

Husbandry Manual for



Spectacled Flying Fox

Pteropus conspicillatus

Mammalia: Pteropodidae

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Maintenance Graph

Task	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Breeding Season		████████████████████										
Hessian Blinds		████████████████████							████████████████			
Vet Check	████████					████████████████████						████████
Major Maintenance	████████											████████
Minor Maintenance						████████████						████████
Worming	████████				████████				████████████			
Diet Change						████████████████████						
Birthing Season									████████████████			

1 Introduction

The Spectacled Flying Fox is a “Placental and are distinguished from other mammals in that the foetus is nourished during gestation via a placenta in the uterus”. (Wikipedia McKenna MC & Bell SK, (1997), Classification of Mammals Above the Species Level. Columbia University Press.)

The Spectacled Flying Fox is native to Australia and the Torres Strait Islands they are found in the humid rainforests, Hinchinbrook Island, north of Tully, Cape York Peninsula in Queensland and extending up to the Torres Strait Islands. They nest in large colonies a gradient of 100– >15,000.

They roost on dead trees they strip the foliage, flowers and have been known to use roosting sites for over 10 years.

The Spectacled Flying Fox are herbivore/frugivorous.

Black Flying Fox and the Spectacled Flying Fox share nesting areas which I observed at Chillagoe. This part of Queensland is mainly made up of thick mangroves. The Colonies are small and tend to be those of juvenile Spectacled Flying foxes and Black Flying Foxes.

(January 2005)

Their vocalisation is a high pitched chatter and males are more vocal than females. They frequently climb to the highest point of the tree to vocalise to other surrounding colonies.

Spectacled Flying Foxes and other Megachiroptera, urinate on their chest for scent marking their territory and other flying foxes so that they can identify each member in the colony. It is also used as a means to cool their bodies in the hot humid summer days that can reach up to 45 degrees Celsius and 96% humidity.

Spectacled Flying Fox size varies between sexes.

Weight – (F)= 700gm >(M)= 1000gm Forearm – (F)= 155mm >(M)=182mm, however during mating season males are broader across the scapula, this has also been noted in Grey Headed Flying Foxes.

Unfortunately, the Spectacled Flying Fox is under a lot of threat due to orchardists being able to cull the Spectacled Flying Fox in the thousands every year, only now has there been talk of a permit licence instated to protect the Spectacled Flying Fox.(April 2005) “Austrop Organisation “

OH&S

Never attempt to handle a baby, juvenile, adult Flying Fox or Micro bat, without first having your inoculations to protect yourself against the Lyssa-virus number 7 in the rabies strand.

Is your Lyssa-virus booster up to date?

Spectacled Flying Fox: *Pteropus conspicillatus*

The OH&S issues that arise with capture and restraint of Flying Foxes is as follows

1. All persons involved must be inoculated against the Lyssa Virus number 7 of rabies. Have proof of 12+ teeter levels from a Doctor; otherwise transmission of the virus may be inevitable if bitten. There is no cure for the Lyssa Virus and is seen as fatal. It can only be transmittable by saliva to blood or open wounds; being that flying foxes have sharp canines - bites are sometimes inevitable.

There are also two other potentially fatal viruses which the flying fox has been known to carry, these are the Hendra virus which is usually and equine virus and the Menangle virus which pigs carry. No humans to date 12.03.05 have contracted these viruses from flying foxes, but all carers must be aware that precaution must be upheld when dealing with all species of the flying foxes. Gloves can be used, however, it is hard to judge the tightness of your grip or feel the animal's delicate wing membranes.

If bitten, even though you are inoculated against the Lyssa Virus you should see a GP for advice, as he may suggest getting a booster depending on the length between shots.

2. Eye gouging is another risk of flying foxes when having to capture a flying fox from a colony. Eye protection should be worn as a precaution as flying foxes are curious and use their thumbs to grab on to the closest thing to them which will be your head. If eye gouging does occur flush the eye with running fresh water and seek medical attention.

3. Scratches are also common during capture and restraint, and is one of the most common ways of contracting tetanus, please make sure your tetanus booster is up to date. Tetanus can also be fatal. Gloves can be used, however, it is hard to judge the tightness of your grip or feel the animal's delicate wing membranes. If scratched wash the area well with antibacterial wash and if symptoms of tetanus appear seek urgent medical attention. Tetanus usually starts with red lines travelling up the length of the wound site.

4. Flying foxes carry a lot of pathogens, both in the wild and in captivity; the most common of these are worms such as rat lungworm, round worm, fungal growth such as ringworm and Ectoparasites such as mites. Flying foxes also bathe in their own urine to

scent mark other flying foxes. Rigorous hygiene must be carried out, such as washing of hands with antibacterial soap in between handling of flying foxes and after handling flying foxes - this stops the spread contamination to you and other flying foxes. To further prevent contamination to you against round worm, worming yourself every six month may be a good preventative and excellent hygiene.

2 Taxonomy

2.1 Nomenclature

Kingdom - Animalia

Phylum - Chordata sub-phylum- Vertebrate

Class - Mammalia sub-class- Eutherian

Order - Chiroptera sub-order- Megachiroptera

Family - Pteropodidae

Genus - Pteropus

Species - *Pteropus conspicillatus*

2.2 Subspecies

None

2.3 Other Common Names

Spectacled Fruit Bat

3 Natural History

3.1 Morphometrics

The Spectacled Flying Fox is one of our smaller flying foxes and is slightly smaller than the more prevalent Grey Headed Flying Fox.

3.1.1 Mass and Basic Body Measurements

Male

Head to end body	220-240mm
Forearm.....	185-196 mm
Weight.....	934 – 1000gm
Bust.....	75 – 100mm
Wingspan.....	740 – 784mm

Female

Head to end body	210-230mm
Forearm.....	167 – 182mm
Weight.....	650 – 875gm
Bust	65 – 85mm
Wingspan.....	668 – 728mm

3.1.2 Sexual Dimorphism

The sexual dimorphism is the occurrence in an animal species of two distinct types of individual. “Collins English Dictionary Australian Edition Edited by G.A. Wilkes”

This species is sexually dimorphic in size also there genitalia is external such as the males penis and testies are visual to the naked eye.

3.1.3 Distinguishing Features

The Spectacled Flying Fox, features are set apart from all other Flying Foxes as they are known prolifically for their straw coloured fur that surrounds their eyes, which gives them the appearance, of wearing spectacles.

Around the collar and shoulders of the Spectacled Flying Fox the fur colour varies between gold straw to light ivory, this feature is not gender biased nor are the facial features between male and female. In some cases young Spectacled Flying Foxes eye rings may not be obvious and are sometimes mistaken for Black Flying Foxes.

(Australian Natural History Series Flying Foxes Fruit and Blossom Bats of Australia, Written By Leslie Hall and Greg Richards publication 2000 – Chapter 3 ID and Distribution Page 13)

3.2 Distribution and Habitat

The most common distribution on the main land of Australia is of course Queensland's Far North Coast in the wet tropics of Tully and continuing up through to the tip of Cape York.

They are found close to dense rainforests and occasionally in the mangroves, especially in the summer months, where they share the area with the Black Flying Fox population. However, it has been noted that only juvenile Spectacled Flying Foxes have been seen roosting in amongst the Black Flying Foxes.

Off the coast of Australia from Hitchin brook Island to the Torres Strait Islands including Trobriand Islands and across Indonesia, the Spectacled Flying Foxes roost in large colonies for some of the year.

The Spectacled Flying Fox prefers hot and humid tropic regions where temperatures can reach up to 45 degrees Celsius, a relative humidity reading of 96%.

They roost in dense rainforest to escape direct sunlight on exceptionally hot summer days and this also provides easy feeding areas and safety areas for their young. However, this has caused an outstanding amount of deaths during the past year of 2004; the deaths were due to tick paralysis, as the Spectacled Flying Foxes roost in dense tick shrubs for shelter from blazing sun and to feed.

(Refer to appendices 5 Distribution of the Flying Foxes in Australia)

The Distribution of the Spectacled Flying Fox is quite Small Compared to that of the Grey Headed Flying Fox, Black Flying Fox and Little Red Flying Fox.



3.3 Conservation Status

The conservation status in Australia's main land and the Torres Strait Islands is as follows:

Sites listed the Spectacled Flying Fox as vulnerable.

The IUCN status of the spectacled flying fox is presently being reviewed, as abundant evidence shows there has been a steep decline in their numbers over the past 30 or so years. (www.austrop.org.au/fox_threats.html 1/06/05)

3.4 Diet in the Wild

Spectacled Flying Foxes are Herbivore / frugivorous

Family – Eucalyptae /Melaleucas

Common Name: Mugga, Red Ironbark

Scientific Name: *Eucalyptus sideroxylon*

Flowers: large flowers pink in colour and usually flowers late summer and autumn

Common Name: Forest Red Gum

Scientific Name: *Eucalyptus tereticornis*

Common Name: Pink Blood Wood

Scientific Name: *Eucalyptus intermedia*

Common Name: Iron Bark

Scientific Name: *Eucalyptus fibrosa*

Flowers: The flowers of an ironbark are cream in colour and usually flowers in summer.

Common Name: Stringy Bark

Scientific Name: *Eucalyptus phaeotricha*

Common Name: Tallow Wood

Scientific Name: *Eucalyptus microcorys*

Common Name: Grey Gum

Scientific Name: *Eucalyptus propinqua*

Common Name: Paperbark

Scientific Name: *Melaleucas quinqueneruia*

Flowers: Flowers are white to cream and develop from February to July. This occurs along the coast of eastern Australia.

Common Name: Spotted Gum

Scientific Name: *Corymbia maculata*

Flowers, Seeds and Fruit: The spotted gum blossom, flowers in early spring.

Common Name: Flax leaf Paperbark

Scientific Name: *Melaleuca lineariifolia*

Common Name: Brush box

Scientific Name: *Lophostermon confertus*

Fruits and Flowers: The Brush Box has both fruit and flowers. Its feathery cream flowers blossom in late spring and the fruit is a three celled capsule, bell-shaped and has a smooth surface.

Common Name: Swamp Box

Scientific Name: *Lophostenion suvaeleolens*

Common Name: Lemon Scented Tea Tree

Scientific name: *Leptospermum liversidgei*

Other native flora that is a part of the Spectacled Flying Foxes diet is as follows:

Palm nectar and fruit, occasionally leaves of native plants, particularly, tea-trees, mangrove plants for salt consumption, Grevilleas, Figs, Callistemon, Banksia's and Lily Pilly. They will also take the fruit of cultivated trees, particularly during periods of shortage of their preferred food.

Most feeding is done within 5 to 15 kilometres from the campsite, but they can travel up to 40 kilometres or more in search of native nectar, blossom and fruit. Flying-foxes prefer to feed close to where they roost, especially in breeding season and the rearing of their young.

3.5 Longevity

3.5.1 In the Wild

Depending on their habitat, environment and predators, their longevity in the wild has a life span of 1-9 years.

3.5.2 In Captivity

Spectacled Flying Fox in captivity tend to have a longer life span due to the environment in which they are kept. Some factors are health treatments, constant supply of a nutritious diet and no predators. The longest recorded life span is 21years with an average of 19 years.

4 Housing Requirements

4.1 Exhibit/Enclosure Design

Spectacled Flying Fox enclosures must be built to the guidelines of the EAPA and offer shelter, water, environmental enrichment, food and Veterinarian attention.

Exhibited Animals Protection Act 1986 No 123 – EAPA of NSW

When designing your Spectacled Flying Fox enclosure, you must take into account the behavioural mannerisms of the Spectacled Flying Fox, they are curious and inquisitive mammals, and they are active both during the day and night.

The items to avoid when constructing your enclosure is galvanised mesh or raw zinc coated mesh as this can lead to poisoning or high toxic levels of zinc in the body. Also avoid sharp edges and wire joins as Spectacled Flying Foxes have delicate wing membranes that are easily torn, or have thumbs caught.

Safe material to be used for the flying fox enclosures is as follows:

¼ inch reinforced perspex can be used as a means for roofing as this allows sunlight in but protects them from the wind, rain, bird or wild bat droppings being able to come into contact with your Spectacled Flying Fox collection.

10 -15mm teflon mesh, powder coated “polyethylene mesh”, or non galvanised mesh, however, this mesh does not have a very long life. This mesh causes sighting restrictions to the public, in viewing the animal on exhibit.

In order to avoid the possibility of members of the public being bitten or scratched, it is recommended that a 3-4cm gap between double mesh walls be used to stop the contact between the two. Spectacled Flying Foxes carry a rabies like virus called the LyssaVirus and it is a zoonotic disease.

The Act, with respect to the exhibition of animals at marine or zoological parks, circuses and other places states that:

Schedule 3 - Licensing standards (Sections 14, 25) 1 Housing fencing, caging and exercise facilities for animals.

The enclosure in which animal or animals are kept must be structurally sound and allowing for adequate exercise/movement are to be kept in good repair.

EAPA of NSW

Enclosure for the Spectacled Flying fox should be as follows:

It is advised by the Department of Agriculture “Steven Jackson” recommends a flight enclosure to be “four times the span of the wings at full spread and four times the body length in height for Flying foxes” and only for temporary housing.

An enclosure that has 7 or more animals sharing the same area, has to allow for group behaviour patterns. [EAPA of NSW]

4.2 Spatial Requirements

Spectacled Flying Foxes live in hierarchy colonies in the wild, therefore, when taking into consideration the spatial requirements, you must consider that many high points are placed within the enclosure.

The dominant Spectacled Flying Foxes will seek out these areas. If sufficient higher points are placed around your enclosure it reduces fights within the colony.

4.3 Size of Enclosure

Noting that flying foxes live in large colonies in the wild it is never advised that Spectacled Flying Foxes are housed individually. This can lead to health problems such as stress and aggressive behaviour and even death.

The following enclosure dimensions are as stated by the EAPA for 3-6 Flying Foxes:

The height is to be 3.8 meters

The breadth must be 4 meters

The width must also be 4 meters

For each extra Spectacled Flying Fox a minimum of 1.6 x 1.6 cubic spaces should be offered.

The animal must be provided with sufficient space for exercise and be provided with social husbandry needs [EAPA of NSW].

4.4 Position of Enclosures

Spectacled Flying Foxes enjoy a good amount of sun bathing and it is a vital part to the absorption of Vitamin D that prevent slimy wing; slimy wing is a fungi that grows in the creases of the wing (Refer to 8.3 known health problems in this manual for aetiology).

The enclosure should be positioned, where they get either, the late afternoon sun or the early morning sun.

Approximately 90% of their enclosure should be shaded from the sun at the middle of the day. On my observations in the past 1.5 years Spectacled Flying Foxes, sun bath early morning or late afternoon and seek shade from 11am on wards in the summer time and midday in the winter months, as noted in wild populations of Cairns QLD, in June 2005.

The sun bathing behaviour of the Spectacled Flying Fox is also to reduce the possible cause of wing pathogen outbreaks in the wetter months of the year and also because of the humid climate they originate from, being far North Queensland.

4.5 Weather Protection

Caution should also be taken so that the Spectacled Flying Foxes are not overheated in their enclosures. [Australian mammal care assignment 2003.]

Even though, Spectacled Flying Foxes come from a high heat and high humidity climate, great care must be taken when protecting them from harsh weather conditions, such as wind, rain and sun.

One way I find effective in the design of their enclosure for weather protection is:

30% solid coverage on roofs and 3 walls, this allows adequate room for the Spectacled Flying Foxes to escape heavy winds, rain and sun.

30% open wire mesh on walls and roof this is to promote sun bathing and rain bathing.

40% of the enclosure should be made up of open wire mesh on one side and shade cloth around the other 2 side walls, the roof also should be covered with a layer of shade cloth then a perspex layer above that.

Adequate ventilation is needed to avoid faecal and urine odours from becoming unbearable. Good ventilation is necessity for the Spectacled Flying Foxes as it avoids the common problem of heat exhaustion in the summer months and respiratory problems caused by high humidity.

Other media used to control temperatures are sprinklers on the roof or walls; sprinklers to keep the circulating air in the enclosure cool.

On a cold winter's day heat lamps can be used, however, care must be taken when placing them into the enclosure as the Spectacled Flying Fox are sure to burn their wings or sensitive noses. A safe way to avoid this from occurring is to place a metal guard around the heat lamp; Spectacled Flying Foxes should be monitored when heat lamps are

in use. The most common injury sustained in wildlife parks and zoos is wing scorching as the bats had strayed too close to the heat lamp cage. You may need to add more bedding material to encourage them not to stray too close to the lamp.

4.6 Temperature Requirements

The temperature requirement for the Spectacled Flying Fox is what sets it apart from other Australian mainland flying foxes. The temperature conditions it has adapted to in order to survive.

Its thermal gradient is 24>45 degrees Celsius.

The humidity gradient is 55>96%

This is the climate they inhabit in the wild, therefore, when constructing the enclosure ensure you take into account its temperature necessities.

Heat lamps are a requirement that is unavoidable; a humidifier should be installed in a water feature if no sprinklers can be used as a cheaper alternative.

During the winter months keep temperatures at 28 degrees and humidity at 55%

Spring temperature 32 degrees and humidity of 65%

Summer 38 – 40 degrees humidity usually doubles in the summer months due to the wet tropical season that every summer brings to Cairns, therefore, humidity would be at 80%.

Autumn season temperature varies from year to year, therefore, a constant temperature of 28 – 32 degrees should be given and 60% humidity.

4.7 Substrate

Substrate should be kept as natural as possible, so having a dirt floor is great but due to pest and hygiene reasons, the following is advised:

Smooth concrete should be laid and painted with sealer [non – toxic], to stop moisture and urine absorption into the concrete, causing bacteria and fungal build up. The concrete floor should be laid at a slight angle for effective drainage. NOTE: The drain is at no time to be blocked or covered by debris.

A thick layer of blue metal should be laid down first for extra drainage - fresh dry dirt, dry untreated eucalyptus mulch as this softens any fall if that should occur. The eucalyptus mulch is inexpensive and readily available, plus it smells and looks like natural habitat and it is more appealing to Spectacled Flying fox as well as members of public.

If possible plant small native shrubs that are high yielding in blossoms such as Lily Pilly, hedging Melaleucas, Grevillea red spider which are higher in nectar. Native Spindle

Grass as this encourages natural foraging behaviour thus the richest form of environmental stimuli, make sure all plants are in pots for rotation throughout the year.

Discarded food attracts rodents so a secure rodent barrier should be placed in the enclosure.

A sure and safe rodent guard is as follows:

Aluminium gauge 1/8th mesh or aluminium fly screen, reinforced aluminium track. Build a frame 30 cm in height pop rivet the guard around the entire bottom of the enclosure walls, this stops rodents from being able to chew their way through, and the concrete stops the rodents from being able to dig under the fence line.

A cheaper alternative is Perspex sheeting, pop rivet this to the side of enclosure, however, this scratches easily, discolours and UV breaks the Perspex down rapidly.

Water features are not recommended even though it is a great environmental stimuli it is often very hard to keep hygienically clean and pathogen free, or reduced so they are rarely placed with in the enclosure.

However, a wall, water feature in the past has been used, and was found to be more hygienically sound but still the water does get dirty quiet quickly, especially in the hotter months of the year. If you are thinking about installing a water feature then a wall fountain is looked upon as being the better of the two.

4.8 Nest boxes and/or Bedding Material

Spectacled Flying Foxes, like their privacy, especially from prying eyes of the public. Dark natural fabric hanging from the enclosures roof provides protection from cold, hot weather, escape from stress, the public and one another.

The material can range from thick Hessian, Calico{dark}, polar fleece and woollen fabric. To avoid urine and other waste matter from being absorbed, scotch guard can be sprayed onto the fabric and is non toxic to flying foxes.

When placing bedding in enclosure make sure the bedding is placed under complete cover and is in close range to heat lamps, however, far enough away to avoid fabric burning and the flying foxes from over heating, it is advised that 1 – 2 metre distance is upheld.

4.9 Enclosure Furnishings

Enclosure furnishing is as follows:

For exercise and enrichment hang thick marine rope around their enclosure.

Spectacled Flying Foxes are strictly arboreal; therefore, ropes should be placed as high from the ground as possible. If the Spectacled Flying Foxes should fall for some reason or another, they must have something to climb onto in order to regain their upside down position. Flying foxes cannot take flight off the ground nor can they walk, instead they flap around helplessly until they find something to climb on; this process is extremely stressful and hazardous to the health and wellbeing of Spectacled Flying Fox. To avoid such stress, horizontal ropes should be draped around the enclosure touching the ground to avoid this from occurring.

In the centre of the enclosure a eucalyptus fork should be placed - this is to resemble their roost tree to encourage natural behaviour, if you cannot find a natural tree fork large enough for the enclosure an artificial one can be erected by using 100mm x 50mm untreated timber, covering it with artificial grass and bound by acrylic rope. This does not pose a health threat to the Spectacled Flying Fox as they do not gnaw or chew at items just lick and scent mark them. Natural branches should be suspended from the roof at different height intervals to encourage hierarchy behaviour.

Hessian bags hung sporadically around the enclosure this encourages them to fly from one Hessian sack to another and also to encourage playing within the colony.

Natural foliage will have to be hung around the enclosure, as Spectacled Flying Foxes like to hide within the foliage and reduces stress within the colony. Good foliage to use, is banana leaves and coconut palm.

Foliage should be placed at the top of the enclosure to replicate the canopy of the rainforest which is their natural habitat. Fresh blossoms should be placed around the enclosure to enhance natural order for browsing and natural diet stimuli.

To increase browsing behaviour and enrichment in flying fox enclosures, "fruit kebabs" should be used, these are branches with blunt spikes where apples, melon and bananas can be speared on and hung in the canopy.

To ensure that all of the enclosure is able to be used safely by Spectacled Flying Foxes, prawn netting is a must. It is the safest way to ensure that injuries do not occur. It is thick enough to be moulded, and small enough that wings and thumbs do not get caught. On hot or cold weather days it is comfortable for their feet. As there is good give in the material it can be hosed on a hot day and can be used to cool the enclosure, also I have witnessed the Spectacled Flying Foxes licking the water from the net.

Green is the best colour to use as it resembles the rainforest canopy. Timber 4cm skirting dowel should be fitted around the corners of the wall and roof so they don't get their feet caught in corners; this is the only set back that has been noted in using prawn netting. Be sure to peak the roof to enhance hierarchial behaviour this will reduce fights amongst the colony.

Food buckets should be hung sporadically from the roof low, enough that the Spectacled Flying Fox head can get into the buckets easily, on the walls place feeding trays and fruit kebab's in the canopy.

The animals' enclosure must resemble, as much as possible its wild/ natural habitat in aid of it physical wellbeing as well as behavioural. (EAPA of NSW)

5 General Husbandry

5.1 Hygiene and Cleaning

Spectacled Flying Fox enclosure must be kept clean to reduce the risk of contamination of pathogenic diseases from spreading to keepers and or to other flying foxes within its enclosure.

Spectacled Flying Fox waste should be removed from the enclosure daily. Gloves, face masks and aprons should be worn while cleaning. (Queensland Government)

Sick animals should be quarantined immediately to avoid out breaks. The colony should be taken off exhibit and watched closely, in case others are sick within the enclosure.

The food must be prepared with high standards of cleanliness to both food and utensils. (EAPA of NSW)

Fresh food and water must be given to the animal every day.

Food and water bowls should be cleaned every day to prevent rodent infestations from occurring, and removing all spoilt food to prevent fermentation.

Enclosures should be cleaned thoroughly to stop fungal and bacteria of faeces and urine building up, causing illness to other animals, keeper, public and themselves.

Bedding material should be replaced every second day for washing if bedding is soiled, material is removed. Fresh bedding should be arranged in its exact place, this avoids stress, as Spectacled Flying Foxes do not like sudden changes to the environment.[Tolga Bat Hospital July 2005]

5.2 Record Keeping

It is essential to keep records of your animals that you have in your care.

Daily distant examinations of your animal, so you are aware of any behavioural changes. Records of feed for allergies or implemented breeding diets, as well as breeding triggers. Oestrus within your females' Spectacled Flying Foxes logged in sparks or logged in your divisions Daily Diary (DD).

Medication dosages and times, for vaccinations given and when they are due, Veterinary examination eg blood tests, cloaca smears, and faecal floats would be logged in "medARKS", cage cards personal file.

Records for growth including weight, height, length, age and births logged in "ARKS" and all of the above mentioned.

5.3 Methods of Identification

Methods of identification are important for a collection of your Spectacled Flying Fox colony. This ensures exact breeding cycles eg if sent overseas for breeding programs, gene diversity or if a selected characteristic is needed for a particular breeding collection.

Each Spectacled Flying Fox should be given an ISIS number.

Micro chipping – Is a great means of ID however, a catch up or small crush is needed in order to scan the flying fox and this can be difficult within large colonies.

Ear tags – Are used in wildlife parks but are not advised for wild release as they can be easily caught on items and does not have a very natural look in an exhibit - and is not favoured by members of the public.

Ear tattooing – a great means of ID but re application is needed yearly, this is not practical for means of conservation in the wild or breeding programs. To catch them is very hard and impossible in large colonies in zoos or in the wild.

Paint – This only lasts up to a month, therefore, a constant reapplying is needed and this is considered too much high maintenance.

Ear notching – has been used for many Spectacled Flying Foxes and is seen as an excellent means of ID it has also been successful in the Blossom Bats in past ventures. The only major draw back for using this technique on Spectacled Flying foxes is that they have small ears and this makes it hard to notch and other flying foxes have been known to chew the ear completely off.

Photos - Visual identification, although the full time keeper may be able to identify each member of the colony it is not a recommended way of ID within Zoo and Wildlife Parks therefore should be avoided.

Thumb banding – Are the most popular and successful way for identification, Stainless Steel or Monel butt-end bands are used. For males the thumb band is placed on the left and females on the right thumb. A major draw back that has been noticed in past usage of thumb banding is that wildlife groups, have placed bands on wrong thumbs for distinguishing the sex and wild colony colours; therefore consistency with banding protocols should be upheld and if wild caught populations are being used for exhibit purposes you may have to re-band your collection.

5.4 Routine Data Collection

Writing data reports on the following:

Feeding patterns: Time of feeds, lunar cycles, temperature, seasonal behaviours and faecal examinations.

Preferred foods: The Spectacled Flying Fox will seek out high sugared foods first, because nectar and blossom are hard to come by in the wild, especially in autumn and winter when the rain fall is reduced and humidity is at its lowest.

6 Feeding Requirements

6.1 Captive Diet

Herbivorous animals are able to adapt to different diets as long as the food is digestible and Nutritious (zoo biology & Cheryl Standen)

The captive diet of a Spectacled Flying Fox should be a variety of foods and since they are herbivores their diet should contain:

Apple, banana, figs dried and fresh, also grapes/kiwifruit.

Orange in small amounts, as not all Spectacled Flying Foxes has been known to eat orange.

Rock melon, watermelon, spinach, mango, fresh dates, pawpaw or papaya, also plums, Apricots and Peaches are part of the captive diet.

(See appendices 3 for stockists and suppliers)

If the Spectacled Flying Foxes are to be rehabilitated back into the wild; orchard fruits such as stone fruits and fresh figs should be avoided as it is believed that this would cause orchards to be attacked by the flying foxes and place the Spectacled Flying Foxes in danger of being shot by orchardist.

Spectacled Flying Fox should be feed 20 -35% of their body weight a night plus 1 so that if you have 5 Spectacled Flying Foxes in the enclosure 6 portions of food should be placed around the enclosure to stop aggressive behaviour between the dominant Spectacled Flying Foxes.

When making up the diet be sure that, hard fruits such as apple and pear make up most of the diet.

Example 1 male Spectacled Flying Fox weighs 1000gms 30% of its body weight = 300gms therefore the diet would consist of:

2parts hard fruits = 200gms

1 part soft fruits = 100gms

Fruit should be cut up to bite size pieces to avoid wastage and to make it easier to consume.

Minimum of 3 fruits should be feed out daily. Seasonal fruits such as mango and fresh figs should be kept separate for behaviour conditioning and as a training aid.

Fresh water should be available at all times (EAPA of NSW) Spectacled Flying Foxes prefer salted water but in a weak solution 1 teaspoon to a litre and should be offered daily and water change should regulate up to 4 times a day.

Spectacled Flying Fox is native to Australia, its natural diet should be included within its captive diet and the browsing should consist of:

Native variety of plant matter even though they tend to chew on it and spit the pulp out, native fruit and eucalyptus plant matter:

NOTE: The Spectacled Flying Fox eats only the blossoms, gum nuts and new shoots. Never feed new shoots that have pink stems and leaves. The pinkish colour has high amounts of eucalyptus toxins and is fatal to Spectacled Flying Foxes just like in our Possums.

Pink tea tree – *Leptospermum squarrosum* this includes the species of tea tree.

Sunshine wattle – *Acacia terminalis*

Callistemon all varieties

Melaleuca all species

Red spider flower grevillea – *Grevillia speciosa ssp speciosa*

Ghost gum – *corymbia*

Sub-species of the bleeding gum or red gum are as follows:

Tranversaria, Angophora, Symphomyrtus

Rainforest Berries

6.2 Supplements

Supplements should be placed on Spectacled Flying Foxes feed daily.

Supplements that I use due to professional advice given are as follows:

Wombaroo high protein supplement - it has been designed especially for fruit and nectar diet of mammals dosage 7gms to be added per 300gm of food per Spectacled Flying Fox. This product is used by Sydney Wildlife, WIRES, Tolga Bat Hospital, KBCS and Atherton Tableland carers.

Other supplements are Sandoz, Glucosamine Chondroitin, Vetafarm Blossom Nectar, Vitamin C powder Ester C, Animal Science Vitamin and mineral spray for small mammals, this spray consists of sodium minerals that the Spectacled Flying Fox seeks out in the dense mangroves of North Queensland and Complan.

(See appendices 2 for stockists and substitute supplements)

Veterinary advice should be sought before supplementing your collection as over dose of some nutrients can be toxic and even fatal.

6.3 Presentation of Food

The Spectacled Flying Fox feed both during the day and more at night where they can eat up to 40% of their body weight in the winter months if food is available.

Place food around enclosure for environmental enrichment; place it in the tree canopy on fruit kebabs around the entire enclosure, this assists Spectacled Flying Foxes practice their innate behaviour of foraging. Another suggestion is to place the food in hard to get to places, this gives stimuli and also helps pass time in the enclosure to aid wild behaviour.

Do not move feeding areas around too much, have places where the food will constantly be, and place smaller pieces of food in hiding places for the Spectacled Flying Fox to hunt out.

Utensils used for feeding animals must not be used for any other purpose and must be easy to clean and designed to avoid risk of injury to animal (EAPA of NSW)

Food presentation should be fresh and appealing to all animals.

7 Handling and Transport

7.1 Timing of Capture and Handling

Never attempt to handle a baby, juvenile, adult Flying Fox or Micro bat, without first having your inoculations to protect yourself against the Lyssa-virus number 7 in the rabies strand.

Is your Lyssa-virus booster up to date?

Best time for catching Spectacled Flying Foxes is late morning and/or early afternoon when it is not hot, the temperature should be below 28 Celsius, also this is when Spectacled Flying Foxes are at their rest periods during the day.

7.2 Capture Equipment

Towels can be used and are quiet effective when capturing Spectacled Flying Foxes, the towel should be large enough to comfortably cover the entire body of the Spectacled Flying Fox so that the animal can be securely enclosed inside the towel.

Other ways of capturing the Spectacled Flying Fox is small crush cages; however, this can be both stressful on the animal and the keeper.

Gloves are a popular and are more effective for capture, as you are not constricted and can feel the pressure on the fragile bones and membranes through the gloves. It is however advised, that the gloves are thick leather such as welding gloves or Raptor gloves for catching the Spectacled Flying fox.

Equipment to avoid for capturing; that in the past have been used and have been documented to cause unnecessary damage to the Spectacled Flying Fox's delicate wings – are hoops, hard and soft, and netting.

7.3 Capture and Restraint Techniques

The Spectacled Flying Fox capture and retraining can be done in a very safe way. First your Spectacled Flying Fox, should be conditioned with food rewards; for example, if you want the Spectacled Flying Foxes to go to a particular corner of the enclosure - capture food rewards should only be given in that particular area, this makes the capture easy and very efficient with minimal stress to animal and keeper and is practiced by most wildlife sanctuaries and zoo's.

The EAPA state in their regulations for the Spectacled Flying Fox: is to have a minimum of 3 meter high enclosure, this makes it very difficult, to catch them at that great height by using a ladder, this also raises major OH&S issues.

The other means of capture is using a hung crush cage, however this has been seen as stressful for the animal and difficult to use at great heights.

The best restraint technique that I find easy and bite proof is: to approach the Spectacled Flying Fox with a towel held at waist height, not up high as this will alarm your Spectacled Flying Fox remember FFF, {Fright, Flight, Fight.}

When you are close enough to the animal:

Place towel behind their back making sure you are facing your flying fox to watch if the behavioural pattern/change.

Wrap the towel around the bats body make sure you do not attempt a wrap while the flying fox has its wings open, this can cause wing damage. Wrap the body and wings firmly but not constrictive until towel is completely wrapped around the flying fox.

The feet should still be visible and holding on to an object. Flip the bottom of the towel up towards the feet so that now your flying fox is completely restrained.

Remove the flying fox from its perch simply by lifting the head a little higher then its hanging then slowly and delicately lift the feet from the object to one of your index fingers so it has something on which to hang this reduces some of the stress.

7.4 Weighing and Examination

Weigh the animal before it is transported, this can be done by spring scales with the adult animal in a cotton bag. Babies and/or juveniles can be wrapped securely then placed in a tray or small bucket to be weighed on digital kitchen scales.

Physical and distant examination routines should be done in detail and a copy sent with the Spectacled Flying Fox or Foxes.

On arrival the animal should be weighed again, distant examinations and physical examinations are to be carried out in detail for the following 3 weeks. Examination of their food consumption should to be observed and documented as well.

7.5 Release

To release the Spectacled Flying Fox you simply reverse the restraint technique.

From your finger place the flying foxes feet onto the perch.

Then unfold the towel from the feet to head.

Unfold the flying fox with face to you.

Then un wrap the towel from around its body and wings slowly and gently in case there may be thumbs in the towel weave.

Finally remove the towel from back and under head, place in one hand and back away from the Spectacled Flying Fox swiftly.

7.6 Transport Requirements

The loading and movement of all aircrafts within and from Australia are controlled by the Commonwealth Air Navigation Act and the Air Navigation Orders and Regulations. In practical terms the Regulations require that:

When live animals are carried by air they are adequately contained to ensure the safety of the aircraft and the comfort and safety of handlers and passengers.

All animals are handled as live cargo and are stowed in the cargo bays of the aircraft unless the aeroplane has been specially converted as a dedicated livestock carrier.

The International Air Transport Association (IATA) Live Animal Regulations prescribe the minimum standards for transporting animals by air in containers, pens and stalls. It is a condition of membership of the IATA that airline operators accept live animals for air transport in accordance with the IATA regulations.

The IATA regulations are not fully satisfactory for Australian conditions particularly as they do not take into account the special requirements for the containment of Australian native animals.

The code does not take into account that the majority of animals transported within Australia are companion and native animals.

The Code of Practice needs review, and development into an Australian Mammal manual for the air transport of all live animals within or from Australia to overseas.

The Commonwealth Export Controls (Animals) Act ensures that all animals exported from Australia by air are subject to inspection by Australian Quarantine Inspection Service officers and the containers in which the animals are to be confined approved.

Animals shipped by air within Australia are received by normal cargo staff and loaded and unloaded by normal baggage staff. Only animal containers are checked to ensure aircraft safety and hygiene standards.

All the provisions for the humane road transport of animals must be applied when animals are transported to the airport.

Only air cargo workers who have received proper animal handling training and understand their needs should accept animals for air transport, and transfer them from the reception area and load them onto an aircraft.

Provision must be made for holding animals prior to loading, or after unloading from aircraft to a sheltered and quiet area. Clean fresh water must be made available especially on warm days or where trans-shipping times are prolonged.

Airline companies accepting animals for transport should have in place at every airport from which they operate a contingency plan to ensure prompt assistance for any animal which becomes ill or injured during air transport.

Airline companies accepting live animals for transport should ensure that the container is clearly labelled 'LIVE ANIMAL-HANDLE WITH CARE' and must have a contact number, both during and after hours, for the consignee, and should make contact with that person if the aircraft is delayed or the animals are not collected promptly on arrival. "All the above information for transport requirements are quoted directly from the IATA on www.affa.gov.au date visited 05/06/2004"

7.6.1 Box Design

Spectacled Flying Foxes transport containers should be designed as follows:
IATA container requirements 77

(See appendices 4 for pictorial of transport box and container requirements)

Materials - plywood, wood non-treated, wire mesh, screening mesh.

Dimension - container must be large enough to ensure Spectacled Flying Fox can move freely within.

Frame - must be made of solid wood parts screwed together which can also form the base, sides and top.

Sides - the sides including the door must be made of the appropriate wood one or more sides preferably including the back must be lined with 2.5cm (1in) diameter wire mesh set 1cm away from the side so that the Spectacled Flying Fox can easily hang upside down from it. Meshed ventilation openings must be present on all four sides.

Floor - the floor must be solid with a droppings tray fixed to it.

Roof - the roof must be made of wood with meshed ventilation openings over its surface, a secondary roof must be constructed within the container from 2.5cm (1in) diameter

wire mesh set approximately 1cm below the top from which the Spectacled Flying Fox can hang.

Doors - a sliding door, which has approximately ¼ of the lower part consisting of a finely meshed opening and with meshed ventilation holes spread over the remainder, must be provided at the front of the container, it must have secure means of fastening so that it cannot be accidentally opened. A screen of loosely woven material or a ventilated plywood panel must be placed over the front of the container to reduce light.

IATA specifications are 30cms in length x 40cm in height x 30cm in breadth.

7.6.2 Furnishings

It is advised by IATA that flying foxes should not have a perch or stick placed in their transport container as this can be an unnecessary risk to the animal if the stick slips or snaps in transit the flying fox may damage its wings or other parts of its body, therefore it is not recommended.

7.6.3 Water and Food

All animals must be given salted water within 12 hrs of departure, temperature pending, if it is in the summer months water must be supplied prior to departure and on arrival.

All animals must be given food 24 hrs after departure failure to do so falls under the prevention of cruelty Act.

Since water dishes are proven to be inadequate, dripper bottle can be used and are easily attached to the side of the transit container so that no harm can be done to the flying fox and water remains unsoiled by faeces and urine.

7.6.4 Animals per Box

Each container must contain one Spectacled Flying Fox, although they stress when not in a group, this can cause aggression and injuries to Spectacled Flying Foxes within that Container.

Female flying foxes are not to travel with young and must be transported just after mating or prior to mating unless otherwise stated by a Government body such as NPWS. Young flying foxes can not be transported until they are 90% weaned from their mother or if young have been orphaned from the mother.

7.6.5 Timing of Transportation

All transportation of flying foxes should be done during the day when they would be naturally roosting. In the early hours of the morning avoid capture and transport during the hottest part of the day as this can lead to over heating and sudden death.

As a reasonable animal carer it is your job to ensure that all animals are to be transported from terminal holding areas as quickly as possible.

7.6.6 Release from Box

Open the front on the transport container allowing total access to the flying fox repeat capture and restrain techniques 7.3 or open door hold container close to the wire mesh in the enclosure and allow the animal to climb out in its own time, although this can prove to be too lengthy if you have a large collection to release. A method I have witnessed, and found to be both, efficient and effective is to have a release bench that has rope tied to the length of it, approximately 10cm away from the opening of the container. The Spectacled Flying Fox climb to the front of their enclosure, thumb hook the rope, climb across onto a tree fork and make their way up to the roof to the highest vantage point.

Once all the Spectacled Flying Foxes are out of the transport containers, remove them and yourself and allow the Spectacled Flying Fox to explore its enclosure. Animals should not be disturbed for 12 hours, this allows adequate time to distress, feed and find the hierarchy within their new enclosure and colony.

8 Health Requirements

8.1 Daily Health Checks

Daily health checks are to be carried out every morning when the Spectacled Flying Fox is active in the roosting area of the enclosure.

Distant examinations to be completed on a daily basis, with date, time, year and signed by the keeper.

Note, normal and abnormal behaviour; refer to section 9 in this husbandry manual for normal behaviour and the abnormal.

Check food intake and waste excretion, weigh the food left in the feeding trays and check faecal matter, which should be the consistency and shape of toothpaste.

All abnormal behaviour should be reported to head carer/curator for further investigation/review.

During your distant examination, things to look out for in your Spectacled Flying Fox collection are as follows:

Gait, smell/odour and alertness

8.1.1 Chemical Restraint

This is not recommended for Spectacled Flying Foxes as they do not fare well under anaesthetics. However, under extreme cases Hathothane, ketamine. The sedation chemicals, which are recommended by most Vets is Diazepam.
Donna Schofields 2004 veterinarian surgeon

8.1.2 Physical Examination

Physical examinations should be carried out before, and after mating season this routine can be carried out by one person, if your collection is a small colony. Two or more people will be needed for larger colonies being 20 +.

Restrain the Spectacled Flying Fox, and thoroughly check the animal over, starting with the wings, spread one wing at a time and run your fingers along the bones then hold wings up to the light to look for holes/punctures fungi and or hydration of the wings, which should feel soft and smooth like velvet. A treat should be offered to the Spectacled Flying Fox after wing examination; this helps condition the animal and makes future examinations less stressful.

Other examinations that are to be carried out are as follows:

Hydration pinch on the back of the neck.

Check feet and claw length.

Heart rate

Respiratory

Temperature

The above three examinations must be carried out by a vet in order to have the correct values.

Ears

Dental check-ups especially, canines as they are the most common teeth broken/rotted out.

Feeling over the body for lumps, fur loss, bites, mites, ticks and general fur condition.

8.2 Routine Treatments

It is important to arrange regular veterinary inspection (EAPA) and should be carried out twice a year or when otherwise needed. Vet checkups must be carried out before and after mating.

Worming paste must be administered as Spectacled Flying Foxes are prone to worms.

Recommended by vet or as supplier suggests.

Mite's treatments ivermectin, frontline, advantage plus every 3 months.

8.3 Known Health Problems

Spectacled Flying Foxes are susceptible to disease, reproductive / mating inadequacies, stress and pathogens, such as ticks, mites, lice, fleas, internal worms, bacteria, viruses, and protozoa's.

It is important to reduce this risk of contamination by keeping food and water fresh. This is to be kept at a safe distance from the public as it has been known that people put poisons and unsuitable foods in the food containers. Food supplies are to be inspected regularly for quality control.

The Spectacled Flying Fox can also suffer from; nutrient deficiencies and overdosing, fat soluble vitamins such as E, D, & A which are stored either in the gall bladder and or liver, it is very hard to cause high toxicity in water vitamins such as vitamin B's and C as the body is unable to store them therefore deficiencies can occur.

Some diseases in the Spectacled Flying Fox:

Coccidiosis – protozoan pathogen that live in the lining of the bowel causing inflammation of the large intestine and chronic diarrhoea and is fatal if not treated immediately. Faecal samples will need to be carried out by the Vet.

Lyssa virus – Australian Bat Lyssa virus ABL rabies virus number 7 it affects the central nervous system which in return causes neurological problems such as aggression, unable to take flight, fitting and increased salivation. There is no known treatment at this stage as of 2005 and only 3% of the wild population are believed to be infected. If death is uncertain an autopsy should be carried out. The Macquarie University Sydney NSW Australia will do a Lyssa virus autopsy, if tested positive you may need to consider Euthanasia, however, the safest way to ensure no infection within human population is to have yourself and staff inoculated against the Lyssa virus.

Hendra Virus – Equine Morbillivirus EMV a form of pneumonia, it is an acute respiratory infection on equines (horses), symptoms of the virus is fever, increased respiratory and heart rate, respiratory distress, and death. Flying Foxes pass it on to equines and from equines to humans. There is no vaccine or treatment for the Hendra and contagion is very low, in fact when research was carried out on the Hendra virus out of 13 horses only 2 became sick with Hendra all though all had been housed together for 21 days. Like the Lyssa Virus an autopsy of the Spectacled Flying Fox must be carried out, if tested positive, euthanasia is the most favoured option as there is no vaccine.

Endoparasites – Worms are found in all flying foxes around Australia’s mainland – common in juveniles, signs include; lack of appetite, coughing, diarrhoea and vomiting in severe cases. It is treatable with feline worming paste, administer by mouth or spread on to fur on belly and the Spectacled Flying Fox will lick it off this is specified on the back of the packaging. Faecal floats should be carried out to view the severity of parasites and to ensure that future prevention can be carried out.

Ectoparasites – Increased scratching that can lead to severe derma logical problems such as fur loss, weeping tissue, skin thickening, inflammation and secondary infections. It can be treated with ivermectin and kitten revolution; however it is not recommended by the company; though vets have been know to use it with great success.

Skin scrapings and or biopsy should be carried out; however prevention of ectoparasites should be enforced.

Fungal – Ringworm is of course the most common fungal infection in animals especially in the young. Hair loss, circular lesions on the skin that looks flaky and inflamed, and scratching at the site of fungus. Running a strong Black UV light over the animal helps you find the lesions as they show up as fluoro green. This is easily treated as long as the animal is isolated from the Colony. Topical creams can be used as well as oral treatment, however, Vet advice must be sought before giving medications.

Slimy wing – Major cause is lack of access to natural sunlight, therefore a creamy yeast texture is seen on the wing membrane especially in the wing creases. The wing membrane is literally slimy to touch much like algae and in severe cases becomes necrotic. The Spectacled Flying Fox will also emanate a potent odour when wings are flapped is described as the “sour bread smell.” Treatment is as follows, Melaseb, Iovone & Nilstat.

A preventative for slimy wing is adequate time for sunny and UV exposure and a well designed enclosure.

Refer: Chapter 4 housing requirements.

8.4 Quarantine Requirements

Any newly acquired animal must be kept in isolation until it has been examined or restored to good health before being placed with other animals. (EAPA)

Any animals with a contagious disease such as Tuberculosis, Hendra influenza, Lyssa virus should be removed. If no treatment or vaccination can be rendered to the Spectacled Flying Fox the animals must be destroyed/ euthanatized. Enclosure facility must be sterilized and any other animals also taken for examination or where in contact with the infected animal. This must be monitored and be euthanatized if found to have contracted these untreatable diseases.

If disease is zoonotic and untreatable to humans also, then animals are to be removed from the exhibit immediately, euthanatized and medical advice is sought the outcome is attended to by keeper.

Quarantine should be for a minimum of 40 days from the time when the last animal is placed in to quarantine.

9 Behaviour

9.1 Activity

The chronobiology of the Spectacled Flying Fox is very repetitious, although the Spectacled Flying Fox is nocturnal they also become semi active throughout the day, grooming, playing, vocalizing, climbing from branch to branch on the roosting tree, bathing, wing fanning and minimal eating.

It is believed that the Spectacled Flying Fox eats at night because it has less competition for food and predation. At approximately 5pm in the winter months and 6pm in the summer months the Spectacled Flying Fox colonies start to prepare for a night of feeding, the dominant male becomes very reckless and is vocalizing for 4 minute periods on and off as seen in Tolga Cairns 6th July 2005.

Pregnant females take flight and are seen leaving the roosting tree 20min before the rest of the colony although no scientific research has been done of Spectacled Flying Foxes hierarchy in great length, it is still unknown why this occurs. Though speaking with long term carers of the Spectacled Flying Fox, they believe it is to give the pregnant females a head start on feeding as they require more energy and nutrients then that of young immature Spectacled Flying Foxes. 9th July 2005.

Through my own observations on the Spectacled Flying Fox during daylight, it spends its times as follows:

- 10% Playing, and exploring its roost tree.
- 3% Urinating on itself or others
- 54% Resting/sleeping
- 4% Vocalization
- 14% Eating /chewing
- 11% Grooming itself and others
- 1% Fighting
- 3% Wing airing/flapping and other

Observation were carried out on the 12th July 2005 Time: 8:30am – 12:00pm

Night observation on the Spectacled Flying Fox is as follows:

Note - although Spectacled Flying Foxes fly up to 50km a night on average, it is impossible to get an accurate time chart for night activities, however, the record was for how many times they returned to their roost, time away from the roost tree will be divided into feeding, flying and resting.

60% Feeding
30% Flying
5% Resting
5% Home roost

Observation was carried out on the 16th July 2005 Time: 5:30pm – 9pm

9.2 Social Behaviour

The Spectacled Flying Fox is a highly sociable animal, in-fact it has been noted that if housed individually for long periods Spectacled Flying Foxes become so stressed that they die of starvation due to depression or become overly aggressive.

There is a particular hierarchy formation to Spectacled Flying Foxes; the dominant males usually take up roost at the highest points of the tree allowing co-roosting with favoured females or young juvenile females.

Young Spectacled Flying Foxes roost further down the tree and on surrounding trees within the colony. Juvenile males fight and form there own kind of structure within their roost tree, this is a developing behaviour that is important to the progression onto the adult roost tree in years to come.

Colonies have been documented to be up to 50,000 and each Spectacled Flying Fox has a particular role and position within that colony.

Males tend to groom the females more; juveniles also groom one another and fight more, than secure adult males do with each other.

The Spectacled Flying Fox is an extremely vocal mammal and this is the major part of communication within the colony they do not have echolocation this only applies to Micro bats.

9.3 Reproductive Behaviour

Reproductive behaviour is displayed for up to 5 weeks in the year.

Males will seek out the female and lick and smell the female genital area to see if she is in oestrus and ready for mounting. If she is ready the dominant male will vocalise then grip the female's neck and use his thumbs to keep her steady then continues to copulate this is repeated daily even hourly depending on the female's tolerance and how many females the dominant male has to serve, depending on size of the colony.

Spectacled Flying Foxes roost communally. The sexual hierarchy of the roost changes during breeding.

For the gestation period, males and females roost separately and forage over different areas to that of males.

Pregnant females don't over exert themselves with hunting for food, that is why females arrive at traditional breeding spots to give birth, where juvenile females or non pregnant females assist and support pregnant Spectacled Flying Foxes.

The roosting trees for pregnant Spectacled Flying Foxes are usually within 10 – 20km of an abundant supply of fruit and blossoms.

Pregnant Spectacled Flying Foxes are surrounded by juvenile female Spectacled Flying Foxes this helps protect the pregnant females from predation.

Males arrive soon thereafter and establish their hierarchy territories around females. Males including the juvenile males create circular rings around the females. Adult males roost at the highest point of their roost trees giving them advantage to overlook the pregnant roost.

Males and females form polygamous seasonal bonds if the females bear a young from a particular male. Males display antagonistic behavior toward one another during the establishment of territories, vocalisation is increased until harmony and structure is developed. Males have been known to savagely maul one another for a right to breed with a particular mature female. Neck nipping is one of the most common along, with males mounting submissive males.

9.4 Behavioural Problems

The main behavioural problems with captive Spectacled Flying Foxes is the environment in which they are kept is lacking the environmental stimuli they require. This can lead to boredom and aggression within the colony and in extreme cases self mutilation. However, this has not been documented in 10 years in our captive collections. Hand reared Spectacled Flying Foxes can have major colony inadequacies in not understanding hierarchy and normal behaviour as they have been over humanised and this leads to out casting by the colony. Other rare behavioural problems are over crowding and an imbalance of sex ratios within the colony. The best ratio which is recommended for optimum colony harmony is 3.6.0 This stops males from displaying ongoing aggression to other males.

9.5 Signs of Stress

Major signs of stress in the Spectacled Flying Fox are as follows:

- Lack of interest in food, or no appetite at all.
- Constantly in wing wrap or wing spreading.
- Continual shivering.
- Ears flattened.
- Urinating and defecating.
- Over grooming, licking of wings and lips.
- Unwillingness to blink.
- Huddling very close together, however, make note of temperature before assuming this a sign of stress.
- Low vocalisation but constant.
- Constant eye contact, watching you and moving around you but never looking away.
- Lip curling to show aggression and to keep the FFF.

9.6 Behavioural Enrichment

It is important to give all animals some form of environmental enrichment. This contributes to health and mental well being [Cheryl Standen & Zoo Biology]
It is important to hide food within the enclosure to stimulate their highly developed sense of smell.

Spectacled Flying Foxes are curious animals and it is good to give them tyres, ropes, and natural branches to gnaw on. A dense canopy to hide and explore in, as well as for olfactory smells familiar to the wild, nature is important to Spectacled Flying Foxes well being. Bark strips to hide behind, buster cubes, fruit kebabs and Kong's with treats inside and suspended branches that have an amount of give to replicate natural branches that they would encounter in the wild.

9.7 Intra-specific Compatibility

Spectacled Flying Foxes cope well with additions to a colony, however to avoid excessive aggression between male and male, a suspended cage should be hung on the out side of enclosure before placing adult male into a new colony.

It is advised that collections start with a ratio of 3.6.0 and only adult females should be added, however juvenile males can be brought into to a collection where the dominant males will scent them by urination mount and bite to display dominance. It has not been recorded that Spectacled Flying Foxes kill or savagely maul new additions to a colony. Caution should be taken for any new addition into the colony.

9.8 Inter-specific Compatibility

The Spectacled Flying Fox will happily co exist with other flying foxes; but documented research from Tolga and various Wildlife Organisations show that the Spectacled Flying Foxes will not tolerate the Grey Headed Flying Fox it is not known why this is, when they happily share feeding territory with both little reds and Black Flying Foxes.

9.9 Suitability to Captivity

Spectacled Flying Foxes are very suited to captivity as long as they are kept in a colony.

9.10 Feeding a captive diet

The Spectacled Flying Fox respond well to captive diets as long as there is plenty of browse to stimulate natural behaviour, make sure there is always fresh and slightly salted water available to them. Adults, prefer salt water to fresh, the salt water bottles should be changed about 4 times a day depending on temperature and consumption.

10 Breeding

10.1 Mating Systems

There are many ways to breed the Spectacled Flying Fox

1. Allowing the colony to mate naturally without human intervention, this has been proven to work very successfully in captivity.
2. AI this proves to have a very low success rate and is an expensive way to breed animals.
3. IVF proves to be successful but these techniques are not carried out for cost reasons.
4. Use birth control on the Spectacled Flying Foxes this helps control breeding and over crowding.

10.2 Ease of Breeding

Spectacled Flying Fox will breed very successfully in captivity as long as the colony is free of stress factors; a complete and nutritious diet is offered. If the colony is housed outside, be aware of breeding triggers such as temperature change, seasonal fruits and environmental stimuli is up kept.

10.3 Reproductive Condition

The Spectacled Flying Fox breeding conditions are not that complex, however there are many breeding triggers in which can cause females and males to know instinctively that its time to breed.

Triggers – for breeding are:

Shorter light cycles

Rain fall

Cooler climate temperature autumn

Food quality and amounts

Australian native blossoms which only blossom during their breeding cycle

Breeding males should be ranked by size, weight, libido and fertility which are done by sperm counts and vaccinations, veterinary check ups should also be carried out prior to breeding.

Breeding females should be ranked by size, weight; oestrus length is usually for 14 - 16 days, libido and also fertility which is done by vaginal smear, ultra sounds and ovum tests for fertility and to make sure that there are no damaged follicle cells that may reduce the breeding ability.

The breeding months are from March through to May.

10.4 Techniques used to control Breeding

The separation of both males and females within an enclosure of single sex colonies. De-sexing of males and females. Birth control implants, however this is not recommended as it has had very little success rate and can be a stressful process.

10.5 Occurrence of Hybrids

Being that the Spectacled Flying Fox, shares its roost sites with both Little Reds and Black Flying Foxes no documented cases of cross breeding has occurred and it is not known if possible offspring would be sterile.

10.6 Timing of Breeding

Timing of breeding is important as females do not remain on oestrus very long 14 -16 days at the most; therefore it is important that blood smears are carried out at the beginning of the breeding seasons.

Males will tend to lick and sniff females to tell when they are ready for breeding and innately know when the female is in peak fertility.

Spectacled Flying Foxes like privacy during mating, therefore it is recommended to have a built up canopy or hiding places where they can escape from public viewing.

10.7 Age at First Breeding and Last Breeding

Female Spectacled Flying Foxes reach sexual maturity at 2 years of age. Initial breeding occurs between March and May, followed by a 5-month gestation period. Generally, females give birth to one young per year, however twins are not uncommon. Young bats begin to be weaned after four months and completely weaned at 6 months. Adult females can, and have been known to breed for up to 8 years within the wild and 11 years in captivity, however this depends greatly on their own fertility rate and also their general well being and natural food access.

Male Spectacled Flying Foxes become sexually mature at 1.5 – 2 years of age and continue to breed their entire life providing they continue to up hold their dominance within the colony and the ratio of males to females, however it has been documented by bat carers and conservationist, that the males sperm count decreases greatly after 6 years of annual breeding.

10.8 Ability to Breed Every Year

Spectacled Flying Foxes are able to breed every year if permitted.

10.9 Ability to Breed More than Once Per Year

It is possible get them to breed twice a year if young is plucked from the mother at an early stage usually 2-4 days after birth. No proof or research has been carried out or documented to back up this theory, therefore any attempts in captivity is not recommended unless otherwise directed by management.

10.10 Nesting, Hollow or Other Requirements

Nesting material or hollow is not required for this species. However, Hessian or Polar Fleece bags hung in two corners of the enclosure furthest away from public viewing reduces stress as well as putting into account that females move roosts when nearing to birth date.

10.11 Breeding Diet

As much foliage as it will consume

Such as new eucalyptus blossoms

Grevillia foliage flowers and buds included

Callistemon

Melaleuca blossoms

Wattle foliage

Tea tree blossoms

½ apple

½ pear

2cm wedge rockmelon

3 grapes

¼ kiwi fruit peel removed

½ slice of paw paw

¼ banana

Spray multi vitamin supplement on fruit and foliage every 3rd day

Wombaroo high protein supplement to be sprinkled on food as directed

Although breeding diet is not specified with the above it is, however recommended that it is fed out to pregnant and lactating Spectacled Flying Foxes for optimum nutrition.

The above diet is for per Spectacled Flying Fox.

10.12 Oestrous Cycle and Gestation Period

Oestrous cycle 14 -16 days

The gestation period 5 months

10.13 Litter Size

1 young per year

10.14 Age at Weaning

8 to 10 weeks this is when weaning usually starts.

10.15 Age of Removal from Parents

If required the young Spectacled Flying Foxes can be safely removed from their mother 3days after birthing or after weaning completion. However, to make the transition easier you may want to remove all young of the breeding season and make those a separate colony.

10.16 Growth and Development

Young Pups

Weight 60 - 90 grams forearm length 60 - 70mm Age premature -1 week
Young pups should be placed in a basket with a heating pad as they sleep 80% of the day and night. They are unable to thermo regulate. In the wild the pups are on their mothers at all times. Weight increase of approximately 15 grams and forearm growth of 10mm per week.

Weight 90 - 120 grams Forearm 70 – 85 Age 1 - 4weeks
These babies want to sleep most of the time, they will increasingly become more active by looking around wing flapping but only for short bursts. Their housing changes to a cat carry cage.

Medium Pups

Weight 120 -150grams Forearms 75 - 100mm Age 2 - 5 weeks
a weight gain of approximately 10 -20 grams and forearm growth of 7-10 mm each week.

Weight 150 - 200 grams Forearms 90 -100mm Age 4 - 6 weeks
The pups will become more confident and independent as this is the age when adult females would leave their pups behind in the colony at night. Also introduce a self-feeder with water.

Weight 150 - 250grams Forearms 100 -120mm Age 5 - 9 weeks
It is imperative that Spectacled Flying Fox Pups have at least 1 other Pup to socialize and play with. They will start to do a lot of flapping so ensure there is enough room for this. They should be full time on a clothes airier, but be sure to have a towel underneath them in case they might fall. They will be cleaning themselves and inverting for toileting.

Weight 250 - 350grams Forearms 120 - 140mm Age 9 - 12 weeks
Forearm should increase slowly approximately 2-4 mm per week. The wild pups would be making short flights within the colony during the daylight hours and developing their climbing ability. This is the time to bring them to the crouching cage, weaning should be completed by 12 weeks.

Juveniles

Weight 350gms+
The wild reared juvenile Spectacled Flying Foxes are starting to go on longer flights outside of the colony. And should go into their large flight enclosure with the young of the season to start and develop their own hierarchy. Reintroduction to existing colony is carried out at this time.

11 Artificial Rearing of Mammals

11.1 Housing

A newborn flying fox orphan will need a heating pad, a mummy or stuffed sock which hangs from the edge of a cage, the young can choose to hang or lie cuddling up to this artificial mummy.

A sufficient amount of thick layer of towels, this keeps the pup warm but does not become overheated. It is good to use a top sheet also clamped to the side of the basket but must be changed when it becomes soiled.

You can put a piece of rigid wire mesh over the basket for the pups to move freely on. The depth of the basket is absolutely critical so that their head remain clear of the bottom of the box, ensuring that they do not put their head in any wastes.

Older pups need climbing, hanging, flapping areas and even flying space. It is a good idea to place your Spectacled Flying Fox pup on a clothes airier with towels suspended underneath, clamped on by pegs so that if the pup loses its footing, and this is quite common they fall onto the towel instead of the floor to injure themselves. It also acts as a place for the bat to sleep and rest its head on.

Pups should be placed outside at 6 – 7 weeks of age or 200 – 200grams it is advised that you cover all 3 sides of their outside enclosure with towels or black shade cloth this stops excessive stress, and even worse, ear sucking on other small Spectacled Flying Foxes. Gradually remove the barrier as they become accustomed to being outside.

Wild Spectacled Flying Fox pups are being left alone with young bats in the trees at night while parents go and forage. This helps stimulate environmental night sounds and smells. It is incredibly important that Spectacled Flying Fox pups are socialized with others of similar size. This prevents antisocial behaviour in the coming months of colony hierarchy.

11.2 Temperature Requirements

All young must be kept between 28 – 30 degrees Celsius as young flying foxes are unable to thermo regulate, artificial heat must be offered for the first 3 -4 weeks of age.

NOTE: If it is a hot day keep in mind the temperature in the pups cage, it may be recommended that the temperature be turned down to one or off during the day and put back on over night

At this age 5-7 weeks pups are beginning to thermo regulate, so a warm room is advised and should be free of drafts.

Once pups are starting to fly and climb and are on solids no heating is recommended as the Spectacled Flying Foxes sun themselves in the crèche.

11.3 Diet and Feeding Routine

The young Spectacled Flying Fox can be fed on either Cows Milk or Nestle Nan 0-12 months mix as directed on packet

(see appendices 1 for substitutes milk powders and directions of use for Nan.)

Weight 60 - 90 grams forearm length 60 - 70mm Age premature -1 week

Young pups should be placed in a basket with a heating pad as they sleep 80% of the day and night. They are unable to thermo regulate. In the wild the pups are on their mothers all the time. Feeds need to be 2-3 hourly (5 feeds a day) and 1-3 mls per feed. We like to feed these very young orphans through a teat with a 3 ml syringe. Like young human babies, these orphans need to be kept in a relatively quiet environment with little disturbance between feeds. Expect a weight gain of about 15 gms and FAL (fore-arm length increase of about 10mm per week

Weight 90 - 120 grams Forearm 70 – 85 Age 1 - 4weeks

These babies want to sleep most of the time, they will increasingly become more active by looking around, wing flapping for only short bursts. Their housing changes to a cat carry cage. Can feed with bottle and teat or continue with syringe. Feeds - 3-4 hourly (5 feeds per day) and 3 - 8 mls per feed.

Weight 120 -150grams Forearms 75 - 100mm Age 2 - 5 weeks

Feed these babies with bottle and teat unless they are having feeding problems. They will take 5 -10 mls per feed with 5 feeds per day.

Weight 150 - 200 grams Forearms 90 -100mm Age 4 - 6 weeks

The pups will become more confident as they begin feeding from a self-feeder; also introduce a self-feeder with water, however still needing 8-12 mls per fed 4 times a day.

Weight 190 - 250grams Forearms 100 -120mm Age 5 - 9 weeks

Fruit can be introduced at this stage. Some Spectacled Pups will still need help to keep clean especially when consuming stewed apple puree 15 mls per day 3 times a day salted water to be available between feeds.

Weight 250 - 350grams Forearms 120 - 140mm Age 9 - 12 weeks

Fruit is now an established part of their diet but it is important to continue with salty water 1 teaspoon sea salt to 1 litre of boiled warm water until release. Some people prefer to sprinkle the milk powder or Wombaroo high protein formula, this must go on top of the chopped fruit daily. Once fully weaned they are placed into crèche with other Spectacled Flying Foxes.

Refer: 6.2 supplements

Weight 350gms+

The Juvenile is completely weaned and feeding on adult captive diet.

11.4 Specific Requirements

Young Spectacled Flying Foxes need to be toileted, this is done by inverting the legs down and gently stimulating the genital area.

Young Spectacled Flying Foxes stress less if given a dummy to suckle in between feeds; this will help reduce stress in young infants.

11.5 Data Recording

Growth and weight charts should be maintained every second day. The young flying foxes are to be weighed before feeding, to get an accurate weight.

A record of toileting is also carried out; include faecal consistency and frequency, urine colour this helps determine whether or not the animal is in good health, you may need to re evaluate your feeding plan or supplement the food with powders or sprays.

11.6 Identification Methods

Micro chipping

Thumb bands

Individual photo cards

Ear tags, however, this does not look good in an exhibit situation where they are in public view; also Spectacled Flying Foxes are curious and have been known to tear out there own ear tags as well as others within the colony.

11.7 Hygiene

Spectacled Flying Fox Pups carry contagious diseases such as thrush, so wash your hands before, during and after feeding young and adults, wash your hands also between animals not just species specific.

Spectacled Flying Foxes also carry two deadly diseases, Lyssa virus and Hendra, therefore, only inoculated person or persons should care for them, as well as other contact with them, this goes for feed dishes and utensils.

Adult bedding such as Hessian sacks, towels and blankets within the enclosure, mummer's, sleeping cloths are washed in Napisan with antibacterial active agents. Sterilize all feeding equipment with Milton and rinse thoroughly with boiled water to remove any chemical cleaning residue. It is advised that you do not share teats among other spectacled Flying Fox Pups 1 sterilized teat per Pup.

Don't store milk in plastic containers, glass bottles are best.

Chewed teats must be discarded

Milk formula must be cooled to room temperature before refrigeration and can only be kept for 24 hours after which time it must be discarded.

All fruit is to be discarded if not eaten throughout the day, dishes and water dripper bottles are to be washed separate from other animals, due to the viruses they carry.

11.8 Behavioural Considerations

When introducing any Spectacled Flying Fox whether young or adult be sure that they are housed separately but can still see, smell and hear each other, this gives the Spectacled Flying Foxes time to adjust to one another. Once this has been established and behaviour is normal; open the suspension cages and allow the Spectacled Flying fox to climb out and find their way around the enclosure and their own hierarchy. If young pups, give them ample time on the airier with one another but place back in separate cages for sleeping time this also reduces the possibility of ear sucking of other flying foxes.

11.9 Use of Foster Species

To this date this has not been successful and further research and attempts to be carried out. 2005

11.10 Weaning

The weaning process should begin at 8 – 10 weeks or between 350 - 450grams where you can offer fruit instead of milk for their lunchtime or afternoon feed. Once Spectacled Flying Fox young is eating fruit in the afternoon begin to introduce fruit such as peeled apple for morning feed as well by week 9, 350 – 400grams. No more milk is to be fed, begin 3 feeds of fruit a day sprinkled with WPS {wombaroo protein supplement} no more than 10 grams feed out daily.

11.11 Rehabilitation and Release Procedures

In the wild juveniles are taking flights of increasing distances out of the colony, from early January. Research in Sydney with the Grey-headed Flying Foxes indicates the importance of releasing your orphans into the colony before the breeding season begins in March.

Rehabilitation should start by taking them out to the release cage or creche at the colony about half way through January, weather permitting.

You will have to support feed the Spectacled Flying Foxes while in the creche for up to 3-4 months.

At first you will need to supply feed daily with bite size pieces of apple, pear and melons such as paw paw and rockmelon, this is done with small hanging baskets suspended around the creche enclosure. Gradually reduce the amount of food by putting it out on fewer days.

At this time of year you may encounter very heavy rain and even cyclones in Cairns, Far North Queensland. Increase the amount of food if this happens to occur due to the difficulty for the Juvenile Spectacled Flying Foxes to fly out at night in search for food.

This enclosure must have a removable flight hatch at the top which is opened at night to encourage the Spectacled Flying Foxes to socialize with the existing colony. It also helps the juveniles seek refuge if aggression and fights break out within the rehabilitation colony as well as the wild colony; this is quite common to begin with.

When support feeding, it is important not to socialize with the Spectacled Flying Foxes by resisting the temptation to “play” as this inhibits the development of their wild behaviour and can cause Spectacled Flying Foxes to land on unsuspecting members of the public in future years. This behaviour is always met with concern for the public, with the 2 most dangerous diseases Lyssa virus and Hendra virus transmission to a person who is not inoculated will lead to death. Therefore this procedure must be strictly adhered to.

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13 References

Queensland Wildlife Organisations

The Following Information is taken directly from;

http://members.optusnet.com.au/~hparsons20/wildlife_rehabilitation_contacts.htm

- * Dept of Environment, 160 Ann St, Brisbane, 4002 Ph: 07 3227 8185
- * Australian Wildlife Rescue Service Central Queensland, PO Box 6687, Mackay Mail Centre, 4741
- * A.R.R.O.W. (Australian Rescue & Rehabilitation of Native Wildlife Assoc.Inc) 7 Bucknall Court, Hattonvale 4341 Ph: 07 54665 6865
email: arrowwildlife@bigpond.com.au
- * Australian Seabird Rescue Group Queensland Inc. PO Box 604, Tewantin Qld 4565 Ph: 07 5485 3543 or 0418 758822
- * "Batland" Flying Fox & sustainable environment centre, Ipswich ph: 0408 744529
- * Birds Injured Rehabilitated and Orphaned, 56 Kolora Crescent, Ferny Hills, 4055
- * Currumbin Sanctuary, Tomewin Street, Currumbin, 4223
- * Central Queensland Wildlife Hospital Inc. 23 Jennings Road Cawarral 4711 Ph: 07 4935 4309
- * F.A.U.N.A. (Fostercare of Australia's Unique Native Animals) Association Inc., PO Box 39, Esk, Qld 4312 Ph: 0754 264 389 email: fauna1@bigpond.com Web: www.fauna.com.au

- * Gladstone & District Wildlife Carers, PO Box 7009, Kin Kora, 4680 24hr Ph: 0421 106 803
- * Inala Community Conservationist Assoc., 71 Fernlea Ave, Scarborough, 4020
- * Nascaring Wildlife Shelter, M/S 464, Via Helidon, 4344

- ✿✿ Noahs Ark Wildlife Coalition Inc, PO Box 1249, Beenleigh, Qld, 4207 Ph: 07 3807 3404 email ;admin@noahsark.org.au Web: www.noahsark.org.au
- ✿✿ North Queensland Wildlife Care Group, PO Box 1446, Aitkenvale, 4814
- ✿✿ North Queensland Wildlife Care Group, PO Box 1629, Townsville, 4810
- ✿✿ Orphaned Native Animals Rear and Release Darra, PO Box 15, Darra, 4076
- ✿✿ RSPCA Qld native animal rescue, 301 Fairfield Road, Fairfield, 4103 Ph: 07 3426 9999
- ✿✿ Queensland Wildlife carers & Volunteers, 33 Holland St, Bargara(Bunderberg), 4670. Ph: 07 41591504
- ✿✿ West Chermiside Vet (emergency wildlife Vet) Ph: 07 3359 5333
- ✿✿ Wildcare Queensland, PO Box 2379, Nerang Mail Centre, 4211 Ph: 07 5527 2444
- ✿✿ Wildlife Education and Rescue Service of Central Queensland, PO Box 8308, Mt Pleasant 4740
- ✿✿ Wildlife Volunteers Association Inc., 14 Osprey Street, Bli Bli, 4560
- ✿✿ Wildlife Preservation Society of Queensland (WPSQ), Head Office, 95 William Street, Brisbane, 4000
- ✿✿ WPSQ Bayside, PO Box 427, Capalaba, 4157
- ✿✿ WPSQ Brisbane, c/- 296 Ferguson Road, Norman Park, 4170
- ✿✿ WPSQ Brisbane Valley, Lot 72 Willaura Drive, Coominya, 4311
- ✿✿ WPSQ Bundaberg, PO Box 1215, Bundaberg, 4670
- ✿✿ WPSQ Caboolture, PO Box 1415, Caboolture, 4510
- ✿✿ WPSQ Cairns, PO Box 1350, Cairns 4870
- ✿✿ WPSQ Caloundra, PO Box 275, Caloundra, 4551
- ✿✿ WPSQ Cape York, PO Box 567, Cooktown 4871
- ✿✿ WPSQ Capricorn, Yeppoon Environment Centre, PO Box 263, Yeppoon, 4703
- ✿✿ WPSQ Dalby, PO Box 338, Dalby, 4405
- ✿✿ WPSQ East Logan, PO Box 3340, Loganholme, 4129
- ✿✿ WPSQ Glossy Black Cockatoos, PO Box 345, Mudgeraba, 4213

- ✿✿ WPSQ Gold Coast & Hinterland, 28 North Road, Lower Beechmont, 4211
- ✿✿ WPSQ Hervey Bay, PO Box 830, Pialba, 4655,
- ✿✿ WPSQ Hinchinbrook, PO Box 1184, Ingham, 4850
- ✿✿ WPSQ Innisfail, PO Box 750, Innisfail, 4860
- ✿✿ WPSQ Kedron Brook, 91 Jean Street, The Grange, 4051
- ✿✿ WPSQ Maryborough, 74 Pallas Street, Maryborough, 4650
- ✿✿ WPSQ Nanango, 22 Henry Street, Nanango, 4615 07 4163 2240
- ✿✿ WPSQ North-West Brisbane, PO Box 134, Albany Creek, 4035
- ✿✿ WPSQ Pine Rivers, PO Box 377, Strathpine, 4500
- ✿✿ WPSQ Proserpine & Whitsunday, PO Box 1002, Airlie Beach, 4802
- ✿✿ WPSQ Samford Valley, PO Box 272, Samford Valley, 4520
- ✿✿ WPSQ South Redlands, 6 Main Street, Redland Bay, 4165
- ✿✿ WPSQ Townsville, PO Box 857, Aitkenvale, 4814
- ✿✿ WPSQ Tully, PO Box 771, Tully, 4854
- ✿✿ WPSQ Upper Dawson, PO Box 262, Taroom, 4420

New South Wales Wildlife Organisations

- ✿✿ National Parks and Wildlife Service, 43 Bridge Street, Hurstville, 2220 Ph: 02 9585 6444
- ✿✿ Australian Wildlife Hospital Association, PO Box 84, Raymond Terrace, 2324
- ✿✿ Australian Wildlife Ambulance Rescue Service (AWARE), PO Box 592, Caringbah, 2229
- ✿✿ Australian Seabird Rescue Inc. PO Box 733, Alstonville NSW 2477.
- ✿✿ Cabramatta Creek Flying Fox Committee (CCFFC), PO Box 430, Bonnyrigg, 2177
- ✿✿ For Australian Wildlife Needing Aid (FAWNA), PO Box 218, Wauchope, 2446
- ✿✿ Friends of the Koala, PO Box 5034, East Lismore, 2477
- ✿✿ Fund for Animals (FFA), 313 Mona Vale Road, Terry Hills, 2
- ✿✿ Great Lakes Wildlife Rescue (GLWR), Huntley, The Lakes Way, Bungwahl 2423
- ✿✿ International Fund for Animal Welfare (IFAW), 29 Georgina Street, Newtown, 2042
- ✿✿ Kangaroo Preservation Cooperative, GPO Box 3719, Sydney, 2001
- ✿✿ Koala Preservation Society of NSW, PO Box 236, Port Macquarie, 2444
- ✿✿ Friends of the Koala Inc. PO Box 5034 Lismore 2480 Ph: 6622 1233
- ✿✿ Ku-ring-gai Flying-fox Conservation Committee, 45 Highfield Road, Lindfield, 2070
- ✿✿ Looking After Our Kosciusko Orphans (LAOKO), 18 Kurrajong Street, Jindabyne, 2627
- ✿✿ Native Animal Network Association (NANA), PO Box 2191, Tomerong, 2540
- ✿✿ Native Animal Trust Fund (NATF), PO Box 1052 Toronto. 2283 24hour Hotline Ph: 0500502294
- ✿✿ Northern Rivers Wildlife Carers (NRWC), PO Box 6432, Lismore, 2480

- ✿ Northern Tablelands Wildlife Carers (NTWC), PO Box 550, Armidale, 2350
- ✿ Organisation for the Rescue and Research of Cetaceans (ORRCA), PO Box 442, Artarmon, 2064
- ✿ Rescue and Rehab of Aust Native Animals (RRANA), 107 Boughtman Street, Broken Hill, 2880
- ✿ RSPCA NSW, PO Box 34, Yagoona, 2199
- ✿ Southern Oceans Seabirds Study Association (SOSSA), PO Box 142, Unanderra, 2526
- ✿ Sunraysia Wildlife Carers Group (SWCG), PO Box 189, Gol Gol, 2738
- ✿ Sydney Metropolitan Wildlife Service (SMWS), 31 Chiltern Road, Ingleside, 2101 Ph: 02 94134300
- ✿ Taronga Zoo Wildlife Clinic, PO Box 20, Mosman, 2088
- ✿ The Big Scrub Environment Centre, 49 Keen Street, Lismore, 2480
- ✿ The Wildlife Preservation Society of Australia (WPS), 8 Reiby Road, Hunters Hill, 2110
- ✿ Tweed Valley Wildlife Carers (TVWC), PO Box 898, Murwillumbah, 2484
- ✿ Wildlife and Rehabilitation Providers (WARP), PO Box 476, Muswellbrook,
- ✿ Wildcare Queanbeyan, PO Box 852, Queanbeyan, 2620
- ✿ Wildlife Animal Rescue and Care (Wildlife ARC), PO Box 2383, Gosford, 2250
- ✿ Wildlife Carers Network Central West (WCNCW), 'Grundy Fen', Running Stream, 2850
- ✿ Wildlife Carers of Glen Innes (WCGI), PO Box 520, Glen Innes, 2370
- ✿ Wildlife Information and Rescue Service (WIRES), PO Box 260, Forestville 2087
- ✿ WIRES Blue Mountains, PO Box 607, Springwood, 2777
- ✿ WIRES Central Coast, PO Box 527, Gosford, 2250
- ✿ WIRES Central Northern NSW, PO Box 734, Tamworth, 2340
- ✿ WIRES Central West, PO Box 1271, Bathurst, 2795
- ✿ WIRES Clarence Valley, 1005 Brooms Head Road, Taloumbi, 2463

- ✿✿ WIRES Coffs Harbour, PO Box 417, Bellingen, 2454
- ✿✿ WIRES Dubbo, PO Box 1456, Dubbo, 2830
- ✿✿ WIRES Far South Coast, 7 Tristania Court, Tura Beach, 2548
- ✿✿ WIRES Illawarra, PO Box 1271, Wollongong, 2500
- ✿✿ WIRES Mid South Coast, C/o Bodalla Post Office, Bodalla, 2545
- ✿✿ WIRES Mudgee, PO Box 723, Mudgee, 2850
- ✿✿ WIRES New England, PO Box 1487, Armidale, 2350
- ✿✿ WIRES Snowy Mountains, PO Box 739, Tumut, 2720
- ✿✿ WIRES Southern Tablelands, PO Box 1190, Goulburn, 2580
- ✿✿ WIRES Wagga Wagga, PO Box 1314, Wagga Wagga, 2650
- ✿✿ WIRES Wingecarribee, PO Box 1149, Bowral, 2576
- ✿✿ WIRES Woolgoolga, PO Box 75, Woolgoolga, 2456

Victoria Wildlife Organisations

- ✿✿ Dept of Natural Resources and Environment, PO Box 500, East Melbourne, 3002
Ph:03 9412 4011
- ✿✿ Healesville Sanctuary, PO Box 248, Healesville, 3777
- ✿✿ Help for Wildlife Vic, 0417 380687
- ✿✿ Jirrahlinga Wildlife Sanctuary, Barwon Heads, 3227
- ✿✿ Phillip Island Nature Park, PO Box 97, Cowes, 3922 Ph: 03 5951
2838 email: mhealey@penguins.org.au
- ✿✿ RSPCA Victoria, 3 Burwood Highway, Burwood East, 3151
- ✿✿ Quamby Wildlife Shelter 03 5367 2171
- ✿✿ Wildlife Victoria, 247 Flinders Lane, Melbourne, 3000. Ph: 03 9663 9211 Ph 24
hrs 0500540000

Tasmania Wildlife Organisations

- ✿ Dept of Parks & Wildlife Tasmania, GPO Box 44A, Hobart, 7001 Ph: 03 6233 6556
- ✿ Animal Rescue Inc., 166 Samuel Street, Elizabeth Town, 7304
- ✿ RSPCA Tasmania, PO Box 1024, Launceston, 7250
- ✿ Taspaws, GPO Box 44A, Hobart, 7001
- ✿ Wildcare Tasmania, PO Box 44A, Hobart, 7001
- ✿ Trowunna Wildlife Sanctuary, POBox 183, Mole Creek, Tas, 7304 Ph: 03 63636162 Web: www.trowunna.com.au

South Australia Wildlife Organisations

- ✿ Dept Environment, Heritage & Aboriginal Affairs, GPO Box 1782, Adelaide, 5001 Ph: 08 8204 8702
- ✿ Bird Care and Conservation Society, 120 Wakefield Street, Adelaide, 5000
- ✿ Earth Sanctuaries, PO Box 1135, Stirling, 5152
- ✿ Fauna Rescue of SA Inc., PO Box 241, 70rmsby Avenue, Modbury North, 5092
- ✿ Kangaroo & Wildlife Information and Rescue Service, PO Box 1135, Aldinga Beach, 5173
- ✿ The Marsupial Society of Australia, GPO Box 2462, Adelaide, 5001
- ✿ RSPCA South Australia, 158 Currie Street, Adelaide, 5000
- ✿ Wildlife Welfare Organisation of SA In., 27 Coronation Road, Strathalbyn, 525

Western Australia Wildlife Organisations

- ✿ Dept Conservation and Land Management (CALM), Locked Bag 1, Bentley Delivery Centre, Bentley, 6983 Ph:08 9334 0292
- ✿ Albany Wildlife Shelter, 8 Bottlebrush Road, Albany, 6330
- ✿ Fauna Rehabilitation Foundation (FRF), PO Box 2276, Malaga, 6944
- ✿ Fostering and Assistance for Wildlife Needing Aid (FAWNA), PO Box 551, Busselton, 6280
- ✿ Kojonyup Wildlife Rescue, PO Box 133, Kojonyup, 6395
- ✿ RSPCA West Australia, PO Box 463, Cannington, 6107
- ✿ The Brand Wildlife Centre, Lot 65 Camboon Road, Malaga, 6090
- ✿ WA Native Bird Hospital, PO Box 232, Mundaring, 6073
- ✿ Waterbird Conservation Group Inc., Lot 139 Urch Road, Ruleystone, 6111
- ✿ Kanyana Wildlife Rehabilitation Centre Phone 08 9293 1416

Northern Territory Wildlife Organisations

- ✿ Parks and Wildlife Commission, PO Box 496 Palmerston, 0831 Ph: 08 8999 4536
- ✿ RSPCA Northern Territory, PO Box 40034, Casuarina, 5792
- ✿ Wildcare Northern Territory, PO Box 464, Palmerston, 0831
- ✿ Wildcare Alice Springs, PO Box 4251, Alice Springs, NT, 0871 Ph: 0419 221 128

Manuals and Reference Books

Sydney Metropolitan Wildlife Services (2005) Flying Fox Training Manual
Updated version. Sydney Wildlife

Australian Natural History Series Flying Foxes Fruit and Blossom Bats of Australia,
Written By Leslie Hall and Greg Richards publication 2000

Encyclopaedia's used

Britannica 1997 - 2001

Readers Digest various authors 1999

Britannica Science 2001

Word Power Dictionary copy right 2001

Nature Books used

Time Life Australian Mammals various authors 1989

A – Z of Australian animals and reptiles various authors 2000

A Photographic Guide to Mammals of Australia, 1995 - by Strahan, Ron

The Incomplete Book of Australian Mammals, 1997 - by Strahan and others, Ronald

Documentaries

Life of Mammals produced by BBC Narrated and Hosted by David Attenbrough

BATS Produced by BBC

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http://www.epa.nsw.gov.au/legal_and_licensing.htm

<http://www.kanyanawildlife.org.au/carers/index.php>

<http://www.dpi.vic.gov.au/dse/nrenpa.nsf/LinkView/A5C4F9768CBA5AC6CA256BC60026AEDD832B52E5A03F23CCCA256E5A00154280>

<http://www.deh.gov.au/cgi-bin/sprat/public/publicthreatenedlist.pl?wanted=fauna#mammals%20that%20are%20Vulnerable>

<http://rainforest-australia.com/bats.htm>

http://animaldiversity.ummz.umich.edu/site/accounts/information/Pteropus_conspicillatus.html

http://www.austrop.org.au/fox_threats.html

<http://www.amonline.net.au/bats/records/bat4.htm>

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<http://www.athertontablelands.com/bats/orphans.html>

<http://www.jeffress.net/ffnff/whiteing1995-96.htm>

<http://www.netspeed.com.au/truscott/environs/rainfor/Page6.html>

<http://www.dse.vic.gov.au/dse/nrenpa.nsf/FID/-BAA86C6B029BC723CA256BF2001E4069?OpenDocument>

<http://www.lubee.org/center-bats.aspx>

http://www.mountainstomangroves.org/06_education/03f_albany.htm

<http://www.noahsark.org.au/?act=wildlife&file=babyfox>

<http://www.naturegrid.org.uk/infant/science/photo4.html>

<http://www.batreach.cairns.tc/ffoxes.html>

http://www.qccqld.org.au/resources/flyingfoxes/flyingfox_species.htm

http://www.brisinst.org.au/resources/brisinst_brown_mcgrath_fox.html

<http://members.aol.com/obcbats/Spectacledinfo.html>

http://members.optusnet.com.au/~hparsons20/wildlife_rehabilitation_contacts.htm

All above websites were an accurate hit / link on 20th September 2005

15 Glossary

Chronobiology – the branch of biology concerned with the periodicity occurring in the living organisms.

Dimorphism – the occurrence in an animal species of two distinct types of individual.

Eutherian – a subclass of mammals all of which have a placenta and reach an advanced state of development prior to birth

Habitat – the natural home of an animal or plant or where the animal is known to dwell.

Hessian – coarse jute fabric similar to sacking used for bags or upholstery.

Imprinting – the development through exceptionally fast learning in young animals of recognition of and attraction to members of their own species or to surrogates.

Longevity – life expectancy of the animal

Metatherian – a subclass of mammals comprising of marsupials which do not have a placenta and young are birthed semi developed and continue stages of development in a pouch where young attach to a teat.

Morphometric – derived from Greek word morpho meaning shape and metric meaning measurements meaning literally what is the shape measurements.

Oestrus – hormonally controlled cycle of activity of the reproductive organs in many Female mammals.

Paralysis – the impairment or loss of voluntary muscle function from particular part of body if not entire body.

Placental – a vascular organ formed in the uterus of most mammals during pregnancy consisting of both maternal and embryonic tissues, providing nutrients and oxygen to foetus. A trait of eutherian

Prolifically – producing offspring in abundance, constant or having successful results.

Prototherian – Subclass of mammals which includes monotremes which are egg laying mammals of which Echidna and Platypus are the only mammals who are prototherian.

Spatial – relating to space, existing in a particular space.
Substrate – enclosures flooring materials

Terrestrial – an earthly place of where species are located.

Tick – small parasitic arachnids (8 legs) that feed of warm blooded mammal in most cases where they consume animal blood and tissues from their host.

Uterus – a hollow muscular organ lying within the pelvic cavity of female mammals. It houses the developing foetus and by contractions it aids expulsion at birth.

Vocalise – to express tone and pitch through voice and vowels.

The above definitions come mainly if not directly quoted from Collins English Dictionary Australian Edition Edited By G.A. Wilkes second Edition 1986.

16 Appendix

Appendices 1

Milk powders that are used to rear young Spectacled Flying Foxes

Cows Milk readily available at all Supermarkets

Nestle Nan baby milk Formula

Lactose, Reduced Minerals Whey Protein Concentrate (from Cow's Milk), Nonfat Milk, Corn Syrup, Palm Olein Oil, Soy Oil, Coconut Oil, High-Oleic Safflower or High-Oleic Sunflower Oil, and Less Than 1.5% of: Calcium Citrate, M. Alpina Oil (A Source of Arachidonic Acid (ARA)), C. Cohnii Oil (A Source of Docosahexaenoic Acid (DHA)), Potassium Chloride, Potassium Phosphate, Potassium Citrate, Sodium Citrate, Magnesium Chloride, Ferrous Sulfate, Zinc Sulfate, Copper Sulfate, Potassium Iodide, Manganese Sulfate, Sodium Ascorbate, Inositol, Choline Chloride, Alpha-Tocopheryl Acetate, Niacinamide, Calcium Pantothenate, Riboflavin, Vitamin A Acetate, Pyridoxine Hydrochloride, Thiamine Mononitrate, Folic Acid, Phylloquinone, Biotin, Vitamin D3, Vitamin B12, Taurine, Nucleotides (Naturally Found in Breastmilk) (Cytidine 5'-Monophosphate, Disodium Uridine 5'-Monophosphate, Adenosine 5'-Monophosphate, Disodium Guanosine 5'-Monophosphate), Ascorbyl Palmitate, Mixed Tocopherols, L-Carnitine.

Directions

Use as instructed by your doctor. (Nan is a routine formula. If you suspect your baby is allergic to milk, use only under a doctor's supervision. As with any powdered infant formula product, use with immunocompromised infants is not recommended.) Your baby's health depends on carefully following these directions for preparation and use: 1. Boil clean preparation and serving utensils, then cool. 2. In separate container, boil water, then cool to 100 degrees F. (40 degrees C). 3. Pour desired amount of water into bottle. 4. Add 1 unpacked level scoop (8.7g) of powder for each 2 fl oz water. (Separate enclosed scoop from frame.) 5. Cap bottle, shake well and feed baby immediately. Discard unused formula left in bottle after feeding. Storage: Refrigerate and use prepared bottles within 24 hours. Cover oven can and use within 1 month. Store open and unopened cans in cool, dry place. Avoid extreme temperatures.

Wombaroo Flying Fox Milk Replacer

Ingredients - Whey protein, caseins, milk solids, vegetable oils, omega-3 & omega-6 fatty acids, maltodextrin, 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.

If Nestle Nan is unavailable the following can be used

S26

SMA white powder

Hipp Organic Milk formula

Milupa Aptamil Milk first and or Milupa Aptamil Liquid Milk first 200ml

Cow and Gate Baby Milk premium1 OMNEO and or Cow and Gate Baby Milk premium
1 Ready To Feed Milk 200ml

Farleys Baby Milk

Enfamil Lipil with Iron, Milk-Based Infant Formula, Powder,

Nestle Good Start Milk-Based Infant Formula with Iron, Powder

Similac Milk-Based Infant Formula with Low Iron, Powder,

*Available at all chemists, Kmart, Coles, Woolworths, IGA, BigW, Target, BIL
Supermarket, and all good general stores. If still can not find one of the above please
order on*

www.ebay.com

Appendices 2

Supplements used on Adult Spectacled Flying Fox

WPS Wombaroo Protein Supplement –

Ingredients Whey protein, soy protein, ground cereals, maltodextrin, dextrose, lysine, methionine, vegetable oils, omega-3 and omega-6 fatty acids, 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.

Wombaroo insectivore mix

NEKTON-CAT-M

POLY-AID PLUS

Sandoz

Glucosamine chonrotin,

Vetafarm blossom nectar

Vitamin C powder

Animal Science Vitamin and mineral Spray for small Mammals

Always follow directions and ask a veterinarian professional before supplementing your Spectacled Flying Foxes.

All of the above are available from Veterinary surgeries and Pet Product wholesalers, see table below to find your closest stockists.

Pet Product wholesalers

NSW	WA	VIC	QLD	SA	CANBERRA
<u>The Pet Warehouse</u> 1- 3 Lawrence St Alexandria NSW 2015 ph: (02) 9519 0444	<u>Pets Direct Australia</u> Kardinya WA 6163 ph: (08) 93373468	<u>Murphy Brothers</u> Cnr Burwood & Auburn Rds Hawthorn VIC 3122 ph: (03) 9882 2296	<u>The Pet Shop</u> Shop 5, Crn Mains Rd & McCullough Rd Sunnybank QLD 4109 ph: (07) 3345 8900	<u>P & K Pets</u> 19 Magill Rd Stepney SA 5069 ph: (08) 8362 2375	<u>Cardawan Pet Foods & Supplies</u> 116 Uriarra Rd Queanbeyan NSW 2620 ph: (02) 6297 9154
<u>Custom Pet Food Co</u> Bellevue Hill NSW 2023 ph: (02) 9388 9999	<u>Budget Pet Shop</u> 86 Lockyer Ave Albany WA 6330 ph: (08) 98417911	<u>Ascot Vale Stockfeeds</u> 536 Racecourse Rd Flemington VIC 3031 ph: (03) 9376 6871	<u>Purebread Pet Pantry & Supplies</u> 293 Given Tce Paddington QLD 4064 ph: (07) 3369 0699	<u>Mitchell Park Pet Supplies</u> 97b McInerney Ave Mitchell Park SA 5043 ph: (08) 8374 2988	
<u>Condell Park Produce</u> Rear 44 Simmat Ave Condell Park NSW 2200 ph: (02) 9790 6231	<u>Greenslade & Co Pty Ltd</u> 77 Rockingham Rd Hamilton Hill WA 6163 ph: (08) 93351811	<u>Lilydale Pet Foods</u> Fact 11/ 478 Maroondah Hwy Lilydale VIC 3140 ph: (03) 9739 6434	<u>Southside Pet Barn</u> 467 Underwood Rd Rochedale QLD 4123 ph: (07) 3341 4937		
<u>Pet Food Delivery</u> Sydney NSW 2000 ph: (02) 9984 1746		<u>Buddies Pet Supplies</u> 359 Nepean Hwy Brighton East VIC 3187 ph: (03) 9596 4472	<u>Andergrove Veterinary Clinic</u> 195a Bedford Rd Andergrove QLD 4740 ph: (07) 4955 5181		
<u>Hiland Pet Supplies</u> Cnr Cavendish & Davy Sts Mittagong NSW 2575 ph: (02) 4872 1940			<u>Fur N Fins</u> 169 Station Rd Burpengary QLD 4505 ph: (07) 3888 5052		
<u>Peninsula Pet Supplies</u> 1 Niangala Cl Belrose NSW 2085 ph: (02) 9450 2112			<u>Plain Jane Wholesalers</u> PO Box 1076 Slacks Creek QLD 4127 ph: (07) 3209 5610		
<u>Bazza's Pet Shack</u> Units 6-8/ 10 Grieve Cl Gosford West NSW 2250 ph: (02) 4325 2915					

<u>Petbarn Ltd.</u> Unit 5C, Lot 6 Boundary Rd Northmead NSW 2152 ph: (02) 9630 1600					
<u>Woonona Petfood & Produce</u> 500 Princes Hwy Woonona NSW 2517 ph: (02) 4284 3162					
<u>Supasave Pet Supplies</u> 14 Hall St Newcastle West NSW 2302 ph: (02) 4926 2006					
<u>Dollar Save Pet & Produce Supplies Pty Ltd</u> 321 Hillsborough Rd Warners Bay NSW 2282 ph: (02) 4956 6522					
<u>Pet Stock Animal Supplies</u> 47 Princes Hwy Albion Park Rail NSW 2527 ph: (02) 4257 4001					
<u>The Pet People</u> Shop C103, Menai Central Carters Rd Menai NSW 2234 ph: (02) 9543 1077					
<u>The Pet Cave</u> 956A Woodville Rd Villawood NSW 2163 ph: (02) 9728 9777					
<u>Yummi Pet Food Products</u> 128 Bungaree Rd Pendle Hill NSW 2145 ph: (02) 9636 9708					
<u>The Pet Warehouse</u> 246 Railway Pde Kogarah NSW 2217 ph: (02) 9587 9000					

Appendices 3

Fruit and Vegetable Produces Suppliers

NSW	WA	VIC	QLD	SA	CANBERRA
<u>Lahood Bros The Fresh Food Specialists</u> 17 Milperra Rd Revesby NSW 2212 ph: (02) 9771 1222	<u>Chantec Pty Ltd</u> 250 Bernard Road North Carabooda WA 6033 ph: (08) 9407 0000	<u>Melbourne Markets</u> Box 1, 542 Footscray Rd West Melbourne VIC 3003 ph: (03) 9258 6100	<u>Buy 'n' Rite</u> Sunrise Beach QLD 4567 ph: 0438 884 461	<u>City Fruit & Vegetable Supply</u> Building M Diagonal Rd Pooraka SA 5095 ph: (08) 8262 7272	<u>Direct Fruit Distribution Pty Ltd</u> Unit 21 Koala Court 151 Gladstone St Fyshwick ACT 2609 ph: (02) 6239 2432
<u>Sydpro Pty Ltd</u> 13 Woodburn St Redfern NSW 2016 ph: (02) 8399 0822	<u>About Produce</u> Warehouse E4, Units 11 & 13, Market City Canning Vale WA 6155 ph: (08) 9456 3244	<u>Simply Fresh Fruit</u> 15 Virginia St Mornington VIC 3931 ph: (03) 5976 3944	<u>Growers Own Ready Fresh</u> 220 East St Rockhampton QLD 4700 ph: (07) 49222777	<u>A To Z Fruit & Vegetables Supplies</u> Unit 1/ 32 Cnr Mary St & Park Tce Salisbury SA 5108 ph: 0411 411 492	<u>Erindale Fruit Market</u> 65 Sternberg Crs Wanniassa ACT 2903 ph: (02) 6231 9342
<u>Nowra Fruit Market Pty Ltd</u> Lot 3, 164 Princes Hwy Nowra South NSW 2541 ph: (02) 4421 2241	<u>Broome Fruit & Veges</u> Clementson St Broome WA 6725 ph: (08) 9192 2242	<u>Yarra Valley Farms</u> PO Box 321 Yarraville VIC 3013 ph: 1300 734 433	<u>Market Garden Produce</u> 98 Scott St Cairns QLD 4870 ph: (07) 40521477	<u>Adelaide Fruit & Veg Supply</u> 422 Churchill Rd Kilburn SA 5084 ph: (08) 8349 6331	<u>Gundaroo Growers</u> Shop 9, Mawson Pl Mawson ACT 2607 ph: (02) 6286 7333
<u>Perfection Fresh Australia Pty Ltd</u> Unit 3/ 7- 9 Underwood Rd Homebush NSW 2140 ph: (02) 9763 1877	<u>Bullet Produce</u> Mail Point 99/ 280 Bannister Rd Canning Vale WA 6155 ph: (08) 9456 0422		<u>Brisbane Markets Limited</u> Upper Level, Brisbane Markets Commercial Centre Sherwood Rd Rocklea QLD 4106 ph: (07) 33791062	<u>A.M.J. Produce Co Pty Ltd</u> 302 Cormack Rd Wingfield SA 5013 ph: (08) 8349 5222	
<u>A & H Fruit Supply</u> BldgA Flemington Markets Flemington NSW 2140 ph: (02) 9746 7649	<u>Bunches Galore</u> 150 East Rd Pearsall WA 6065 ph: (08) 9405 1564		<u>Arcadia Greengrocers</u> Unit 1, 13 Lionel Donovan Drv Noosaville QLD 4566 ph: (07) 5442 4855	<u>Arharidis Brothers Pty Ltd</u> Lot 8 Penfield Rd Virginia SA 5120 ph: (08) 8380 9233	
<u>A Fresh Delivery Pty Ltd</u> PO Box 323 Plumpton NSW 2761 ph: (02) 9835 0755	<u>Cloe Foods</u> Unit 2, 75 Forsyth St O'Connor WA 6163 ph: (08) 9337 7588		<u>Ashmore Wholesale Markets</u> 1/ 22 Commercial Drv Southport QLD 4215 ph: (07) 5532 3434		

<u>Abalode Pty Ltd</u> 27 Karimbla Rd Miranda NSW 2228 ph: (02) 9525 3390			<u>Ausfruit</u> 2 Nicholson Cl Bribie Island QLD 4507 ph: (07) 34087053		
<u>All Seasons Vegie Factory</u> Shop 2/ 3 Russell St Woonona NSW 2517 ph: (02) 4283 1032			<u>Betros Bros Pty Ltd</u> Annand St Toowoomba QLD 4350 ph: (07) 4632 4166		
<u>Allambie Heights Fruit Market</u> S16 Grigor Pl Allambie Heights NSW 2100 ph: (02) 9975 4616					
<u>Anchors Fresh Fruit & Veg</u> Unit 1c Banyette & Station Sts Bowral NSW 2576 ph: (02) 4861 1501					
<u>Armidale Wholesale Fruit Market</u> 168 Rusden St Armidale NSW 2350 ph: (02) 6772 5970					
<u>Beaumont's Produce</u> 3954 Waterfall Way Dorrigo NSW 2453 ph: (02) 6657 2389					

Appendices 4

IATA – Transport Box design and dimensions

CONTAINER REQUIREMENT 77

The illustrations shown in this Container Requirement are examples only. Containers that conform to the principle of written guidelines for the species but look slightly different will still meet the IATA standards.

Applicable to:

- Bat (all species)
- Flying fox
- Flying lemur

See USG Exceptions in Chapter 2.

1. CONTAINER CONSTRUCTION

(see Exception QF-01 in Chapter 3)

Materials

Wood, plywood, wire mesh and screening material.

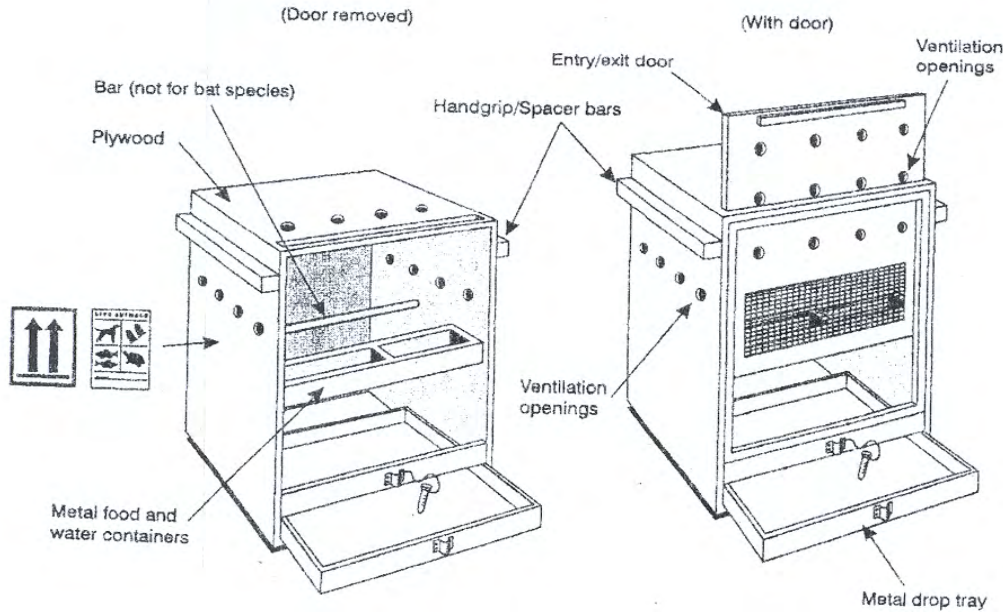
Principles of Design

The following principles of design must be met in addition to the General Container Requirements outlined at the beginning of this chapter.

Dimension

The container must be large enough for the bat to move around freely.

EXAMPLE:



Frame

The frame must be made from solid wood parts screwed together which can also form the base, sides and top.

Sides

The sides and door must be made of the appropriate wood, one or more sides, preferably including the back, must be lined with 2.5 cm (1 in) diameter wire mesh set 1 cm (3/8 in) away from the side so that the bat can easily hang upside down from it. Meshed ventilation openings must be present on all four sides.

Floor

The floor must be solid with a droppings tray fixed to it.

Roof

The roof must be made of wood with meshed ventilation openings over its surface. A secondary roof must be constructed within the container from 2.5 cm (1 in) diameter wire mesh, set approximately 1 cm (3/8 in) below the top from which the bat can hang easily.

Doors

A sliding door, which has approximately 1/4 of the lower part consisting of a finely meshed opening and with meshed ventilation holes spread over the remainder, must be provided at the front of the container, it must have a secure means of fastening so that it cannot be opened accidentally. A screen of loosely woven material or a ventilated plywood panel must be placed over the front of the container to reduce light.



CONTAINER REQUIREMENT 77 (cont'd)

Ventilation

Wire meshed ventilation must be provided by openings with a minimum diameter of 2.5 cm (1 in) spread over the sides, door and top. If the mesh is fixed to the interior of the container all sharp edges must be covered with smooth material.

Spacer Bars/Handles

Must be made to a depth of 2.5 cm (1 in), must be present on three sides of the container as shown in the illustration.

Feed and Water Containers

Off the floor food and water containers must be provided. A plentiful food supply must be in the container at the start of the journey.

Rigid Plastic Pet Containers (see Container Requirement 1)

Rigid plastic pet containers can be used for the air transport of a small number or individual animals. The following modifications must be undertaken:

- the height and width of the container must allow the animal to move around easily;

- there must be suitably sized wire mesh fixed to the roof and back of the container at a distance of 1 cm ($\frac{2}{5}$ in) away from the plastic side and top in order that the animals can hang upside down easily. Any sharp edges must be covered and made smooth;

- the grill door and all ventilation openings must be covered from the outside with a fine wire mesh. Curtains that reduce the amount of light inside the container but allow air to circulate freely must be hung over the door and all ventilation openings;

- food and water containers must be fixed off the floor inside the container, a plentiful supply of food material must be present in the container at the start of the journey;
- the container must be correctly labelled.

If a container has wheels, they must be removed or rendered inoperable.

2. PREPARATIONS BEFORE DISPATCH

(see Chapter 5)

No special requirements.

3. FEEDING WATERING GUIDE

(for emergency use only)

Bats must be provided with a large quantity of food before shipment which helps to prevent fighting.

If feeding is required due to an unforeseen delay, water and, depending on species of bat, to be indicated by the shipper, insects or fruit must be provided in the container but care must be taken not to overfeed.

4. GENERAL CARE AND LOADING

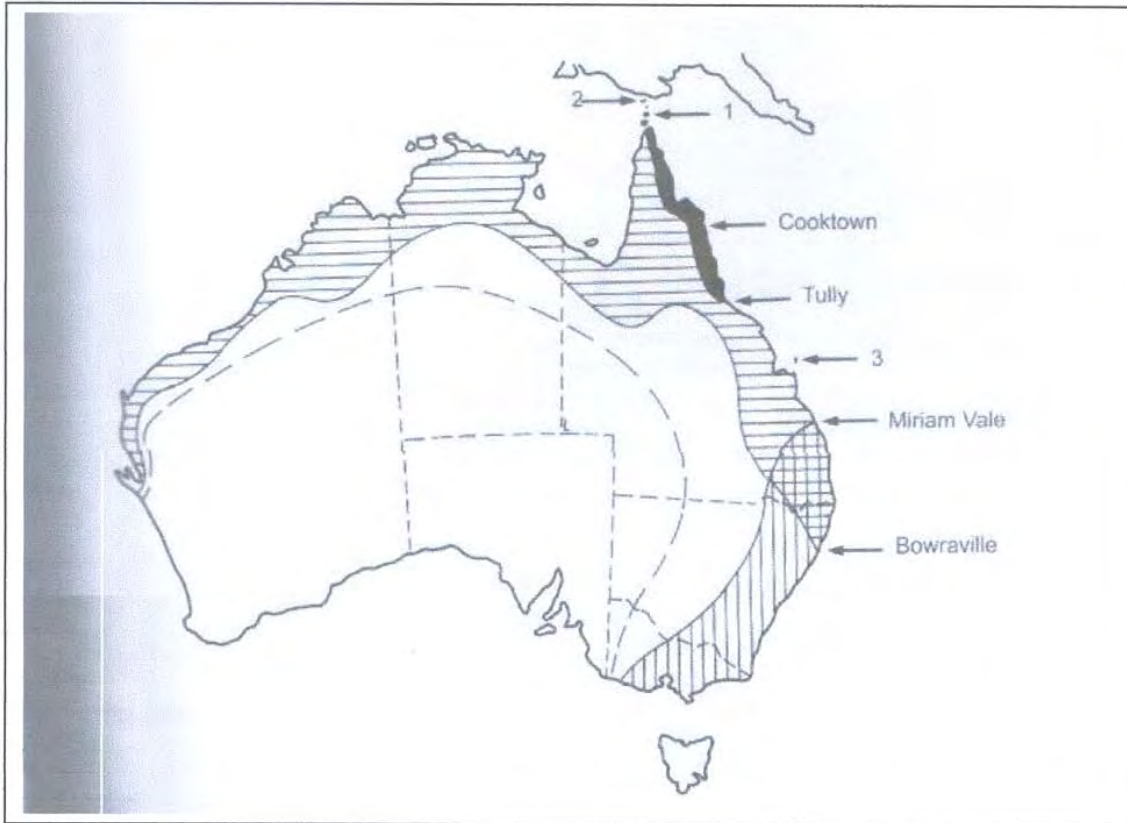
(see Chapters 5 and 10)

No special requirements.

Warning: Bats can inflict severe bites, therefore bat containers must never be opened except by experienced handlers.

Appendices 5

Distribution of the Flying Foxes in Australia



KEY



Grey-headed flying fox



Black flying fox



Spectacled flying fox and bare-backed flying fox (north of Cooktown)



Little red flying fox (inner limit)

1

Torresian flying fox (Moa Is.)

2

Large-eared flying fox (Boigu Is.)

3

Dusky flying fox (Percy Is.)