagle) and Aquila audax fleayi (Tasmanian Wedge-tailed Eagle). Taken from Planet of Birds website compiled by Lori 2011.
3.3 Longevity

In the wild, the Wedge-tailed Eagle can live up to 40 years of age but on average, only live to be 5.9 years old (Olsen 2005). This is due to illegal catching, baiting and killing of these birds of prey, loss of habitat due to deforestation and collision with power lines (Cherriman, Foster & Debus 2012).

In captivity, *Aquila audax* can live to be 40 years old but on average only live to be 26.4 years of age (Olsen 2005). The ability for zoos to prevent disease and illness in the animals as well as give them the very best care and facilities at all times can greatly increase the lifespan of animals in captivity (Cherriman, Foster & Debus 2012).

Knowing the age of a bird in captivity can help explain the animal’s lifestyle or behaviour and help staff better suit its food and activities to its age. It can prove difficult to determine the age of these birds just by looking at them (Cherriman, Foster & Debus 2012). However, we know that both males and females reach sexual maturity at 3 years of age, so if the birds are seen showing mating behaviour then they are at least 3 years old (Olsen 2005). If they are seen fledging or flying for the first time, then the bird is around 79-95 days old (Olsen 2005). Similarly, if the bird is seen becoming independent of its parents, then it is assumed that it is around 3 to 6 months old (Olsen 2005). By looking at the bird’s plumage, we can get a rough estimate on its age as they do not get their full, dark brown or blackish adult feathers until they are 6 years old, with the feathers looking a lot fluffier and lighter in colour as a juvenile (Olsen 2005). A study by Schneider in 1981 showed that the age of birds can be determined by skull pneumatisation, or the amount of air pockets in the bird’s skull. She used Field Sparrows to test her theory and found that 100% pneumatisation in the skull only occurred when the full adult plumage was seen on the sparrows. She also found that the pneumatisation process started very quickly in chicks and then gradually slowed as the birds matured. This technique requires an expert in skull pneumatisation and special equipment, but is another way to tell a birds age (Schneider 1981). Additionally, by plucking a down feather or younger feather from under the belly area of an adult bird, it can be used to extract the DNA of the bird and that can also help determine the age and sex of a given bird (Olsen 2005).
4. HOUSING REQUIREMENTS

4.1 Exhibit/Enclosure Design

An understanding of the Wedge-tailed Eagles requirements and needs is vital knowledge for all keepers working with this bird of prey, as it is crucial that each animal is housed in a manner that does not limit the animal’s mobility or behavior. Similarly, it should not pose a risk to the wellbeing of the bird or to other animals and people (SA Government 2010). A high standard of care and husbandry should be undertaken by all keeping staff. *Aquila audax* should not be housed with, or adjacent to any other species where they can see potential prey as this may cause harm to the welfare of the bird or other animals (NSW Government 2010). The width, height, and length of the enclosure should provide the animal with freedom of movement, space for escape from other animals in the enclosure, appropriate space for exercise, husbandry practices, and minimal stress conditions (SA Government 2010). Regular inspection of the enclosure and work area associated with the animal should be regularly completed to monitor levels of efficiency, hygiene, and predict potential housing problems (NSW Government 2010). Successful captive management of Wedge-tailed Eagles depends upon good husbandry care that incorporates the bird’s behavioural, physical, and environmental requirements. A stress-free environment can decrease risk of negative effects such as illness and aggression in Wedge-tailed Eagles (SA Government 2010).

According to the Exhibited Animals Protection Act (NSW Government 2010) the enclosure of any raptor should be

- Constructed with materials that can be maintained and will contain the animals at all times. The materials should be safe for the animals including health and physical harm.
- Enclosures should always include a shelter, protection from wind, rain, and sun
- The exhibit should include misting sprays, be well drained, and be easily cleanable
- Mesh netting surfaces are recommended to be made of flexible nylon and not wire mesh to avoid damage to the birds and their talons/plumage
- Double door systems are to be used and locks
- A safety fence must be constructed to prevent public coming into contact with the Eagles and should never be kept in walk-through aviaries

4.2 Holding Area Design

Most animals in captivity are required to be removed from their enclosure or moved into holding facilities when necessary. Such as in order to perform health checks, for quarantine purposes, enclosure maintenance, transport or breeding plans. A holding enclosure is usually a different design, smaller than the main enclosure and is a temporary holding place for the animal. The holding area should be big enough for the individual and accommodate for its full wing span without limiting its mobility or movement (NSW Government 2010). The
minimum holding enclosure size across most states for two compatible Wedge-tailed Eagles is a minimum of 10 metres in length, 5 metres in width, 4.5 metres in height (SA Government 2010). It should be increased by 17 metres$^2$ per extra individual (SA Government 2010). The requirements for space alone is not enough to provide a satisfactory holding area for this large bird of prey as they also require correct lighting to allow adequate visibility if the holding area is for longer-term use (otherwise it should be left dark). It also needs UV lighting to facilitate normal feather care and calcium absorption, the ability to turn off lighting during night hours, proper ventilation, minimum dust, odours and moisture/condensation (NSW Government 2010).

![Figure 2. Diagram of holding area, looking into the holding area from the enclosure (keeper access not shown).](image)

![Figure 3. An example of an empty lock-away or holding area.](image)

### 4.3 Spatial Requirements

The standards given by NSW Agriculture (1996) for all species involves sufficient vertical and horizontal space so that activity requirements can be met for the animal. The space must be of decent size to allow for a temperature gradient and for each individual added to any given space, the enclosure size must be increased by 20% (NSW Agriculture 1996). According to the Department of Primary Industries (NSW Government 2010), the minimum special requirements for one Wedge-tailed Eagle is 5.5 metres in width, 10 metres in length, 4.5 metres high and should increase by 17 m$^2$ per bird added to the enclosure. Wedge-tailed Eagles are such a large bird of prey that they require a larger enclosure space increase for every bird that is added than generally stated for most species.

### 4.4 Position of Enclosures

Wedge-tailed Eagles can be kept indoors or outdoors but the requirements do not change. Raptors in Australia should not be housed adjacent to, or with any other species that may cause harm to them, or they may cause harm to (SA Government 2010). It is recommended to provide enough distance between the eagle’s enclosure and enclosures of their prey (such as other birds or small mammals) so that they do not see each other, to prevent stress on either species.
4.5 Weather Protection

There should be adequate undercover area for the birds of prey to perch and escape the weather. For example, the SA Government (2010) requires that at least one quarter of the enclosure be built up on 3 sides and have a roof covering that area. An area that is always dry and sheltered from wind, rain and sun should be available in all Wedge-tailed Eagle enclosures as well as a place to escape observation (SA Government 2010). Adequate shade must be available in warmer weather (> 25°C) and misting sprays are recommended to provide a cooling spray for the birds on very hot days (> 30°C) (NSW Government 2010). Access to open areas where the birds are able to get exposure to the elements and sun themselves must be provided, ensuring that they have enough room to spread their wings at full length in order to sun themselves properly (SA Government 2010).

Figure 4. An example of an undercover perching area in a Wedge-tailed Eagle enclosure

4.6 Temperature Requirements

Wedge-tailed Eagles are subject to extremes in cold and warm weather in the wild as they are found across many different environments. Their enclosure should allow them to experience the natural changes in temperature that would be experienced in the wild, however a dry, warm area must always be available in the enclosure (SA Government 2010). Indoor enclosures should aim to mimic the natural temperature change as felt in the wild, however room temperature is adequate (NSW Government 2010). Suitable facilities should be available in the event of a sick or injured Wedge-tailed Eagle, that provides low light, warmth and isolation as necessary (SA Government 2010).

4.7 Substrate

Substrates used for Wedge-tailed Eagle enclosures vary among institutions but must not be irritating or be of any danger to the birds (SA Government 2010). Recommended substrates include dirt, sand, grass, pebbles or concrete, although it is suggested to have a few different substrate materials available in the enclosure (NSW Government 2010). The substrate must be able to be cleaned or replaced easily and without risk to the birds’ health (SA Government 2010). This avoids the accumulation of faeces, pellets, food scraps and fungi’s. The enclosure must have a drainage system that allows for proper removal of excess water (NSW Government 2010). This drainage system should not be accessible to the Wedge-tailed Eagles to prevent injury or escape (SA Government 2010).
4.8 Nest boxes and/or Bedding Material

Nest boxes and bedding material are not used by Wedge-tailed Eagles as they nest in high trees on a bed of sticks and twigs created by the parents during the breeding season (see ‘10. Breeding’ for more details). Instead they require tall dead trees to perch on and an undercover perch for resting as well.

4.9 Enclosure Furnishings

Wedge-tailed Eagles require the listed furnishings:
- Sturdy perches, the number of which should be more than the number of birds in the aviary.
- Tree stumps.
- Appropriate plants such as native shrubs or trees.
- A pond or other water/bathing source big enough to allow full wing span length and deep enough to allow normal bathing behaviour (SA Government 2010). It should be able to be easily emptied and refilled with clean fresh water. The pond should also have a non-slip surface (NSW Government 2010).

The perches should be no less than the talon span in diameter and wide enough that the birds can perch comfortably with their large feet and talons to prevent any disease or injury of the foot (SA Government 2010). This can be done by having multiple uncontaminated, non-slip and clean large dead trees in the enclosure or elevated branches permanently fixed to the side of the enclosure walls. Perches and stumps should be placed so as to avoid visual and physical contact with adjoining enclosures (NSW Government 2010). Perches and stumps should be placed so as not to limit maximum flight abilities and can perch comfortably without any part of their body meeting the walls or other furnishings (SA Government 2010). They should also not be placed over other perches, food or water bowls (NSW Government 2010). At least one perch should be no less than 2 metres above the ground (SA Government 2010). It is common to have competition for the highest perch and visual point when there are multiple birds in an enclosure, therefore more than one equally high perch should be provided (NSW Government 2010). Perches should not be close enough to the roof to limit the space needed for the Eagles to complete their natural wing movement during take-off and landing (SA Government 2010). This also applies for indoor housing.

Note: enclosure with Wedge-tailed Eagles that are unable to fly or are limited in their ability to fly must have lower perches that allow for the birds to climb up and access higher areas (SA Government 2010).
5. GENERAL HUSBANDRY

5.1 Hygiene and Cleaning

The code of practice for the public display of exhibition animals of the Victorian Government, 2016, requires that facilities should be decontaminated or cleaned regularly which is particularly important with Wedge-tailed Eagles as their diet consists of carcasses, bones and meat. It also requires that the water is changed regularly to prevent contamination and the enclosure should be well drained (Agriculture Victoria 2016). It is recommended that all the perches and stumps be cleaned regularly to prevent a buildup of faeces or scraps which can cause diseases of the claw/foot in birds of prey. Additionally, regular removal of faeces, food scraps and any other
waste is recommended as it provides a cleaner environment for the birds and is appealing to the eye of the public. An example regime of cleaning is given below (Table 1. And Table 2.).

<table>
<thead>
<tr>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
<th>Sunday</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Remove food scraps from enclosure</td>
<td>- Rake and clean back of house</td>
<td>- Remove food scraps from</td>
<td>- Clean pond/water source and refill</td>
<td>- Remove faeces or waste</td>
<td>- Only remove waste/faces if built up or is a</td>
<td>- Only remove waste/faces if built up or is</td>
</tr>
<tr>
<td>- Clean pond/water source and refill</td>
<td>area (including lock away/holding</td>
<td>enclosure</td>
<td>- Check misting sprays are working</td>
<td>- Clean perches and stumps of any faeces</td>
<td>risk to the bird’s health</td>
<td>risk to the bird’s health</td>
</tr>
<tr>
<td>- Fill in and check for rat holes</td>
<td>areas)</td>
<td>- Remove any faeces or waste</td>
<td>- Clean pond/water source and refill</td>
<td>- Clean perches and stumps of any faeces</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Check misting sprays are working</td>
<td>- Weed</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- Cobweb removal</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1. Weekly regime of a Wedge-tailed Eagle enclosure (This is an example only)

<table>
<thead>
<tr>
<th>January</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>- Remove all mulch and enclosure</td>
<td>- Clean all walls and surfaces of</td>
<td></td>
<td>- Re-mulch and re-furniture</td>
</tr>
<tr>
<td></td>
<td>furniture</td>
<td>enclosure where possible</td>
<td></td>
<td>enclosure OR clean all old</td>
</tr>
<tr>
<td></td>
<td></td>
<td>including any faeces on plants</td>
<td></td>
<td>furniture thoroughly if putting</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>back in enclosure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Clean undercover/nest areas</td>
<td></td>
<td>- Clean all windows/viewing areas</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Clean all back of house surfaces</td>
<td></td>
<td>- Clean all back of house surfaces</td>
</tr>
<tr>
<td></td>
<td></td>
<td>and tools where possible</td>
<td></td>
<td>and tools where possible</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>February</th>
<th>- Normal weekly cleaning routine</th>
</tr>
</thead>
<tbody>
<tr>
<td>March</td>
<td>- Normal weekly cleaning routine</td>
</tr>
<tr>
<td>April</td>
<td>- Normal weekly cleaning routine</td>
</tr>
<tr>
<td>May</td>
<td>- Normal weekly cleaning routine</td>
</tr>
<tr>
<td>June</td>
<td>- Normal weekly cleaning routine</td>
</tr>
<tr>
<td>July</td>
<td>- Remove all mulch and enclosure</td>
</tr>
<tr>
<td></td>
<td>furniture</td>
</tr>
<tr>
<td></td>
<td>- Clean all walls and surfaces of</td>
</tr>
<tr>
<td></td>
<td>enclosure where possible including</td>
</tr>
<tr>
<td></td>
<td>any faeces on plants</td>
</tr>
</tbody>
</table>
- Re-mulch and re-furniture enclosure OR clean all old furniture thoroughly if putting back in enclosure
- Clean undercover/nest areas
- Clean all windows/viewing areas
- Clean all back of house surfaces and tools where possible

<table>
<thead>
<tr>
<th>Month</th>
<th>Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>August</td>
<td>- Normal weekly cleaning routine</td>
</tr>
<tr>
<td>September</td>
<td>- Normal weekly cleaning routine</td>
</tr>
<tr>
<td>October</td>
<td>- Normal weekly cleaning routine</td>
</tr>
<tr>
<td>November</td>
<td>- Normal weekly cleaning routine</td>
</tr>
<tr>
<td>December</td>
<td>- Normal weekly cleaning routine</td>
</tr>
</tbody>
</table>

*Table 2. Annual cleaning regime for a Wedge-tailed Eagle enclosure (This is an example only)*

Note: When cleaning is conducted for more than 30 minutes or cleaning on a large scale is completed, it is recommended that the Wedge-tailed Eagles be removed from the enclosure or put into their holding areas to reduce stress and discomfort to the birds. Minimum disturbance is best when dealing with Wedge-tailed Eagles as they can get stressed which can lead to injury. Therefore, time spent in the enclosure while the birds are also present should be kept to a minimum and a full enclosure clean every 6 months is adequate unless absolutely necessary (this doesn’t include weekly cleaning activities).

When removing waste, weeding and using cleaning products, gloves are recommended to prevent human illness or contamination. When cleaning the pond/water source, scrubbing with a clean decontaminated brush is most effective to remove any mould build up and rinsing before refilling with fresh clean water removes any lingering dirt/mould. Tools used to clean enclosures and back of house areas should also be maintained by keeping them clean and decontaminated after every use. A ‘poo’ brush or brush that is designated for faecal cleaning can be used to remove substance from perches and stumps. Cobweb removal can be done with a purpose-built cobweb brush or other adequate brush/broom. To reach high areas when maintaining enclosures, ladders can be used but only under safe conditions and with another staff member to watch and help balance the ladder. Ladders generally come with instructions on this safety requirement. Windows can be cleaned using a window cleaning brush/cloth and water only.

Decontamination generally means that the item or area is free of any bacteria or germs, usually by cleaning with bleach and water followed by spraying with F10Sc (See appendix for MSDS). F10Sc is a total spectrum disinfectant that has no side effects on humans or animals as well as being biodegradable and ecologically friendly. The recommended ratio of F10 is 1:500 (1 ml F10Sc in 500 ml of water which can be found on the label). Bleach water (See appendix for MSDS) can be used to clean or wash most tools, enclosure furniture items, ponds or water sources and enclosure surfaces. The bleach water should be of a ratio 150:500 (150 ml of bleach in 500ml of water) but can also be found on the label. It is important to always rinse any bleach cleaned areas thoroughly as it can be harmful to the bird’s body/feet if in contact with bleach for long periods of time.
Strong smelling disinfectants such as ‘Pine O Cleen’ or other human cleaning products should be avoided as it can cause discomfort or illness when in close contact with captive animals (Agriculture Victoria 2016). Biodegradable and ecologically friendly purpose made cleaning products are recommended and can usually be found at your local Veterinary Facility.

Keeping pest species away is an important and necessary part of keeping animals in captivity, especially for Wedge-tailed Eagles. They are capable of catching and eating most pest species that could enter their enclosure which could lead to transfer of disease or illness. As the Wedge-tailed Eagles will receive mostly meat, it may attract pest species such as rats, mice and foxes. Wild birds may also attempt to get into the enclosure and retrieve scraps of food. This can be avoided by under wiring the enclosure and filling any holes or areas of entry for rats and mice that may dig, crawl or climb their way in. The wire/netting/wall materials used when building the enclosure should have spaces small enough that birds and pests are not able to fit through. The presence of pests should be checked weekly and dealt with accordingly, such as looking for rat holes and filling in or flooding the rat holes to get rid of them. If an extreme case of pest presence is observed then professional help may be acquired, but poisons, traps or baits should be avoided and never put in the enclosure or near/in reach of the Wedge-tailed Eagles.

5.2 Record Keeping

Keeping records on all animals under care is very important and advantageous. Records should be kept on almost all dealings with animals such as health of the animal, treatments given, food intake, breeding, growth and development, interaction and training if any, enclosure maintenance and behaviour of the animal. This provides an opportunity to recognize any patterns in the animal’s life that aren’t necessarily working and correct them. It can also be used to help the care or rearing of a future animal based on what did, or did not work, with animals already in one’s care. Acquiring all the animal’s history and a general idea of how to care for them through looking at their records is vital when receiving new animals or transporting away animals. It can also be of great advantage to vets and keepers to be able to have access to these records so that everyone is informed of that particular animal’s past and present conditions.

Most states and countries have it under law that records must be kept when dealing with animals such as the Wedge-tailed Eagle. The New South Wales Animal Welfare Code of Practice No 4 - Keeping and Trading of Birds outlines the importance of keeping records when caring for birds and states the code for care and housing of birds in captivity (NSW Agriculture 1996). Earnhardt, Thompson and Willis (1995) evaluated the use of electronic record keeping versus hard copy record keeping and found that it is an extreme advantage to have electronic record keeping on a site such as ISIS (International Species Information System) or ZIMS (Zoological Information Management System). It is then always safe if natural disaster was to strike and it allows an accurate, accessible and consistent collection of important data (Earnhardt, Thompson & Willis 1995).

5.3 Methods of Identification

The most common way of identifying birds is through leg bands or visual recognition as it is easy, cheap and has majorly been used throughout history successfully (Olsen 2005). By taking photos of distinguishing features and writing them down for all staff to read, such as markings on the plumage, legs or face of the bird, it can help identify the individuals correctly (Olsen 2005). This method of identification can be applied to almost all animals however the photos must be updated as the animal ages and grows due to the distinguishing features changing over time (Olsen 2005). Leg bands would be a sensible choice for Wedge-tailed Eagles as, even
though the males and females are visually different, it allows one to be 100% sure of the identification of the animal rather than guessing with visual recognition. In order to put a leg band on such a large bird of prey it would require a long training process or conditioning to having their legs touched, or catching the bird (Olsen 2005). Both processes are difficult but it is mostly done when the birds are juveniles and not at full size yet (Hebert et al 2004). Leg bands can be identifiers by being different colours or have different numbers or letters on them (Olsen 2005).

It is possible to identify Wedge-tailed Eagles from one another through more complex methods such as DNA Barcodes (Hebert et al 2004). Short DNA sequences from a standardised region of the genome provide a DNA barcode for identifying species, therefore meaning that a number of birds of prey can be told apart at the genomic level even though their appearance may be similar (Hebert et al 2004). This can be achieved using a feather plucked from the bird or blood sample (Hebert et al 2004). It is also possible to microchip birds by inserting a microchip (sterile device which contains an electronic identification code and is the size of a grain of rice) in the left breast muscle (Olsen 2005). This should be done by a trained professional.

### 5.4 Routine Data Collection

Data collection is an important and necessary part of working with animals in captivity. Records are a great way to assist with health problems, veterinary procedures, any treatments given, growth, behaviour, breeding, diet changes and feeding habits of animals under one’s care. A daily routine should be established when working with Wedge-tailed Eagles or any animal in the workplace, that includes recording any notable observations of the birds of prey or their surroundings. For example, it is expected that the Wedge-tailed Eagles would be observed daily at least once when delivering food, when walking past or maintaining the enclosure to make sure the birds are eating and behaving normally. Any changes should be recorded. If the animals then develop an illness or bad behaviour, keepers and veterinarians can look back at the records and gain information on what may have caused the irregularity.

Data sheets should be developed to allow an efficient and clear way to record information daily for the Wedge-tailed Eagles. A general example is shown below however the layout may change between animal species and workplaces.

<table>
<thead>
<tr>
<th>Species:</th>
<th>Common Name:</th>
<th>ID No:</th>
<th>Enclosure No:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender:</td>
<td>Distinguishing Marks:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date &amp; Initial</th>
<th>Food Intake</th>
<th>Weight</th>
<th>Notes/Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>06/03/17 BJB</td>
<td>Ate ¾ diet</td>
<td>4.5kg</td>
<td>Fed well, behaviour normal, faeces normal</td>
</tr>
</tbody>
</table>

Figure 2. Example of a daily record sheet for any animal in the workplace (example of data is shown in italics).
6. FEEDING REQUIREMENTS

6.1 Diet in the Wild

The Wedge-tailed Eagles diet mainly consists of mammals, in particular rabbits, but also birds, reptiles and carrion (Leopole & Wolfe 1970). Debus et al. (2007) discovered that in areas such as Northern New South Wales, Wedge-tailed Eagles fed on 74% mammals (56% of that being rabbits, the others being wallabies, small kangaroos and other small mammals whether they are carrion or live prey), 22% birds (such as swamp birds) and 4% reptiles. When in the breeding season, the Wedge-tailed Eagle pair will hunt more prey items than normal and are known not to breed at all if there isn’t enough food available in their area (Ridpath & Brooker 1986). So if the goal is to breed the Wedge-tailed Eagles in captivity then it is important to offer enough food during the breeding season. The percentage of different prey items that make up a Wedge-tailed Eagles diet will change throughout the year as their prey populations grow, decrease or move (Ridpath & Brooker 1986).

6.2 Captive Diet

The NSW Government (2010) law requires that all raptors in captivity should be given suitable and safe whole animals which should provide at least 50% of the nutritional and energy requirements for the birds of prey. It also states that this should include mammals, birds, and any natural prey species that can be acquired legally (NSW Government 2010). Any business displaying raptors should be able to give proof of guaranteed access to enough fresh or frozen suitable whole animals (NSW Government 2010). Mammal and bird food sources that were less than ten weeks of age when killed should not form more than 25% (by weight) of the diet fed to the Wedge-tailed Eagles (NSW Government 2010). Starve days should be given no more than once a week and there should be at least 3 days between starve days (NSW Government 2010). A sufficient amount of food shall be provided on non-starve days that there should be some left over each day and should be given raw (NSW Government 2010). The food supplied should be clean, fresh and acquired from a reliable source (such as a laboratory) (NSW Government 2010). Before food is offered it should be cut open and checked for disease or signs of spoil and should be placed on a clean surface when feeding (NSW Government 2010). Foods to avoid are animals that have died from toxic material or disease, birds that have not undergone treatment to rid them of any disease they may carry (e.g. Trichonomiasis infection), fatty meat, meat that has not been supplemented with appropriate calcium additives if necessary and animals that have been killed using lead shot bullets (NSW Government 2010).

As an example, Moonlit Sanctuary Conservation Park, Pearcedale, Victoria, houses two Wedge-tailed Eagles on display and sources their food from the local butcher and qualified local rabbit hunters. Items from their butcher can include cow spines, legs and pelvis’s, quail, kangaroo chunks, kangaroo heart, kangaroo kidney, whole
chickens, chicken necks and beef chunks. Their local hunter provides rabbits that are kept fresh, frozen and checked for disease before feeding. They also increase the food amount given during the breeding season to mimic wild foraging activity. It is suggested that one should consult the provider on how long items need to be refrigerated before use or their shelf life so as to avoid spoiled food. For example, rats with fur can be kept in a freezer for 9 months. The food items should change between being left as whole items or chopped into smaller portions (using a sharp knife, protective gloves and a chopping board that is clean). Whole items or items with bones are particularly important for beak care or beak ‘honing’ as well as talon use.

Another example is from Leigh Valley Hawk and Owl Sanctuary, Garibaldi, Victoria. Their Wedge-tailed Eagle diet consists of a mix of rabbit, whole rats, quail, chicken necks and kangaroo mince with appropriate supplements. This works for the sanctuary because it allows the opportunity for normal foraging behaviour and also gives the birds access to all the nutrients they need. The quail is low in vitamin D and calcium as they are reared in sheds, therefore the range of other food sources and supplements balance this out (this information was received by Martin Scuffins from Leigh Valley Hawk and Owl Sanctuary, see appendix for details). This diet is different due to the food sources available in that area.

The quantity of food given will change depending upon what food item is given but a healthy body weight should be maintained for the Wedge-tailed Eagles and food can be varied to allow for a correct amount of fat, protein, calcium and other nutritional components. Seeking the advice of a professional is recommended. Hollond (1962) suggests that Wedge-tailed Eagles should be fed 15-20% of their own body weight daily except starve days. For example, if a female weighs 5.2 kg, then she should be fed 780g – 1040g of meat daily.

<table>
<thead>
<tr>
<th>DAY</th>
<th>DIET (defrost items in fridge the day before use and weigh all food items to appropriate feed out amounts for each WTE. Use gloves when handling food items.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>Cow/kangaroo spine or pelvis with beef/kangaroo chunks to make up weight</td>
</tr>
<tr>
<td>Tuesday</td>
<td>Whole chickens</td>
</tr>
<tr>
<td>Wednesday</td>
<td>Kangaroo/cow legs</td>
</tr>
<tr>
<td>Thursday</td>
<td>Rabbits</td>
</tr>
<tr>
<td>Friday</td>
<td>Chicken necks and heart/liver</td>
</tr>
<tr>
<td>Saturday</td>
<td>Cow/kangaroo spine or pelvis with beef/kangaroo chunks to make up weight</td>
</tr>
<tr>
<td>Sunday</td>
<td>Starve day</td>
</tr>
</tbody>
</table>

Table 3. An example of a successfully used diet plan for Wedge-tailed Eagles housed at Moonlit Sanctuary, Pearcedale, Victoria. Note: diet plan is subject to change due to availability of food items.

Figure 7. Lamb kidney being cut to appropriate weights  
Figure 8. A whole chicken carcass being carried in a bucket to be placed on a feeding platform in the WTE enclosure
6.3 Supplements

Supplements must be used with care and it is suggested that the help of a professional in birds of prey or veterinarian be consulted before giving supplements to Wedge-tailed Eagles (NSW Government 2010). The most common supplement is calcium which may be required when there is a lack of bones or calcium in the diet provided (Hollond 1962). Calcium can’t be added to any food source as it must be balanced with the phosphorous and calcium that is already present (Hollond 1962). Too much phosphorous will cause the body to lose calcium, and vice versa (Hollond 1962). It is usually recommended to use calcium supplement if intending to breed the Wedge-tailed Eagles (Hollond 1962). 6 weeks prior to the breeding season calcium can be added to improve egg and chick health (Hollond 1962). Wedge-tailed Eagles acquire this naturally from bones or bone marrow when feeding in the wild which is another reason why their feeding behaviour increases in the breeding season (Hollond 1962). A calcium deficient egg will have visible deformities or colour changes and the chick will have low bone density which can cause broken bones and poor development (Hollond 1962). It can also be helpful when working with Wedge-tailed Eagles that have to be kept indoors (perhaps due to injury or a chick), to give calcium supplements so that it gets enough Vitamin D. An example of a calcium supplement product is Soluvite D Breeder from Vetafarm. It contains 12 essential vitamins and minerals as well as Vitamin D3 to promote breeding performance and health of birds housed indoors.

Another example is Spark Liquid, also from Vetafarm, that aids a bird’s carbohydrate and electrolyte intake if the bird is going through a time of stress, transport or high temperatures. This can be added to their water so is an easy way of keeping the birds hydrated and healthy.

It is of course recommended not to focus on just one supplement but rather have a full balanced supplement, such as Wombaroo Insectivore Rearing Mix (see appendix). This contains all the amino acids, fatty acids, minerals (such as calcium, phosphorous and vitamin D) and vitamins needed. Supplements can be given to Wedge-tailed Eagles by sprinkling it across their food, rolling it with meat to make easily feedable pellets, shoving it in a carcass of say, a chicken, or as a liquid or powder slurry. (This information was provided by Wombaroo/Passwell, see appendix for details).

6.4 Presentation of Food

Wedge-tailed Eagles will come down to the ground to feed on items such as carrion or when hunting live prey. However, they will bring food into a tree or to the nest during the breeding season. Therefore, food should be presented in a way that allows for both these behaviours (Leopole & Wolfe 1970). A feeding platform may be used, such as a stump or log, which the food can be put on so that the birds have the opportunity to feed on a clean surface daily. The food can be presented as is, or can be presented in a way that is enriching for the animal. Enrichment can be a form of mental, physical or sensing stimulation and is recommended for all animals in captivity. For example, putting a carcass or food source in a tree to make it more challenging for the birds to get to. Or putting the food in a safe box/container that needs to be tipped over/moved in order to collect the food item can be used to encourage exercise and thought processes. Even tying a carcass with a safe material to the tree can encourage flight and talon use. Enrichment should be given only if safe and easily removable from the enclosure. It should also not be so hard that the animal will never get the food item and should be monitored when the enrichment is in contact with the Wedge-tailed Eagle.
Figure 9. Cow spine presented on a feeding platform/clean log in the enclosure
Capturing Wedge-tailed Eagles is an WH&S risk. They have very sharp talons and beak and are capable of causing serious injury to a person. Please refer to the occupational health and safety section (page 4.) at the start of this manual before continuing.

7.1 Timing of Capture and Handling

The best time to catch Wedge-tailed Eagles is first thing in the morning or in the evening if they are on display. This is to prevent members of the public seeing or interrupting the process as well as providing a cool temperature. If not on display, you can catch them through the middle of the day, as long as it is not hot (above 25 degrees). They are known to hunt mainly throughout the day as they have relatively few rods in their retina that act as receptors of dim light, meaning their night vision is poorer than that of a human and would take longer to adjust (Olsen 2005). Therefore, it is not advised to catch them at night as it may cause unnecessary stress on the birds and may also make injury more possible due to their hindered eyesight.

7.2 Catching Bags

Bags are not generally used for large birds of prey as it is too easy for the birds to injure themselves by getting tangled in a large bag. Instead a large blanket is recommended for throwing over the bird (Scuffins 2017). This blanket should be made of sturdy material but not rough enough to harm the keeper or bird (Scuffins 2017). E.g. hessian blanket doubled over itself.

7.3 Capture and Restraint Techniques

Catching a Wedge-tailed Eagle is very difficult and is only recommended for trained personnel. A professional, such as Martin Scuffins (see appendix for contact details), can be contacted and asked to give assistance or train staff for the capture. You would need to catch a Wedge-tailed Eagle if it was injured, sick, not getting along with others, is being moved or is being health checked or treated. Martin Scuffins (2017) recommends the following: the plan would be to direct the animal into an airlock or lock away area that is smaller than the enclosure size by luring with food or gently herding them into the space. You would then have one or two people if necessary, corner the bird so it’s only way of escape is to come towards you. Try to remain calm and only move your arms as much as necessary to guide it towards a corner and keep it there. The whole process should be done as quick and as safely as possible as it is stressful for the bird. The eagle may turn around and face you with the intent to strike at you or try to escape around you. Use a large, thick blanket to throw over the eagle when it is on the ground and cover its head and body. It is important not to do this when the bird is in flight as their talons and wings can be damaged. Proceed to swiftly kneel beside the bird and push the bird firmly to the ground, without causing injury to the bird. Feel along the side of the blanket until you feel the upper part of the leg, then slide your hand down and hold on to the ankle of the bird and do so on the other side. You would grab the eagle in the blanket and put it under your arm, effectively trapping its
wings down. The blanket can remain covering the eagle if that is preferable but you may also go without it if that allows easier grip of the bird. It is important to keep the talons and beak pointed away from you and have the wings pinned down with your body/arms at all times. They are very strong animals so ensure a strong grip at all times as well. You may also then put a ‘hood’ on the eagle. Hoods can be placed over the beak and secured on the head by pulling the straps at the back of the head to tighten. This can assist with keeping the bird calm as it takes away its eyesight. It can also be reciprocated by using a towel and it is recommended to keep the birds head covered. There are 5 points of contact that is important to be aware of at all times; the beak, talons and wings.

This physical capture and restraint method is effective at allowing one to get close to the birds in order to throw the blanket over as well as allowing the free movement and agility of both keeper and bird. It is unfortunately not the safest method as it relies on being able to be in the same space as the eagles. It is important to keep both staff and animal safe at all times. Being scratched or bitten can cause serious injury to keepers and the birds wings, talons and plumage can also be damaged if caught incorrectly (Scuffins 2017). Long sleeved hard clothes or welding gloves are necessary as well as protective eye wear and a back-up person/s with a rake/blanket as a protector (Payne 2007). The welding gloves do reduce movement and feeling in the hands and some people prefer to use bare hands, the choice is yours (Payne 2007). Again, the animal also should be handled with care and held firmly to prevent movement of the wings or talons (Scuffins 2017). A mechanical method can accompany this physical method by luring the birds into a smaller cage with food before closing a door to lock them in, then throwing a blanket over them (Payne 2007). This can create an easier and quicker catching experience but can also cause the risk of closing the door on the eagle.

![Image](image.png)

*Figure 10. Martin Scuffins (Director & Handler at Leigh Valley Hawk and Owl Sanctuary) restraining the Wedge-tailed Eagle ready to release into the new enclosure. Eagle also has hood on in this photo. Notice both wings are pinned down by Mr. Scuffins’ arms and both ankles are held firmly.*

### 7.4 Weighing and Examination

It is recommended to weigh the Wedge-tailed Eagles when they are securely caught or in a travel box. This can be done by either weighing oneself or the box, then weighing oneself or the box while holding the Wedge-tailed Eagle and subtracting the two numbers. This is both quick and relatively accurate if the weight is taken in
succession. E.g. weigh you then weigh you and the bird immediately afterwards to decrease chances of your weight changing between the weighing times.

Examining Wedge-tailed Eagles is similar to how you would examine most bird species. Looking at their behaviour is important to do daily. This can give an indication as to whether the bird is healthy or not. Most birds will try to hide their injury or sickness, as in the wild they would be targeted by predators or picked on by other birds if they were weak (Payne 2007). Behaviours such as constant flying around their enclosure, not perching, not eating, crashing into walls or ceilings and calling constantly without an obvious reason or not calling at all are all signs of a distressed Wedge-tailed Eagle (Payne 2007). Behaviours such as constant flying around their enclosure, not perching, not eating, crashing into walls or ceilings and calling constantly without an obvious reason or not calling at all are all signs of a distressed Wedge-tailed Eagle (Payne 2007). Things such as favoring or holding up one leg, a wing that is sitting abnormally and limited movement can show a sick or injured eagle. Normal behaviour should include bathing, preening oneself, rousing their feathers, flying to perches and eating frequently.

It is important to physically examine the birds of prey on a regular schedule, eg. Bi-annually. See how to physically examine a Wedge-tailed Eagle in more detail in the next section (Section 8. Health Requirements), but you should be looking at their body condition once you have caught them securely. This can be done by looking at their overall plumage, their eyes should be clear and focused, their beak should be strong and clean, their keel should be felt for a body score that should aim to be around 3, their wings should be stretched out gently and checked for functionality and feather quality, and their legs and talons should be strong, sharp and clean. Their feet should also be checked for disease, cuts and functionality. Once captured, any maintenance that needs to take place on the bird can be done in a time sensitive way. The less time the bird is handled the better. E.g. talon clipping or treating a sick bird with cream/bandages etc. This is a minimum two-person job as the person holding the bird needs to have a firm grip the whole time in order for the other person to health check the bird in a safe and efficient way.

Figure 11. Martin Scuffins (Director & Handler at Leigh Valley Hawk and Owl Sanctuary) restraining the Wedge-tailed Eagle while a keeper clips the talons.

7.5 Release

Release into the enclosure should be done gently and quickly. You may choose on a hard release, meaning you let the bird go in its enclosure straight away, allowing it to calm down and (if changing enclosure) get used to its
new environment. You may also choose to do a slow release which involves keeping the bird in an enclosure near or in the bigger enclosure for a period of time before releasing, giving the bird an adjustment period and allowing a calmer release. All Wedge-tailed Eagles should go through a quarantine period of at least 2 weeks when coming into a new zoo/park to make sure they do not carry any unseen illnesses that can be passed on. This may also be used as an adjustment period to the new smells, sounds and sights of the area. The hard release is more common with adult Wedge-tailed Eagles.

If the Eagle is in a crate or box, the box should be brought gently into the enclosure and placed on the ground with the door of the box facing out towards the middle of the enclosure. It is important to angle the box door to an open space so that the eagle does not fly straight into a wall or object when it comes out of the box. It is also important to keep the box and staff close to an exit when releasing, so that as soon as the bird is released, the box and staff can be quickly and easily removed from the enclosure.

If the eagle has been caught physically, the person holding the bird and a second helper should enter the enclosure and stand near the exit. The bird should be kept restrained until the last minute to ensure the safety of the handler. The second person should quickly take off the hood and the handler should unwrap and let go of the bird straight after. The bird should not be thrown into the enclosure. The handler can gently guide it in the direction of the middle of the enclosure as it takes off. It is important when releasing to still be wearing all the safety gear mentioned earlier. The handler and helper should exit the enclosure as soon as the bird is released to give the bird some time to calm down and also to prevent the bird attacking the handler once released. The eagle should fly or run away from the handler straight away but they do have the ability to turn around and attack. It is important to put safety first at all times.

The eagle should be monitored for a short period, e.g. 30 minutes to an hour. If the bird seems to be settling in well by looking around, exploring the enclosure and displaying normal behaviours then it should be checked on every hour or so for the rest of the day. If the bird is not settling in well then, the enclosure can be changed to help the bird adjust. If, for example, the bird is scared of a certain object then re-capture may be needed in extreme situations and enclosure changes can be made. Re-capture may also be needed where the bird is distressed for a long period of time and is showing no signs of calming down.

The best time of day to release a Wedge-tailed Eagle is in the morning as it gives them maximum daylight hours to orient themselves and find suitable perching places or explore the enclosure. It also gives keepers a chance to monitor the bird of prey for the length of the day as well as an opportunity to offer food after the bird has calmed down. The bird may not eat the first day after release but it is recommended to offer food a few hours after release. If the bird does eat, it is a good sign of the bird accepting its new space. If the bird has not eaten overnight or does not eat on day two of release then professional help should be consulted. E.g. a specialist veterinarian.

### 7.6 Transport Requirements

Before transporting Wedge-tailed Eagles, there are important documents that need to be approved and filled out. Any permits that are needed to transport or keep a Wedge-tailed Eagle should be approved by both the sending and receiving parks. E.g. a permit to keep birds of prey on display in parks, zoos, circuses and wildlife displays, an export/import permit. This can be achieved by consulting your local government. Transfer documents are necessary for all transported animals (e.g. transfer of animal’s form) to provide necessary and helpful information to the receiving park/zoo. This document should include for each individual according to the NSW Government (2010):

- scientific name, common name, individual identification, any personal name or distinctive markings
- the origin (e.g. details of the wild population or of the parents and their origin, and of any previous location)
- The dates of acquisition and export, with details of the circumstance and address. The date of hatching.
- Clinical data such as physical examination by a professional, any treatment given, results of routine health checks etc.
- Breeding and any details of offspring
- Date of death (if applicable) and results of post mortem
- Normal diet, including supplement, feeding schedule
- Behaviours and personality traits (if desired)

Note: It is recommended that a veterinarian or approved eagle rehabilitator be consulted on the transport conditions before sending injured/sick birds for any treatment needed (NSW Government 2010). The Australian Government requires that all live animal species transported by air from any country are to be transported in containers specified in the latest edition of Container Requirements of the IATA Live Animals Regulations (IATA 2013). It is recommended to consult the latest version of the IATA Live Animals Regulations before sending any Wedge-tailed Eagles by plane and it can also help when sending inter-state as well. It can help as a guide to the regulations that need to be complied with when transporting this bird of prey, and so can your local government. E.g. Australian government, ZAA (Zoo and Aquarium Association), New South Wales Government. Long and short-term transport is the same with all aspects as the Wedge-tailed Eagle is very strong and so the security of the box design and the bird’s needs do not change.

Box Design
According to the NSW Government (2010), the transport container should not allow light entry except through ventilation holes that should be pierced around the lower half of the box on all sides. The holes should be about 10cm above the internal floor height and about 7.5cm apart with two holes being pierced on all four sides, 10cm below the roof height. The dimensions of the container should be at least 30cm longer and wider than the bird’s dimensions from beak to tip of the tail. The height of the box should allow at least 15cm clearance between the bird’s head when standing or perching and the ceiling of the container. The access point should be a hinged or sliding door on the top side of the box which should be well secured when transporting. It may be constructed of wood, hardboard (Masonite), non-toxic plastic, fiberglass and synthetics, weld mesh and strong plastic mesh.

Wood is common with Wedge-tailed Eagles, especially if the bird is not accompanied by an experienced handler during the transport. In this case the container should be constructed of wooden sheets and framing that can withstand damage in transport. It should also be labelled clearly with ‘LIVE ANIMAL, HANDLE WITH CARE, THIS WAY UP, KEEP COOL’. The roof should be padded with a soft non-destructible padding.
Figure 12. An example of a transport crate for a Wedge-tailed Eagle (IATA, 2013).

Furnishings
According to the NSW Government (2010), a perch made of a block of wood, big enough for the bird to get a firm grip should be fixed to the floor of the container if desired. If not perch, the floor of the container should be lined with a resistant material that will allow grip for the bird’s talons. E.g. non-looped artificial grass.

Water and Food
According to the NSW Government (2010), for transport more than 24 hours, transport containers must have food available inside and should be fed once they have been in transit for that 24 hours. It is recommended to feed them 15-20% of their body weight in fresh meat when travelling for 24 hours or more. E.g. kangaroo meat that has been kept frozen/fresh until fed. The birds should not be fed within 4 hours of departure and provisions should be made for feeding when arrived at the destination point. Note: this does not apply to nestlings, which should be fed as recommended by a veterinarian. Water containers must be provided in each container and should be accessible for refilling. They should also be firmly attached to the wall of the container to prevent spillage with either screws, nails or glued with non-toxic glue.

Animals Per Box
According to the NSW Government (2010), no more than one Wedge-tailed Eagle should be enclosed in a compartment at one time, unless all birds are fledglings of the same nest. This is important to prevent fighting, injuries, space allowance or discomfort for the birds while in transport.

Timing of Transportation
According to the NSW Government (2010), birds should not be subjected to temperatures above 30 degrees or less than 10 degrees during transportation. Noise must be minimized while in transport and time of travel must be minimized. There is no recommended time for transport however it is desirable to allow the bird to arrive at its destination in the morning so that it has a whole day to adjust and orient itself in its new environment.

Release From Box
According to the NSW Government (2010), when the eagles are released into a new enclosure it should be done in the morning to allow optimum adjustment and orientation time for the animal, as mentioned above. Release should be done away from the public eye and separate from other birds when applicable. They can be ‘manned’ or tamed before being put on display.
As mentioned earlier, the hard release or soft release options can be used when releasing Wedge-tailed Eagles.
8. HEALTH REQUIREMENTS

8.1 Daily Health Checks

Wedge-tailed Eagles should be visually checked daily when cleaning, feeding or walking past their enclosure in the mornings. It is important to keep up regular checks of their health and their enclosure to make sure they are at no risk of injury and healthy at all times. On observation, one should look at the way the bird is carrying its body weight, the carriage of its wings, the use of its talons and feet/legs and overall behaviour (Blair 2000). The body should be held centre and upright and the wings should be held evenly and level with the body. If this is not the case, for example drooping wings, it may mean injury such as fracture or breakage and the advice of a veterinarian should be sought immediately (Blair 2000). Wedge-tailed Eagles rely on their talons and foot function in order to hunt and so leg function is crucial for their overall. Any swollen areas, uneven weight distribution on feet and injuries such as deep cuts and damage to talons should be reported immediately and professional help sought (Blair 2000).

Normal use of the eyes should be observed, such as no blood in the eyes, constriction of the pupil’s due to light changes, eyes fully open and response to visual actions. Flicking of the eyes from side to side can be a sign of head injury or concussion and if this is observed the bird must go to the vet immediately (Blair 2000). The birds should also not have any discharge from their eyes, nose, beak or cloaca as this can be a sign of illness and should be reported immediately (Blair 2000). The consistency and appearance of droppings should remain the same and any changes should be noted. The Eagle’s general appearance and feather quality should be shiny and have no missing feathers or broken feathers. Eating habits should be normal including using talons and beak to rip meat off their food item and overall interest in their diet. If housed with other Wedge-tailed Eagles, non-aggressive and relaxed social behaviour should be observed.

8.2 Detailed Physical Examination

Chemical Restraint
Wedge-tailed Eagles can be sedated using a gas mask and some eagles can be trained to assist keepers in the event of having to sedate the birds (Redig, Willette & Ponder 2014). For example, Healesville Sanctuary, Victoria, were able to sedate their elderly Wedge-tailed Eagle using isoflurane, an anaesthetic dispersed from a mask that the eagle had been trained to breath into. An anaesthetic can also be injected by an experienced veterinarian once restrained (Redig, Willette & Ponder 2014). Wedge-tailed Eagles can be dangerous and therefore any major treatments or procedures will most likely have to be done under anaesthetic for the safety of the staff and the eagle itself. Drugs used for anaesthetic purposes in birds of prey can include substances such as Buprenorphine for a long operation (lasts 8 hours) or Butorphanol for a shorter operation (lasts 4 hours) (Redig, Willette & Ponder 2014). Procedures such as blood tests can be done by a professional when a bird is restrained however some are too aggressive and may need to be anaesthetised for this (Blair 2000). It varies amongst individuals.
Note: Any procedure, especially those including anaesthetic, should be very carefully done and the birds health should be seriously considered prior to starting. It can be risky putting animals under anaesthetic, therefore the reasons should be very important and the bird’s health should be adequate enough for it to survive the anaesthetic.

**Physical Examination**

Everything on the Wedge-tailed Eagle should be examined and noted for any changes from the feathers on its head right down to each talon on its feet. This can be done under anaesthetic, or when the bird is restrained properly. However, it is recommended not to restrain the bird for longer than necessary meaning that staff have to be trained to examine the bird’s body in an efficient manner. Particularly in birds of prey, some things to look out for include:

Blood Feathers are feathers where the blood has not retracted back into the skin after developing. They can become irritated and the eagle may begin to chew on them (Blair 2000). If they rupture, the bird can possibly bleed to death. It is important to learn how to identify these and remove them (Blair 2000). One of the most common indicators of a sick bird is disheveled, dull or fluffed up feathers (Blair 2000). They can do this as a way to stay warm and if seen frequently, or for long periods of time, there may be a cause such as draft etc. (Blair 2000). Diarrhea in the enclosure can be a sign of illness, such as over consumption of certain foods, stress, parasites or internal organ problems (Blair 2000). Immediate attention is needed to prevent dehydration and a veterinarian should be consulted (Blair 2000). Normal droppings should include the urates (opaque fluid) with a dry white dropping in the middle (Blair 2000). If it looks green, yellow, or any other colour, the bird could be ill and a sample should be taken for examination where possible by putting down pieces of paper under the main droppings area (Blair 2000). It is important to pay attention to undigested seed or food, foamy stools, or changes in the volume of the droppings (Blair 2000). Sick birds of prey do not want to attract attention to themselves and will remain quiet which can be accompanied by a lack of activity/lethargy (Blair 2000). Eyes should be open and fully alert. Not glassy, watery or half-closed which can be a sign of a sick bird (Blair 2000). The nostrils should be clear, not runny or clogged which can also be signs of a sick eagle (Blair 2000). The bird should be breathing evenly and without any obvious discomfort. Any sneezing, coughing, wheezing or excessive nasal discharge are all signs of health issues (Blair 2000). Eating habits should remain normal and any change in this should be noted down and reported to a supervisor.

**8.3 Routine Treatments**

Nail clipping, coping and worming are some routine treatments in a normal healthy Wedge-tailed Eagle. Nail clipping is usually done when the animal is health checked. This limits the amount of times the animal needs to be caught and therefore is less stressful. Dog nail clippers can be used to trim the end of the bird’s talons making sure not to trim the quick. Consult a trained professional or keeper if unsure of the technique.

Appropriate perches and logs should be provided in the Eagles enclosures to allow natural wearing down of the nails but usually trims are also needed in captivity. Coping is the process of reshaping a raptors beak back to its normal shape. This can be avoided by always providing your Wedge-tailed Eagles with bones and animal carcasses to feed on. They naturally keep their beaks in shape by ripping and tearing at bones and flesh in the wild so an opportunity to do the same should be given regularly in captivity. However, if needed it is possible to re-shape the beak if it is growing out unnaturally. Again, this is recommended to do during a health check to limit stress and the need for multiple captures of the bird. If ignored, an overgrown beak can cause more serious health issues such as cracks in the beak and pain/discomfort for the eagle. This requires two people at least and
follows the same rules as when capturing an eagle for a health check. A hood may be used to reduce stress even further during the process. If unsure of the technique, consult a professional or trained keeper on the task but it involves using the appropriate tools to file down or trim down the beak. Worming is recommended in birds of prey by some and not recommended by others, therefore, it is best to consult your veterinarian or trusted professional before worming your birds to discuss safety risks etc. Moxidectin plus is a good example of worming treatment that can be used for birds. The dosage is 2ml Moxidectin plus per 100 grams of weight of the eagle. For example: a 5kg female Wedge-tailed Eagle would need 100mls of Moxidectin plus in her food. It can be injected into a whole animal such as a rat, for example. This should be done bi-annually and can be incorporated in the scheduled health checks. Consult the label or a veterinarian for dosage amounts if unsure.

Figure 13. Trimming nails on a female Wedge-tailed Eagle.

8.4 Known Health Problems

There is not much information on health problems specifically linked to Wedge-tailed Eagles, however raptors are particularly subject to Trichonomiasis and Nematode worms.

Trichonomiasis

**Cause:** an infection caused by microscopic motile protozoa (Blair 2000). It can be spread through mouth to mouth contact with an infected bird or transmitted through contaminated food or water (Blair 2000).

**Signs:** It is recommended to gently open the beak using both hands and check the mouth (Blair 2000). It can appear like a silvery slime or pale coloured cheesy lump (Blair 2000). The mouth will smell fishy and it can be accompanied by a secondary bacterial infection (Blair 2000). Do not try and remove the cheesy clumps as it can lead to bleeding, instead consult a veterinarian (Blair 2000). Infected birds can show signs of vomiting/regurgitation, weight loss, being fluffed up or green diahorrea (Blair 2000). It can be fatal if not treated.

**Treatment:** Consult your veterinarian, but they can be treated with Ronidazole in water for 7 days which is safe for birds (Blair 2000). All enclosure furnishings and surfaces should be bleach cleaned and disinfected. Infected birds should be given high-energy soft liquid foods as well as a warm, dry, clean place to recover (Blair 2000).

**Prevention:** Worming birds of prey against these parasites bi-annually is recommended (see 8.3 routine treatments). Making sure all food items are stored and refrigerated properly and are free of worms when fed out. Making sure all new birds are quarantined until proven free of Trichonomiasis and that water sources are clean and un-contaminated.
Nematode Worms

**Cause:** Caused by ingestion of the eggs of nematode worms in contaminated food, water, toys or soil (Blair 2000).

**Signs:** It can be seen in the crop and mouth and is identified by the stringy slimy appearance of the inside of the mouth (Blair 2000). There can be small lumps visible on the inside of the mouth with tiny white thread-like worms protruding from it (Blair 2000). Birds can seem fluffed up, have poor growth, dihorrea or breathing difficulties (Blair 2000). A faecal sample will show the presence of nematodes under a microscope by your veterinarian (Blair 2000).

**Treatment:** The lumps inside the mouth requires manual removal with tweezers or similar tool which may have to be repeated over a few days until completely removed (Blair 2000). Consult your veterinarian but it can be treated with Fenbendazole, Ivermectin or Pyrantel Pamoate and is repeated as necessary (Blair 2000).

**Prevention:** Worming birds of prey against these parasites bi-annually is recommended (see 8.3 routine treatments). Making sure all food items are stored and refrigerated properly and are free of worms when fed out. Enclosures should be cleaned daily, especially items that have faeces on them including food, water, toys, perches etc.

Bumble Foot

**Cause:** Bumblefoot (ulcerative pododermatitis) is caused by a bacterial infection leading to an inflammatory response in the feet of birds, usually due to standing in their own faeces or infected areas. Bacteria such as strains of Staphylococcus, Pseudomonas and Escherichia coli are to blame (Payne 2007).

**Signs:** Small reddened areas on the feet of birds of prey that can seem itchy or agitating for them. Swelling of the feet and lesions appearing can also be a side effect. Distortion of the feet or toes can also indicate the presence of bumblefoot (Payne 2007).

**Treatment:** Veterinary care is recommended, along with antiseptics applied to the affected area and antibiotics (Payne 2007).

**Prevention:** By having good husbandry practices in place to promote a clean environment for the birds of prey in captivity, bumblefoot can be prevented. Cleaning perches as often as necessary to stop the birds from perching on their own faeces. Also, if the bird has jesses, making sure they are the right size and also stay clean can prevent bumblefoot as well.

Aspergillosis

**Cause:** *Aspergillus fumigatus* is caused by exposure to a large number of spores from the fungus *Aspergillus* and can become chronic when already immunocompromised. It is non-contagious but grows in organic matter at temperatures up to 25 degrees (Joseph 2000).

**Signs:** It is very hard to identify as the signs are not specific, however diagnostic procedures such as hematology, endoscopy, radiology, and others can help. Some signs that have been observed are labored breathing, heavy breathing, loud or crackly sounding breaths, mucus in cere or airways, depression, seizures, weight loss, lesions, wing drooping, paralysis, diarrhea and anorexia (Joseph 2000).

**Treatment:** If the infection is not noticed and diagnosed quickly, treatment is ineffective. Treatment options are limited but it is recommended to seek veterinary care immediately. Best results usually involve removing affected tissues if possible along with drug treatment (Joseph 2000).

**Prevention:** Stress can cause development of the disease in birds of prey, therefore making the need for a stress-free environment part of its prevention. Malnutrition, poor ventilation, vitamin deficiencies, trauma, unclean environments, irritation of the airways and long-term antibiotic use are all the be avoided to prevent the development of Aspergillosis. Some vaccines have been tested and seem to be working, however consult your veterinarian before undertaking any preventative treatment (Joseph 2000).
8.5 Quarantine Requirements

New Wedge-tailed Eagles to any zoo should be quarantined for a minimum time of 2-3 weeks and no longer than 90 days in order to check for illnesses such as those listed above, Trichonomiasis or Nematode worms (Blair 2000). Tests can be done by a veterinarian to determine if the eagle is infected, such as crop washes for Trichonomiasis (Blair 2000). This will show motile protozoa at 100x and 400x magnification (Blair 2000). It can also be identified using a Diff-Quick stain (Blair 2000). Some birds can show no signs at all of Trichonomiasis even after years of infection so tests need to be thorough (Blair 2000). Faecal samples should be taken by placing paper under the area most faeces are found and given to a veterinarian for testing for nematode worms or other illnesses as well (Blair 2000). The quarantine area should be dry, clean, warm and have adequate furnishings, food and water for the animal. The NSW Government (2010) states that appropriate quarantine procedures and processes be recorded properly, the animal is to remain isolated on arrival, physical examination and tests are to be completed in any new animals, veterinary treatment for any existing illnesses must be undertaken and a period of adaptation is to be completed to the new diet to meet nutritional requirements.
9. BEHAVIOUR

9.1 Activity

Wedge-tailed Eagles can be known to spend the time around sunset and sunrise observing their territory from a high tree in the area (Fleay 1952). They use their early mornings to hunt and catch prey before eating it, usually on the ground immediately after catching it (Fleay 1952). The rest of the day is spent sitting on high, exposed perches or circling and gliding through the air (Fleay 1952). Although they do not spend a lot of time claiming their territory, they do parade themselves around the boundaries of their area by gliding and flying at high altitudes (Fleay 1952). Captive behavior throughout the day includes feeding, preening themselves, bathing (not observed every day usually), resting or moving around the perches in the enclosure.

9.2 Social Behaviour

Wedge-tailed Eagles mate for life and will spend all their time with that mate once found (Fleay 1952). They reach maturity around 5-6 years of age and will remain solitary until they find a partner (Fleay 1952). They are often seen hunting together, displaying mating behaviour, territorial displays or building a nest or ‘eyries’ together (Fleay 1952). This behavior can also be seen in captivity as well as preening one another.

9.3 Reproductive Behaviour

Wedge-tailed Eagles will choose a breeding territory which they will defend against any other birds or threats (Debus et al. 2007). They are often seen displaying a mating dance high up in the air which involves the male diving down towards the female mid-flight but pulling up at the last second to soar back up with semi-folded wings (Debus et al. 2007). She may respond by flipping on to her back and exposing her talons to the male (Debus et al. 2007). This can go on in a beautiful display along with lots of screeching and calling to each other (Debus et al. 2007). The pair will spend time building multiple nests in high trees or cliffs to use throughout the years and will also preen each other on a perch coming up to the breeding season (Debus et al. 2007). Eggs are laid from June to August and April to September in the northern parts of their distribution (Debus et al. 2007).

9.4 Bathing

Wedge-tailed Eagles bathe as often as necessary in the wild and do the same in captivity. Almost all Australian Government guidelines for Wedge-tailed Eagle enclosure include the necessity of a pond. The pond or other water/bathing source should be big enough to allow full wing span length and deep enough to allow normal bathing behaviour (SA Government 2010). It should be able to be easily emptied and refilled with clean fresh water.

9.5 Behavioural Problems

Wedge-tailed Eagles have been blamed for their behaviour of eating young lambs in the past which has however, since been proved to make up only 2% of their diet. They are known to be very inquisitive and can be seen harassing larger animals for their scraps when they are finished with a carcass (Fleay 1952). They can ‘imprint’ on people if taken from the wild at a young age or hand raised. This involves the Wedge-tailed Eagle not being able to survive in the wild as it relies on humans to deliver food and shelter. They also can be
aggressive in captivity towards keepers as a result of becoming territorial of their enclosure area. Solutions to these problems involve not hand raising a bird of prey on your own, but by at least two keepers to prevent imprinting. Also, personal protective equipment must be used when working with Wedge-tailed Eagles and a minimum contact regime is encouraged to prevent injury to both keepers and birds. Wedge-tailed Eagles are naturally bold and confident and it is best to let them be this way in captivity which may include being territorial. Keepers should aim to work with the behavioural attributes of birds of prey instead of trying to suppress them.

9.6 Signs of Stress

Signs of stress in Wedge-tailed Eagles can be expressed in behaviours such as constant flying, flying into walls, a change in weight or body condition, excess loss of feathers, change in appearance or dropping colour/shape/consistency, heat stress or dehydration, changes in food or water consumption, change in behaviour or attitude (e.g. very alert or still) etc. (Fleay 1952). Most commonly they go off their food and are seen flying into walls or extremely alert all the time. This may be a result of illness, a fear of an object, sound or smell etc.

9.7 Behavioral Enrichment

Behavioural enrichment for Wedge-tailed Eagles can be very effective if done properly. Wedge-tailed Eagles can be mentally stimulated using enrichment items such as food sources or other animals. Food items can be placed in different areas or presented in different ways to provide enrichment. For example, hanging a deer leg from a tree using a rope that will not snap easily can be effective. Even having another bird of prey or Wedge-tailed Eagle in a nearby enclosure can stimulate mental activity in the individuals. Keepers may also use audio enrichment such as playing other Wedge-tailed Eagles calls to their bird of prey. This should be done with caution as to avoid causing distress in the birds or aggression in response to the noise. Different food sources from normal can also be presented to see what the eagle will do with it. For example, a whole deer instead of a deer leg or something completely unattractive such as a carrot. A large dog kong can be used for enrichment containing the birds favourite food. This must again be done with caution to avoid the birds consuming any foreign materials.

All enrichments must be done in a way that is safe for the Wedge-tailed Eagles by making sure that anything that comes into contact with the birds will not cause harm or damage if digested. The goal is not to scare the birds so take all enrichment items in slowly and be able to monitor the birds in case of stress meaning the enrichment needs to be removed. Wedge-tailed Eagles can be trained, particularly if they have been hand raised. This can be done using a lot of patience and their favorite food as a reward. This can provide lots of mental stimulation to the eagles but must be done with extreme caution and the proper training as well as personal protective equipment. Seek a training professional before training a Wedge-tailed Eagle.

9.8 Introductions and Removals

Wedge-tailed Eagles can be aggressive towards each other when entering one another’s areas or enclosures in captivity as they can be territorial and the new bird can be seen as an intruder. The birds will either tolerate each other and even become mates, or they will see each other as a threat and attack each other which can cause stress and injury. All introductions should be taken very slowly. The best way to introduce two eagles to each other is to house them near each other with a visual barrier between them. Then after a week the visual barrier can be partly removed. The following week it can be removed a bit more and so forth until the birds have full visual of each other. This will then hopefully create an easier first introduction as the birds already know what the other Eagle smells, sounds and looks like. Martin Scuffins (Leigh Valley Hawk and Owl Sanctuary) suggest
that if the intention is to breed the Wedge-tailed eagles, then it is essential to introduce the male to the new exhibit first so that it is his domain. A period of 2-3 weeks will allow him to claim the space. The females are bigger and may attack or kill the male if she has already claimed the territory.

### 9.9 Intraspecific Compatibility

It is recommended not to introduce any other Wedge-tailed Eagles to mated pairs as they will be protective of their space. Females are known to be aggressive towards males which should be taken in to account when deciding which birds to introduce to each other. If an introduction goes bad, keepers should always put their safety first and not enter the enclosure unless it is safe to do so and with the appropriate PPE on. The birds should be broken up with a distraction of loud noise or even a rake or blanket thrown between them. One of the birds should be caught and removed, again in a way that is safe for all individuals and requires more than two people to do so. Introducing Wedge-tailed Eagles to each other at a young age may prove to be more successful in terms of them liking each other, however that is not to say that as they mature they will not turn on each other as they try to establish their territories. Generally, it is safer and easier to keep Wedge-tailed Eagles housed separately or in a mated pair to avoid dangerous situations for both keepers and the animals.

### 9.10 Interspecific Compatibility

It is very highly suggested to never house Wedge-tailed Eagles with other species of bird or any other animal as they will most likely attack or hunt that animal. Wedge-tailed Eagles are scavengers and will therefore take advantage of any food opportunity that comes their way, including other birds. There is very little evidence found of Wedge-tailed Eagles co-existing with other species of animal peacefully. Perhaps if the species is very similar and the individual is of similar size and weight, such as a White-bellied Sea Eagle.

### 9.11 Suitability to Captivity

There is again very little information on the suitability of Wedge-tailed Eagles in captivity but there are many cases of Wedge-tailed Eagles living in captivity well. For example, Moonlit Sanctuary Pearcedale, Victoria, has two Wedge-tailed Eagles housed together in a display aviary that were both rescued from the wild. Both of these Wedge-tailed Eagles were either injured or deemed unfit to survive in the wild and were introduced to each other slowly in the process mentioned above (9.8). Fortunately, the birds did not attack each other and are now a mated pair and appear to be living suitably in captivity. Wild healthy Wedge-tailed Eagles would however not do so well in captivity as they have no reason to be contained and normally soar at incredible heights over long distances which they are prevented from doing. Most Wedge-tailed Eagles in captivity are rescues or have been born and raised in captivity.
10. BREEDING

10.1 Mating System

Wedge-tailed Eagles will mate for life with their chosen companion unless that partner dies, in which event they would find a new partner (Debus et al. 2007). They will return to the same nest each year and build on it each time (Debus et al. 2007). They strongly defend the nest and can become very territorial of that area (Debus et al. 2007). The male will be seen jumping on to the females back to copulate in which they both spread out their wings during the process (Debus et al. 2007). Prior to mating they can be seen sitting close, preening each other and performing a mating ‘dance’ in the sky which involves a number of rolling, touching talons and steep dives (Debus et al. 2007). They can also be more vocal during the breeding season when attracting a mate (Debus et al. 2007).

![Figure 14. Wedge-tailed Eagle pair mating (Warden, 2014).](image)

10.2 Ease of Breeding

If there is enough resources available, such as food, water and nesting material then Wedge-tailed Eagles should breed annually and produce at least one viable offspring (Debus et al. 2007). If it does not rain at all, Wedge-tailed Eagles are known to not breed until the rain returns the following year (Debus et al. 2007). The males and females both incubate the eggs creating an easier work load for both parents.
10.3 Reproductive Condition

10.3.1 Females
When incubating, the female (and sometimes the male) can form brood patches on their abdomens which allows skin to egg contact and keeps the eggs warmer (Olsen 2005). The female should be at a healthy weight coming into the breeding season, between 3.2kg and 5.3kg, and also be in good condition to allow maximum food retrieval for the chicks (Debus et al. 2007). She will weigh less at the end of the breeding season (Debus et al. 2007).

10.3.2 Males
The male can develop a brood patch, as mentioned above, however Debus and colleagues (2007) found that the male had more input with the nest building and upkeep, whereas the female had more input in incubating the eggs. The male should be at a healthy weight, around 2kg to 4kg, and also be in good condition for hunting and nest defenses (Debus et al. 2007).

10.4 Techniques Used to Control Breeding
The Wedge-tailed Eagles heavily depend on housing/nesting resources and food availability in order to breed, providing keepers with a way to control their breeding activity during the breeding months. To allow for successful breeding there needs to be available in the enclosure (Debus et al. 2007):

- Adequate nest site
- Correct nesting material
- A pair that have been together long enough to form a bond
- Adequate amount of food
- Visual barriers and access to high perches
- Correct winter temperatures
- Available water supply

If breeding is undesired, then removing one or some of these factors can influence the eagles breeding ability. For example, one would not provide the right nesting material making it impossible for the pair to make a nest. Contraception methods are also available from an experienced veterinarian that can be put in and removed as needed (Debus et al. 2007).

10.5 Occurrence of Hybrids
There is very limited information on Wedge-tailed Eagle hybrids which suggests that there are none that we know of. However, there are things such as albino Wedge-tailed Eagles in zoos and in the wild (Olsen 2005).

10.6 Timing of Breeding
Wedge-tailed Eagles breed from June to November in good conditions but can vary if resources, such as food and water, are not available (Debus et al. 2007). As mentioned earlier, they will not breed at all with a lack of resources.
10.7 Age at First Breeding and Last Breeding

Wedge-tailed Eagles reach breeding age around 5-6 years old and may live till they are 40 years of age (Olsen 2005). As far as we know, if healthy, they can breed up until death.

10.8 Ability to Breed Every Year

If conditions are favorable, Wedge-tailed Eagles can breed every year.

10.9 Ability to Breed More than Once Per Year

If conditions are very good then Wedge-tailed Eagles can breed twice a year but this would involve lots of food availability, minimal disturbance and an early clutch first (Olsen 2005). Depending on the facilities you have available, keepers can take chicks for hand rearing which would allow the parents to breed again sooner, however the affects this has on the parents is variable and it can only be done by trained personnel. It may have the effect that the parents will lay again immediately or it may have a negative affect and see the parents move on to find a new nesting site (Olsen 2005).

10.10 Nesting, Hollow or Other Requirements

The mated pair usually chooses a tall tree in the middle of their territory that allows them to keep close surveillance on their area and on the nest (Olsen 2005). If trees are not available they may also nest in cliffs and rock crevices (Debus et al. 2007). The pair will build the nest together using sticks and browse which they will return to and build on every year (Debus et al. 2007). Some nests can get up to 1.8 metres across and 3 metres deep with a weight of 400kg (Debus et al. 2007). The nest has a shallow depression in the top for laying the eggs and any fallen sticks from building the nest are not retrieved (Debus et al. 2007). Reports of discarded sticks piled as high as 1.8 metres under a nest have been seen (Debus et al. 2007).
10.11 Breeding Diet

A study by Debus and colleagues (2007) found that, from two different Wedge-tailed Eagle nesting sites, the majority of food items delivered to the nest and consumed was mammals (89% and 74%) followed by birds (11% and 22%) and reptiles (<1% and 4%). The mammal consists of mostly rabbit and hare (56%), and macropods most of the remainder. A similar diet to this is encouraged when breeding birds in captivity. See section 6.2 – Captive Diet for more details, as a change in diet is not necessary to non-breeding seasons of the year, however more food is certainly required during breeding seasons.

10.12 Incubation Period

The incubation period of the eggs is roughly 45 days (Debus et al. 2007). The eggs are laid at different intervals and therefore hatch at different times, so incubation all together can last anywhere between 45 and 49 days (Debus et al. 2007).

10.13 Clutch Size

Wedge-tailed Eagle females lay between 1 to 3 eggs at different times, generally 2-4 days apart (Debus et al. 2007). Therefore, they hatch at different times and usually the first born is the largest followed by the next largest etc. (Debus et al. 2007). Survival rates of the last chick born are low and increase with relation to body size at hatching (Debus et al. 2007). Unfortunately, the oldest and largest chick is known to kill its smaller siblings if food is scarce (Olsen 2005). A clutch is made up of white eggs measuring around 73mm x 59mm that can have brown spots on it (Olsen 2005). Chicks are covered in white down feathers when they hatch and for the first 5 weeks, need to have food delivered to their mouths by their parents (Olsen 2005). After this period, they can have food laid on the perimeter of the nest and feed themselves (Olsen 2005).
10.14 Age at Fledging

Juvenile Wedge-tailed Eagles fledge at around 70-95 days old (Olsen 2005). They remain with their parents for around 11 weeks after they have left the nest for the first time in order to learn what they can of hunting and surviving (Debus et al. 2007).

10.15 Age of Removal from Parents

In the wild, Wedge-tailed Eagle chicks rely on their parents for everything for the first 70 days or more (Olsen 2005). They acquire enough feathers to fledge around this age and therefore provides an opportunity for removing from the nest (Debus et al. 2007). This should be given great consideration before doing as the plan for that chick may influence the time of removal. For example, if the chick is to be used for encounters or close interaction with the public, then an earlier pulling date is preferred so that the chick grows accustomed to human interaction at an early age. This can cause serious aggression from the parents and the proper WH&S procedures should be put into place.

10.16 Growth and Development

Juveniles are reported to disperse up to 850km from the original nest site, 7-8 months post fledging (Olsen 2005). They are reliant on their parents for learning how to hunt, fly and survive in the wild for the first 5 – 6 months of their life, yet after that they become relatively independent (Olsen 2005). It can take young Wedge-tailed Eagles up to 6 years or more to get all their adult feathers but can appear brown with a reddish-brown head and wings at a younger age (Olsen 2005). By their 5 or 6th year they will be fully mature/self-sustaining and will begin looking for a mate (Olsen 2005).
11. ARTIFICIAL REARING

11.1 Incubator Type

The incubator type used to incubate Wedge-tailed Eagle eggs will be different depending on the location and resources available to the holding facility. All incubators should enable keepers to manipulate humidity and temperature and it should be the right size for Wedge-tailed Eagle eggs (average egg size is 73mm x 59mm) (Fleay 1952). Incubators are usually available from your local animal produce store. A household or simple incubator type is best as it is least complicated, allows you to control the humidity and temperature while also having enough room for the eggs. It is ideal to have 3 incubators set up during the incubation period (Jones 2000). One for initial incubation, one for hatching and a spare in case one breaks down (Jones 2000). The room in which the incubator is in and the incubator itself, should be sterilized before use and turned on 4 days before incubation is needed (Jones 2000). This cleaning process should be repeated when necessary during incubation (Jones 2000). Make sure there is no sunlight on the incubator as it may affect the temperature and preferably it should be kept in a place that is dry, safe and has muted lighting (Jones 2000).

11.2 Incubation Temperatures and Humidity

There are very few studies of incubating Wedge-tailed Eagle eggs in Australia however there are studies on birds of prey eggs being hatched in incubators worldwide. A study by Wiemeyer (1981) found that bald eagle eggs hatched without complication when kept on 56% humidity and temperatures of 37.6 degrees. The temperature was reduced as time went on to 30 degrees and the eggs rotated every two hours (Wiemeyer 1981). Jones (2000) recommends 37.5 degrees and 30-35% humidity for bird of prey eggs. The humidity can be changed based on the amount of weight an egg loses (Jones 2000).

11.3 Desired % Egg Mass Loss

The eggs should be weighed as soon as possible when freshly laid. This allows keepers to know the FEW (fresh egg weight) and therefore how much weight the egg should loose (Jones 2000). This should be done using sterile equipment, gloves and done very quickly to avoid the eggs cooling down or drying out. The eggs should be weighed at regular intervals to allow proper observation of weight loss. E.g. 7:00am every day. The egg should lose 18% of its weight by the time they are ready to hatch (45 days) and 15% of that should have happened by the time the egg has already pipped (crack or hole in the shell) (Jones 2000). E.g. if the FEW is 400g, then the egg should have lost 15% or 60g by pipping and 18% or 72g by hatching.
11.4 Hatching Temperature and Humidity

Some birds of prey are very vocal when they are close to hatching and sometimes movement can be seen (Jones 2000). The hatching incubator should be run at the same temperature as the normal incubator, 37.5 degrees, but the humidity is raised to 55-60% to avoid the egg shell or chick drying out during the hatching process (Jones 2000).

11.5 Normal Pip to Hatch Interval

The eggs should be being turned regularly and therefore, spotting a pipping egg should be easy around the 42-45 day mark (Jones 2000). Once the eggs have started breaking or pipping, then the eggs should be moved to the next incubator (Jones 2000). The eggs may hatch at different intervals of up to a day or two apart, meaning some eggs will be put in to the hatching incubator before others. Cease turning eggs once in the hatching incubator and the egg positioned so that the pip is facing the sky (Jones 2000). After the chick has made its first pip in the egg, it will rest (Jones 2000). Do not interfere in this process as it can cause fatality or complications for the chick (Jones 2000). Once the embryo then starts to turn in the egg, the hatching process should be over within 10 minutes to 1 hour depending on the species (Jones 2000).

11.6 Brooder Types/Design

A water based brooder is a commonly used brooder for birds. It involves a plastic box about the size of a large ice cream container, that sits within another brooder box. This brooder box will be larger and have water about 7-8cm deep in the bottom with a heat rod submerged in it. The water level can be altered so that the internal box is only submerged in the water by 2cm. The heat rod should have a temperature gage on it that can be set to the required water temperature. An internal box thermometer is recommended to make sure the internal temperature is similar to the temperature of the water below. This type of brooder allows humidity for the chicks but also warmth. The internal box should be filled with soft substrate such as wood shavings, sand, cotton material etc.
to allow for comfort for the birds. A depression in the substrate in the shape of a nest with your fist should be made so that the chicks can sit with their leg underneath them to avoid developing splayed legs (Jones 2000).

11.7 Brooder Temperatures

A newly hatched Wedge-tailed Eagle chick should be kept in the hatcher until it is dry or moved straight away to the brooder (Jones 2000). The brooder should be kept at 35 degrees and the temperature reduced by 1 degree per day until the secondary down (type of feather growth on young chicks) is grown (Jones 2000). The brooder should be kept in a still air area and not allowed to get too dry. A lid on the brooder slightly cracked open allows for condensation to build up while keeping the temperature steady. If the chicks are too hot they will tell you by separating and lying flat or splayed out and panting. If they are too cold they can be quite vocal and will huddle together.

11.8 Diet and Feeding Routine

Freshly hatched chicks can be left for 12 hours until their first feed and even longer if they look distended with fluid (Jones 2000). Keepers should wait until the chick is showing signs of hunger and the stomach is flaccid or soft (Jones 2000). Wedge-tailed Eagle chicks can be fed small amounts of kangaroo mince, quail, rabbit, day old chicks etc. (Jones 2000). As long as the guts, skin, gizzard, feet, wings and head are removed (Jones 2000). It is recommended to start with just soft meat ripped into small pieces and work your way up from there. A probiotic can be added to the food for the first few days to provide bacteria and microbes to the chicks (Jones 2000). Consult your local veterinarian or supplement supplier before doing so. Keepers can use tiny forceps or hand to feed Wedge Tailed Eagle chicks with care being taken to avoid hurting the chick or yourself. The food can also be dampened with water if the chick seems to be struggling to eat which also stops the chick from getting dehydrated (Jones 2000). The food should be presented to the chick by putting the food above its beak and waiting for it to raise its head and open its beak, or they will snatch it from you (Jones 2000). The diet can be increased over time as the chick grows with four feeds a day being the recommended starting point (Jones 2000). The frequency of feeds can also be dropped as the chick grows. The chick should be weighed before each feed to keep track of its growth.

11.9 Specific Requirements

Wedge-tailed Eagle chicks raised in captivity can have leg bands put on around 10-14 days old by an experienced staff member or veterinarian (Jones 2000). Casting materials should also be implemented to allow the young chicks to form their first pellets and regurgitate food as they would in the wild (Jones 2000). This should begin when the birds start to grow feathers and can be done by keeping the skin on the food sources, such as day old chicks (Jones 2000). Wedge-tailed Eagles need bones in their diet and so a young chick can be introduced to bones by combining that with the meat using a mincer (Jones 2000). If not available, then adding calcium and vitamins to their diet in powder form can be useful (Jones 2000). Consult your local supplement provider or veterinarian before commencing. Wedge-tailed Eagle chicks in the wild will not access water until they have left the nest however the parents drip an oral secretion on to the food as they are feeding their chicks to give them a form of hydration (Jones 2000). Dampening the food given to the chicks is highly recommended to replicate this in captivity (Jones 2000).
Pinioning Requirements

Pinioning should not be done unless for an important reason. Wedge-tailed Eagles main daily activity is soaring at great heights and they rely on their flight abilities to find food and evade predators. Taking away a bird’s ability to fly should be discussed with supervisors and legal requirements checked with your local state government before completing. Generally, Wedge-tailed Eagles that are kept in captivity are not pinioned, especially if they are used in a bird flight show or in a display only aviary.

Data Recording

The young Wedge-tailed Eagle chick’s weights should be taken every morning before the first feed and written down on a rearing sheet. The rearing sheet should contain details such as time, date, weight, toileted, eaten and any comments. Additional columns can be made for information such as temperature of brooder, behaviour, room temperature etc. This is then entered into an online record system such as ‘ZIMS’ or stored in a secure place so that the records can be reviewed when necessary. Any notable events such as weight gain and diet changes can be recorded in a keeper diary to keep other staff members up to date.

Identification Methods

Leg banding is one of the most common identification methods for Wedge-tailed Eagles and can be done once the chick has reach 10-14 days of age. This should be done by a trained professional or staff member and leg bands can be ordered by your local animal produce store of veterinarian. Leg bands generally have different colours, numbers, letters or all of the above to help identify birds. A detailed list of the physical features that differentiates the bird of prey from others should also be recorded to allow for physical identification.
11.13 Hygiene

Hygiene is of high importance when hand raising Wedge-tailed Eagle chicks. Especially because they eat other animals such as mice and day-old chicks which can carry germs. Keeping the facilities and instruments used when dealing with the birds, sterile and of a high cleanliness level is recommended. It is not recommended to leave the unhatched eggs and hatched chicks in the same room as they can transfer disease and germs (Jones 2000). Regular substrate change and cleanout of the brooder is important to avoid the chick developing any illnesses and promotes healthy growth. Keepers should wash hands every time after handling or feeding Wedge-tailed Eagle chicks.

11.14 Behavioural Considerations

Imprinting is a common problem with Wedge-tailed Eagles as they will then rely on humans for food (Olsen 2005). This may be a problem if the bird is to be released as it is vital that they can hunt for themselves once released to the wild. In the wild the eagle chicks will eventually fledge and separate from their parents and can move up to 850km from the nest site (Olsen 2005). Therefore, it is natural for them to come to a point where they stop relying on keepers for food if the intent is to be released. If the fledglings are to be kept in captivity, then imprinting is inevitable, but close contact with Wedge-tailed Eagles should be done with care as they can become territorial or aggressive as they develop and can harm their carer (Olsen 2005). They should be encouraged to eat for themselves as quickly as possible rather than being hand fed as chicks.

11.15 Use of Foster Species

There is very little information on cross-fostering in Wedge-tailed Eagles but caution should be taken when choosing a species as the bird size, habitat, behaviour, diet and more, can make a huge impact on the survival of the eagle chicks. Some young eagles are known to eat their siblings when not raised correctly or if much bigger than the other family members (Jones 2000). It is suggested that Wedge-tailed Eagles really need their own kind to raise them (Jones 2000). Wedge-tailed Eagle chicks should be returned to their parents or foster parents after 10-12 days if looking healthy and eating well (Jones 2000). Once returned they must be watched closely for a number of hours to make sure the parents have accepted the young chicks (Jones 2000). If the parents accept the chick, they should begin feeding it, investigating it gently and protecting it (Jones 2000). If it is picked up by the parents or shown any aggression, it should be removed immediately (Jones 2000). Fresh food can be left on the side of the nest to encourage the parents to feed the chick (Jones 2000).

11.16 Fledging

Juvenile Wedge-tailed Eagles in the wild will fledge at around 70-95 days old (Olsen 2005). Fledging birds can often be clumsy and fly at random times when first learning. Therefore, when the birds are showing signs of trying to fly, such as flapping and jumping, they should be put into an enclosure, room or area that is safe and secure so that they can spread their wings and learn to fly without flying away or injuring themselves on any objects in the process. Generally, Wedge-tailed Eagles will learn to fly very quickly (Olsen 2005)
Before the rehabilitation of a Wedge-tailed Eagle is begun, it is important to think about release options in the future as it can affect the procedures used. Only carers with a permit, the correct facilities and a proven record should be rehabilitating these birds (Queensland Gov. 1992).

If the eagle being rehabilitated is to be released back to the wild then it is recommended to avoid the bird imprinting by having multiple carers, using a puppet or by limiting the time spent with the bird. Also, the bird should be allowed to do things on its own as soon as possible, such as feeding, perching and cleaning itself.

- **Intensive care facilities**
  Hot boxes can be used for juvenile and young Wedge-tailed Eagles that are injured, in shock or have leg problems. This often results in the bird laying splayed on the floor of the enclosure s keepers need to have full access to the bird and be able to clean the enclosure daily with ease to prevent illness developing in the bird. A towel can be used on the bottom of the hotbox and a temperature of around 28-30 degrees should be maintained (NSW Gov. 2010). However, the box needs to be quite big which makes it harder to regulate temperature. It should be made from sturdy materials such as wood to prevent injury to the bird of prey. It should be dimly lit, have a visual barrier to keepers to minimize stress, allow the bird to stand and turn around, perch and feed, have adequate ventilation, be easily cleaned and provide a shallow dish of water that can be easily refilled (Queensland Gov. 1992). It is recommended to keep these large birds in hot boxes for the minimum time possible. Items needed for rehabilitation are usually leather jesses, thick leather gloves, hood, perches and tweezers or tongs for feeding (Queensland Gov. 1992).

- **Intensive care accommodation**
  If the Wedge-tailed Eagle does not require a hot box but is still not able to be put in a large aviary or still needs assistance feeding, then it should be housed in a small enclosure which allows easy access to the bird at all times. 3 x 3 metres wide and 2 metres high is recommended, made from solid materials such as wood or steel (NSW Gov. 2010). The enclosure should incorporate all the same conditions and allowances as the hot box scenario. More perches can be offered as well as a floor substrate such as mulch, leaves or stones (Queensland Gov. 1992).

- **Intensive care aviary**
  Once the Wedge-tailed Eagle is past needing intensive care, they can be moved to an aviary to promote normal behaviours and surroundings. 6 x 6 metres or greater and a height of 4 metres or greater is recommended (NSW Gov. 2010). All the same enclosure conditions are needed as those found in the intensive care accommodation. However, the eagle should now be feeding for itself and so needs a platform for food presentation such as a stump or log. It also requires a shallow pond or pool to bathe in (Queensland Gov. 1992). It should have direct sunlight in the enclosure but also a place for shelter and perching (see 4. Housing Requirements for further details). This aviary should be encouraging all natural behaviours and development of independence for the Wedge-tailed Eagle.

- **Release**
  Leading up to release, the Wedge-tailed Eagle should be allowed to fly around to strengthen its wing muscles, it must be given the same diet as would be found in its release area (such as rabbits) and it should be exhibiting all normal essential behaviours by itself (such as bathing, preening and perching well). The Wedge-tailed Eagle’s should be released somewhere that is close to where they were found to promote chances of survival (Queensland Gov. 1992). If the original location that the bird was found is unknown, then the information provided in this manual (section 3.2 Distribution and Habitat) should
allow the carer to make an educated decision on the release sight. A low density wood is desirable and professional help can also be sought on the matter (e.g. other carers, local wildlife organisations, zoos and government). This will avoid spreading of disease, displacing of other animals from their natural habitats and compromise genetic integrity (Queensland Gov. 1992). The Wedge-tailed Eagle to be released should be capable of finding a home territory, of an age that is can survive on its own and is not introduced to an area where a pair has already claimed the territory (Queensland Gov. 1992). Prior to release it is recommended to get a vet assessment where possible to confirm the animal is of a good weight, size and is healthy enough for release (Queensland Gov. 1992). The bird should be released in good conditions, such as on a dry, warm day and early in the morning to allow it to orient itself (Queensland Gov. 1992). The Wedge-tailed Eagle should be released in the same way it would be released into an enclosure (see section 7.5 Release, for more details). After release the bird can be monitored using visual sightings and sometimes tracking devices, and re-capture may be necessary if the bird is not surviving as planned on its own.

- **Soft release procedure**
  A soft release involves providing the animal with support, such as supplementary feeding once it has been release to the wild for a short time until it ceases to rely on people for food. This is a difficult procedure as the bird needs to be slowly weaned off carer given food and introduced to catching its own food. It is recommended to slowly decrease the amount of food offered over time and offer the same food items that can be hunted by the bird in the wild. Such as rabbit, carrion etc. Another option is having an enclosure built in the same area that you wish to release the Wedge-tail and giving it a few days in that aviary to get used to its surroundings. This is risky due to stresses on the bird and the chance of other animals trying to get into the aviary, but can give the bird a chance to adjust to its new environment. The soft release method is suitable for young orphaned eagles that must learn survival techniques from its carer.

- **Hard release procedure**
  The hard release procedure involves releasing the Wedge-tailed Eagle to the wild and letting it survive on its own. This can be done providing that again, it can survive on its own and has been deemed healthy by a veterinarian. The hard release option is suitable for adult Wedge-tailed Eagles that have perhaps been injured, and have not been in care for long.

*Figure 19. Hard release of a Wedge-tailed Eagle to the wild (Croxon 2017).*
12 Acknowledgements

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14 Bibliography

http://www.birdsinbackyards.net/species/Aquila-audax
15 Glossary

ASMP – Australasian Species Management Program.
Bi-annual - Twice a year.
Clinical – relating to the observation and treatment of actual patients rather than theoretical or laboratory studies.
Clutch - a group of eggs.
Down feathers - layer of fine feathers found under the tougher exterior feathers.
EA – environmental assessment.
Ergonomic – designed for comfort and efficiency in the work place.
Flagyl – antibiotic that is used to treat or prevent infections that are caused by bacteria.
Fledge – a young bird flying for the first time.
Gizzard – a muscular, thick walled part of a bird’s stomach for grinding food.
Hessian - a strong, coarse fabric made from hemp or jute, used for sacks.
Hybrid - offspring of two animals of different species.
IATA – International Air Transport Association.
Imprint – animal that comes to recognize a human as a parent or other object of habitual trust.
Incubation - the process of warming eggs in order to hatch them.
Keel - a ridge along the breastbone of many birds to which the flight muscles are attached.
Lock-away – an area/room/enclosure that an animal can be moved to or encouraged in to that can be closed off to the main enclosure. E.g. when cleaning a Wedge-tailed Eagle enclosure, they are moved into a lock-away for staff protection.
MSDS - Material Safety Data Sheet.
Nomenclature - term or name applied to something.
OHS – Occupational health and safety.
Permit – official document allowing someone to do something.
Pinioning - restraining or immobilizing
Plumage – A bird's feathers.
Pneumatization – development of air cells or air pockets within bones.
PPE - Personal protective equipment.
Slurry - A semi-liquid mixture.
Studbook – a record of the pedigrees/genetics/breeding of a certain species.
Substrate - an underlying substance or material.
Supplement - something added to something else in order to make it better or complete.
ZAA – Zoo and Aquarium Association.
MATERIAL SAFETY DATA SHEET

F10SC VETERINARY DISINFECTANT

COMPANY DETAILS

UK Distributor: Mapleson, Animal Healthcare Ltd
Unit 7, Windmill Industrial Estate
Windmill Road, Loughborough
Leicestershire, LE11 3RA
ENGLAND.
Tel: 01509 266857

Manufacturer: Health and Hygiene (Pty) Ltd
P.O Box 908 Florida Hills 1718
South Africa
Tel: 27 11 474-0668 Fax: 27 11 474-3570
E-mail: info@healthandhygiene.co.za
Website: www.healthandhygiene.co.za

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: F10SC VETERINARY DISINFECTANT
UN Number: None
SYNONYMS: None
CLASSIFICATION: None
CHEMICAL FAMILY: None

USE: Biodegradable multi-purpose disinfectant for hard surfaces, equipment and equipment.

SECTION 2. COMPOSITION

Quaternary ammonium and quaternary compounds (5%), non-ionic emulsifiers and sequesterants.

ECC Classification: Insignificant. R-phrases: R41/R28: May cause serious damage to eyes. Inhaling to the skin. (Packed concentrates only) 32. Keep out of the reach of children. 32. Keep container tightly closed.

SECTION 3. HAZARD IDENTIFICATION

HAZARD
Packed Concentrate
Use Dilutions (1:100 and higher)

MAIN HAZARD
IRRITANT

HEALTH EFFECTS

SWALLOWED
Ingestion of the concentrate may cause irritation to mouth, throat and digestive tract.

EYE
Concentrate may cause serious damage to the eyes.

SKIN
Concentrate may act as mild degreaser to sensitive skin.

INHALED
None

SECTION 4. FIRST AID MEASURES

SWALLOWED: DO NOT induce vomiting. Give milk or water to drink. Seek medical advice where necessary.

EYE: Rinse thoroughly with clean water or buffered eye wash for 15 minutes. Seek medical advice where necessary.

SKIN: Wash affected area with soap and water.

INHALED: Not applicable

FIRST AID FACILITIES: Contact your medical practitioner or the emergency department of your local hospital.

ADVICE TO DOCTOR: Treat symptomatically.

SECTION 5. FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA: Not flammable

SPECIAL HAZARDS: None

PROTECTIVE CLOTHING: Not required

SECTION 6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS: No special precautions required

ENVIRONMENTAL PRECAUTIONS:

SMALL SPILLS: Push with large amounts of water

LARGE SPILLS: Soak up on inert material e.g. dry earth and dispose of in an area approved by local authority
MATERIAL SAFETY DATA SHEET

F10 SC VETERINARY DISINFECTANT

7. HANDLING AND STORAGE

HANDLING/STORAGE PRECAUTIONS: Store below 30°C in dry conditions.

8. EXPOSURE CONTROL/PERSONAL PROTECTION

OCCUPATIONAL EXPOSURE LIMITS: Not data found

ENGINEERING CONTROL MEASURES: None required

PERSONAL PROTECTION - RESPIRATORY: None required

PERSONAL PROTECTION - HAND: Wear waterproof gloves. Packed concentrate only

PERSONAL PROTECTION - EYE: Wear eye protection. Packed concentrate only

PERSONAL PROTECTION - SKIN: None required

OTHER PERSONAL PROTECTION: None required

5. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Clear, colourless liquid.

ODOR: Slight natural odour

PH: 7.5

BOILING POINT: 110°C

FLASH POINT: Not flammable

EXPLOSIVENESS: Not explosive

OXIDIZING PROPERTIES: None

VAPOUR PRESSURE: Not known

DENSITY: 1.0

SOLUBILITY IN WATER: Soluble

10. STABILITY AND REACTIVITY

CONDITIONS TO AVOID: DO NOT mix with soaps and other chemicals

INCOMPATIBLE MATERIALS: Anionic detergents/chemicals

HAZARDOUS DECOMPOSITION PRODUCTS: Not known

11. TOXICOLOGICAL INFORMATION

Toxicity Table:

<table>
<thead>
<tr>
<th>Toxicity</th>
<th>Packed Concentrate</th>
<th>Use Dilutions (1:100 and higher)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Oral Toxicity (Rat)</td>
<td>&gt;10000mg per kg</td>
<td>No toxicity (&gt;1000 000mg per kg)</td>
</tr>
<tr>
<td>Acute Dermal Toxicity (Rat)</td>
<td>&gt;5000mg per kg</td>
<td>No toxicity (&gt;500 000mg per kg)</td>
</tr>
<tr>
<td>Acute Eye Irritation</td>
<td>May cause serious damage</td>
<td>None</td>
</tr>
<tr>
<td>Acute Dermal Irritation</td>
<td>Slight irritation</td>
<td>None</td>
</tr>
<tr>
<td>Acute Inhalation Toxicity</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Skin Sensitization</td>
<td>Not a skin sensitizer</td>
<td>Not a skin sensitizer</td>
</tr>
</tbody>
</table>

12. ECOLOGICAL INFORMATION

Aquatic Toxicity – Fish: 10mg/l

Aquatic Toxicity – Algae: Not available

Aquatic Toxicity – Daphnia: 0.0mg/l

Biodegradaability: Biodegradaible

13. DISPOSAL CONSIDERATIONS

Disposal Methods: Seal up an inert material e.g. dry earth and dispose of in an area approved by local by-laws. Flush small spills with copious amounts of water.

Disposal of Packaging: Rinse thoroughly before discarding.
Image 1a, b & c. MSDS (Material Safety Data Sheet) for F10Sc

Material Safety Data Sheet

LIQUID BLEACH

1. IDENTIFICATION OF THE MATERIAL AND SUPPLIER

Product Name
Company Name
Address
Telephone/Fax Number
Recommended Use

2. HAZARDS IDENTIFICATION

Health Statement(s)

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Characterization

4. FIRST AID MEASURES

First Aid Measures

Inhalation

Ingestion

Skin

Eye

First Aid Facilities

Advice to Emergency Personnel

Other Information

59
5. FIRE FIGHTING MEASURES

Suitable Extinguishing Media
Use dry chemical, carbon dioxide, foam or water fog, appropriate to surrounding fire.

Records from Combustion Products
Corrosive or toxic fumes.

Special Protective Equipment for Fire Fighters
Self-contained breathing apparatus (SCBA) required for fire-fighting personnel. If necessary to do so safely, wear self-contained breathing apparatus and to protect personnel.

Specific Hazards
If tanks, drums or containers of this material are heated, they may rupture and project corrosive materials over a wide area. They react violently with strong acids. They react vigorously or violently with reducing agents or oxidizers. Contact with acids will generate chlorine, a poisonous gas. Contact with water metals will generate hydrogen, a flammable gas. Contact with reactive metals will generate metals, a phosphine gas.

Health Code
IR

Exposure Limit
H

Stabilising Extinguishing Media
H

Other Information
Avoid contact with coloured fabrics. Goggles may bleach colour out.
May give off dangerous gas if mixed with other products.

6. ACCIDENTAL RELEASE MEASURES

Emergency Procedures
Keep unnecessary people away. Isolate hazard area and deep entry. They ignite. Keep out of low areas. Do not walk or touch material spills. Wear personal protective equipment as outlined above. Do not contaminate drains or dike. Do not attempt to stop leak if you cannot do so without risk. Wear apron and rubber gloves.

Spills & Disposal
H

SHELL Spills:
Take up with sand, clay or vermiculite. Do not use water. Use non-flammable tools. Pour into labelled drums. For larger disposal.

LARGE Spills:
Take up with absorbent sawdust or felt blankets. Roll up and remove. Pack drums, barrels, drums, barrels, quarts, type of vehicle and any other information that would be helpful. Contact spill responder. All equipment and safety steps. Flammable liquids. Avoid contact with skin and eyes. Avoid fire in disposal area. Contact or expert regarding disposal of this product.

7. HANDLING AND STORAGE

Procedures for Safe Handling
In a well ventilated place, not near children, large quantities should be stored in a sealed, double-walled metal tank. Place in plastic, rubberized, steel containers tightly closed or in polyethylene or glass storage. Keep away from acids, peroxides, reducing agents, combustible materials, and explosive salts. Keep away from acids and metal salts.

Conditions for Safe Storage
Store in cool, dry area. Keep away from physical damage. Clean up all spills and splashes promptly. Avoid secondary contamination.

Storage Regulations
H

9. EXPOSURE CONTROLS/PERSONAL PROTECTION

Biological Limit Values
H

Engineering Controls
Corrosive liquid. Maintain adequate ventilation at all times. In most circumstances natural ventilation systems are adequate unless the material is heated, reacted or interates changed in some form of mechanical action, then use a local exhaust ventilation system or enclosure.

Respiratory Protection
H

Eye Protection
H

Head Protection
H

Personal Protective Equipment
PPE contact with the eye. Avoid contact with the skin. Avoid breathing vapors. HAZARDOUS When diluted at a ratio of 1:1 or greater, the resulting mixture is no longer considered to be hazardous or corrosive and the use of protective equipment is at the user’s discretion. General precaution to be exercised from the recommended below, as appropriate to mode of use, quality, and nature and degree of hazardousness. Face/Head: Full face acid-resistant protective goggle. Eyes: High-impact protective plastic frame safety glasses. Nose: Rubber or plastic. Ear: Earplugs/splints. Skin: Appropriate cover-all or protective gear and are. Respiratory: In accordance with ACGIH H515. The use of a NIOSH listed respirator or with replaceable filters is recommended. Filter capacity and recommendations vary according to equipment itself and type of contaminants. Fumes: Use respirator with appropriate filter or cartridge. Additional emergency and personal protective equipment specific to the use of a self-contained breathing apparatus (SCBA) with positive pressure air supply compliance with ANSI Z88.1-1999, or any other relevant/ international standards is recommended. Always maintain a high level of personal hygiene when using chemical. Wear gloves. Where or when handled before eating, washing, smoking, or using the toilet.

10. PHYSICAL AND CHEMICAL PROPERTIES

Form
Liquid

Appearance
Faint yellow liquid.

Other
Typical chlorine like odour.

Decomposition Temperature
H

Melting Point
H

Boiling Point
H

Solubility in Water
Maximizes with water in its proportion.

Specific Gravity
1.1

pH Value
1.0-3.5 (4 solutions)

Vapor Pressure
H

Evaporation Rate
H

Other Threshold
H

Viscosity
H

Octanol/Water Partition Coefficient
H

Density
H

Flash Point
H

Flammability
Not flammable.

Auto-Ignition Temperature
H

Flammable Limits - Lower
H

Extrinsic Viscosity
H

Dynamic Viscosity
H

Explosion Limit - Upper
H

Explosion Limit - Lower
H

Other Information
Very flammable. Will cause violently with acids, producing heat and generating chlorine gas. Handling, contact with combustible materials may cause fire. Will react violently with reducing agents.密度 unstable under moisture from the air. Will react with chlorine, cyan and some strong oxidizing agents, a flammable gas. May react with halogenated and water salts. Contact with ammonia salts may generate ammonia gas.
10. STABILITY AND REACTIVITY

Chemical Stability
 Stable under normal use conditions.

Conditions to Avoid
 Heat, friction, ignition sources and incompatible materials.

Incompatible Materials
 Acids, oxidizing agents, ammonia salts, soft metals.

Hazardous Decomposition Products
 Oxide of copper and corrosive fumes when heated to decomposition.

Hazardous Reactions
 Contact with chlorine, etc. may lead to the generation of hydrogen, a flammable gas. Contact with ammonia compounds can generate ammonia, a poisonous gas. Will react violently with water, generating chlorine gas. May form toxic oxides of chlorine if involved in a fire.

Hazardous Polymers

11. TOXICOLOGICAL INFORMATION

Toxicology Information
 No adverse health effects are expected. If the product is handled in accordance with this Material Safety Data Sheet and the product label. Symptoms and effects that may arise if the product is mishandled and inappropriate routes occur are:

Inhalation
 Will cause severe irritation to the nose, throat and respiratory system with effects including: Irritation, headache, coughing, loss of consciousness, short pains, respiratory paralysis and/or failure.

Ingestion
 Will cause burns to the mouth, upper abdominal, throat, pharynx and stomach. If sufficient quantities are ingested (swallowed) death may occur.

Skin
 Will cause burns to the skin, with effects including: Numbness, blisters, irritated eyes and dermatitis.

Eye
 Will cause burns to the eyes with effects including: Pain, tearing, conjunctivitis and if duration of exposure is long enough blindness will occur.

Chronic Effects
 Prolonged or repeated abuse of the product will lead to numbness (numbness) of the skin. Prolonged or repeated exposure to deliberately concentrating and inhaling the vapors may result in lung function incontinuity or death.

Acute Toxicity - Oral
 LD 50 > 5000 mg/kg invertebrates 500 mg/kg, mice.

12. ECOLOGICAL INFORMATION

Biodegradability
 This product is not corrosive and may be disposed in large concentrations, particularly in the aquatic environment.

Persistence / Degradability
 Readily biodegradable.

Mobility
 Readily adheres to soil.

Information on Ecological Effects
 This reagent may cause acute short-term effects in the aquatic environment.

Environmental Protection
 Avoid contaminating waterways, drains, sewers, or ground.

13. DISPOSAL CONSIDERATIONS

Disposal Considerations

Waste Disposal
 Refer to appropriate authority in your state. Dispose of material through a licensed waste contractor. Normally suitable for disposal by approved waste disposal agent.

14. TRANSPORT INFORMATION

Transport Information
 Classified as a Class 6 Oxidizing Material. Oxidizing materials are incompatible with the following: - Class 1, Class 4.4, Class 5, Class 6, if the Class 6 materials grade andDynel are present and the Class 6 oxidizing grade is sterile and Class 7, Store away from action.

P.H. Number
 21743

Proper Shipping Name
 HYPOCHLORITE SOLUTION

UN Class
 R

North American Code
 2X

Shipping Group
 III

EPD Number
 661

ISO Number
 17

IMDG Marine Pollutant (MP)

15. REGULATORY INFORMATION

Regulatory Information

HAZARDOUS SUBSTANCE - REGULATORY GUIDANCE
 Classified as Hazardous according to criteria of National Occupational Health and Safety Commission, Australia (NOHSC). Classified as a Formaldehyde Poison according to the Poisoning for the Uniform Scheduling of Medicines and Poisons (USMP).

Pictograms

Rearr Category
 36

ADSS (Australia)
 instate

AZS (Australia)
 instate

16. OTHER INFORMATION

End of MSDS

Image 2. MSDS for Bleach
INSECTIVORE REARING MIX

**Insectivore Rearing Mix** is a balanced diet for rearing or supplementing insectivorous or carnivorous birds. These species require a high proportion of protein in their diet.

**ANALYSIS (Powder)**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein</td>
<td>52%</td>
</tr>
<tr>
<td>Fat</td>
<td>12%</td>
</tr>
<tr>
<td>Carbohydrate</td>
<td>18%</td>
</tr>
<tr>
<td>Ash</td>
<td>11%</td>
</tr>
<tr>
<td>Moisture</td>
<td>7%</td>
</tr>
<tr>
<td>Energy (ME)</td>
<td>16 MJ/kg</td>
</tr>
</tbody>
</table>

**INGREDIENTS:** Meat meal, fish meal, blood meal, whey protein, soy protein, lysine, methionine, mannan oligosaccharides, β-glucans, vegetable oils, omega-3 (including EPA & DHA), and omega-6 fatty acids taurine, carotenoids, vitamins A, B1, B2, B6, B12, C, D3, E, K, nicotinamide, pantothenic acid, biotin, folic acid, choline, inositol, calcium, phosphorus, potassium, sodium, magnesium, zinc, iron, manganese, copper, iodine, selenium.

**PACK SIZES:** 250g, 1kg, & 5kg net

**TYPICAL COMPOSITION per kg**

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein</td>
<td>520g</td>
</tr>
<tr>
<td>Vitamin A</td>
<td>3000IU</td>
</tr>
<tr>
<td>Vitamin D3</td>
<td>900IU</td>
</tr>
<tr>
<td>Pyridoxine</td>
<td>15mg</td>
</tr>
<tr>
<td>Folic Acid</td>
<td>6mg</td>
</tr>
<tr>
<td>Sodium</td>
<td>3g</td>
</tr>
<tr>
<td>Magnesium</td>
<td>500mg</td>
</tr>
<tr>
<td>Zinc</td>
<td>23mg</td>
</tr>
<tr>
<td>Fat</td>
<td>120g</td>
</tr>
<tr>
<td>Vitamin K</td>
<td>7mg</td>
</tr>
<tr>
<td>Vitamin B12</td>
<td>130µg</td>
</tr>
<tr>
<td>Biotin</td>
<td>550µg</td>
</tr>
<tr>
<td>Iron</td>
<td>70mg</td>
</tr>
<tr>
<td>Omega 3</td>
<td>6.7g</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>150mg</td>
</tr>
<tr>
<td>Choline</td>
<td>1.8g</td>
</tr>
<tr>
<td>Magnesium</td>
<td>12mg</td>
</tr>
<tr>
<td>Thiamine</td>
<td>45mg</td>
</tr>
<tr>
<td>Inositol</td>
<td>500mg</td>
</tr>
<tr>
<td>Copper</td>
<td>4mg</td>
</tr>
<tr>
<td>Carbohydrate</td>
<td>180g</td>
</tr>
<tr>
<td>Riboflavin</td>
<td>13mg</td>
</tr>
<tr>
<td>Calcium</td>
<td>23g</td>
</tr>
<tr>
<td>Iodine</td>
<td>600µg</td>
</tr>
<tr>
<td>Energy (ME)</td>
<td>16MJ</td>
</tr>
<tr>
<td>Niacin</td>
<td>200mg</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>14g</td>
</tr>
<tr>
<td>Selenium</td>
<td>150µg</td>
</tr>
<tr>
<td>Taurine</td>
<td>500mg</td>
</tr>
<tr>
<td>Pantothenic Acid</td>
<td>70mg</td>
</tr>
<tr>
<td>Potassium</td>
<td>6g</td>
</tr>
</tbody>
</table>

**DIRECTIONS**

Prepared food may be stored refrigerated for a day or frozen for up to 2 weeks. Do not add extra vitamin, mineral or concentrated food supplements to these diets.

**Meat Mix:** Mix 10g (1 level scoop) of powder with 20g of minced meat or fish.

A little water may be necessary to moisten the preparation. Always use good quality meat or fish as a base. Feed as a maintenance diet to magpies, ravens, kookaburras, frogmouths, raptors and seabirds.

**Egg Mix:** Mix 20g (2 level scoops) of powder with 1 large hard-boiled egg.
Mash the egg with a fork and then slowly add the powder to turn into a crumbly mass. Feed as a maintenance diet to small insectivores (e.g. wrens, robins), waders or to orphaned precocial chicks. Mix in live insects to encourage intake. Can also be used as a protein supplement for softbills, songbirds, breeding finches & parrots.

**Moist Pellets:** Mix 20g (2 level scoops) of powder with 12mL of warm water. Slowly add the water and mix to a putty-like consistency. Break small pieces from the prepared mix and roll into pellets for feeding. Extra water should be offered by mouth when feeding pellets. Use as a rearing food for orphaned magpies, ravens, kookaburras or frogmouths.

**Liquid Slurry:** Add 10g (1 level scoop) of powder with 15mL of warm water. Slowly add water and mix to make a slurry. Let the mix stand for 2 minutes to absorb all the water. If too thick, add more water and continue mixing. Feed at about 30°C using a spoon or syringe and tube. Use as a force-feeding formula for sick birds or orphaned altricial chicks.

**Raptors & Seabirds (Whole body-eaters):** Stuff 10g (1 level scoop) of powder per 100g of whole fish, rodent or day old chick. Cavities may be stuffed by preparing as a slurry and using a syringe.

---

**CONTACT DETAILS**

Leigh Valley Hawk and Owl Sanctuary
Martin Scuffins – Director and Raptor Handler
**Address:** 493 Hardies Hill Road, Garibaldi, VIC, 3352
**Phone:** 0427 414 623
**Email:** info@hawkandowl.com.au
**Facebook:** Leigh Valley Hawk and Owl Sanctuary
**Website:** Leigh Valley Hawk and Owl Sanctuary

Vetafarm (products such as Soluvite D Breeder and Spark Liquid)
**Address:** 3 Bye Street, Wagga Wagga, NSW Australia, 2650
**Phone:** (02) 6933 0400
**Fax:** (02) 6925 6333
**Email:** sales@vetafarm.com.au
**Facebook:** Vetafarm
**Website:** http://vetafarm.com.au/

Wombaroo/Passwell (food products)
**Address:** PO Box 151
Glen Osmond
South Australia 5064
**Phone:** (08) 8391 1713
**Email:** wombaroo@internode.on.net
**Website:** www.wombaroo.com.au