

Husbandry Manual for Blue and Gold Macaw

Ara ararauna

Aves: Psittacidae



"Macaw eye". Illustration by Paul Plante, sited on www.mixedgreens.com

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The following table provides a summary of the maintenance regime for the upkeep of Blue and Gold Macaws.

Annual Cycle of Exhibit Maintenance Activities

Table 1. Timeline for maintenance activities.

ACTIVITY	J	F	M	A	M	J	J	A	S	O	N	D
BREADING SEASON												
EGG NEST CHECK												
INCREASE FOOD RATIONS												
VET CHECKS												
DISTANT EXAMINATIONS												
CLEANING OF ENCLOSURE												
REPAIR ENCLOSURE												
REPLACE PERCHES												
REPLACE NESTING MATERIALS												
PEST CONTROL												
HORTICULTURE												
IDEAL TRANSPORT PERIOD												

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All terms used in this manual are described in the glossary of terms at the end of this document.

1. Introduction

Macaws are the largest, most fascinating birds of the parrot family (Psittacidae). The macaw group consists of 17 different living species that are divided up into 4 genera. These are Ara, Diopsittaca, Andorhynchus and Cyanopsitta. From these 4 genera of macaws the genus Ara contains 12 of the 17 known living species seen in captivity. Macaw species in their genera can be seen in Table 2 below. The Blue and Gold Macaw in its management program can be seen in Appendix 1, on page 59.

Most of the different species of macaw can be considered as pets and fall within the largest genus, Ara. The species of the Ara genus vary greatly in size and colour with all of them having a similar body shape. Ara macaws have long tail feathers and large, broad heads with beaks that are extensive and strong. The most noticeable taxonomic feature of these birds is the area of bare skin on either side of the face. These bare patches can be completely bare or be covered in rows of small facial feathers surrounding the eyes. These markings vary between each macaw species.

Table 2. Macaw species in their genera.

Genus	Species	Scientific Name
Ara	Blue and Gold Macaw	<i>Ara ararauna</i>
	Green Winged Macaw	<i>Ara chloroptera</i>
	Scarlet Macaw	<i>Ara macao</i>
	Blue-throated Macaw	<i>Ara glaucogularis</i>
	Military Macaw	<i>Ara militaris</i>
	Buffon's Macaw	<i>Ara ambigua</i>
	Red-fronted Macaw	<i>Ara rubrogenys</i>
	Severe Macaw	<i>Ara severa</i>
	Yellow-collared Macaw	<i>Ara auricollis</i>
	Red-bellied Macaw	<i>Ara manilata</i>
	Illiger's Macaw	<i>Ara maracana</i>
	Blue-headed Macaw	<i>Ara couloni</i>
Diopsittaca	Hahn's Macaw	<i>Ara nobilis nobilis</i>
	Noble Macaw	<i>Ara nobilis cumanensis</i>
Andorhynchus	Hyacinthine Macaw	<i>Andorhynchus hyacinthinus</i>
	Lear's Macaw	<i>Andorhynchus leari</i>
	Glaucous Macaw	<i>Andorhynchus glaucus</i>
Cyanopsitta	Spix's Macaw	<i>Cyanopsitta spixii</i>
Extinct	St. Croix Macaw	
	Cuban Macaw	<i>Ara tricolor</i>
	Spix's Macaw	<i>Cyanopsitta spixii</i>

A Guide to Macaws (2003)

Birds have inhabited all areas of each continent for thousands of years ranging from coasts, wetlands, deserts, all types of forests, treeless plains, mountains, country, farmlands and even cities. These areas of habitat have enabled birds to physically adapt to circumstances surrounding them.

The Blue and Gold Macaw is widely distributed in the wild throughout Northern, Central and Southern America. Its habitat includes areas of humid, lowland and tropical forests that extend over large territories.

Parrots are characterised by having feathers, a curved beak, zygodactyl feet, (2 toes that face forward and 2 toes that face backward) and eggs with hard shells. They are endothermic, which means that they have the ability to make heat to maintain their body temperature. Macaws also have a cloaca, the body part in which both bodily wastes and reproductive products can pass through.

The Blue and Gold Macaw, being part of the parrot family Psittacidae, is a highly intelligent, outgoing, social, innocuous bird that possesses a feature that all parrots have: its large, powerful, curved beak enables it to crush and tear hard objects with ease, such as its favourite food the palm nut.

Macaws are diurnal, arboreal feeders and are more omnivorous than any other parrot that have a well developed sense of taste. They eat large amounts of tough unripe fruits, due to the fact that in the wild, there is a great deal of competition for food and resources with other animals. To avoid indigestion by eating unripe fruit and poisonous seeds Blue and Gold Macaws eat clay from riverbanks, which helps to settle the digestive system. Clay also provides a natural source of calcium and sodium. Seeds and nuts are eaten by the bird “shelling” them. This means that each seed is pushed with the tongue against the ridge in the upper mandible and the shell is removed with the tip of the beak.

The beak is also used to chew wood on trees and the entrance of the nest. Macaws, like most parrots, are cavity nesters. They will nest in a hollow that is as close to a body of water as possible. They lay 2 – 4 eggs and the female incubates them for 24 – 26 days. Once hatched the young birds are born altricial, (as opposed to precocial) and will stay in the nest until they are weaned and have fledged. The young birds will remain in the family group and will flock and feed together for a year after emerging from the nest. Once independent they will break away from the family group and fend for themselves.

The Blue and Gold Macaw is an innocuous bird for the months of the year that it is not in breeding season. When it is however the bird is considered to be hazardous. The following table shows the occupational health and safety risks associated with the Blue and Gold Macaw, and ways to avoid or reduce them.

Occupational Health and Safety (OH&S)

Table 3. OH&S risks and ways to minimize them.

POTENTIAL RISKS	WAYS TO REDUCE THE RISKS
Bites and Scratches	Handle only when necessary Capture, restrain and handle correctly (refer to 7.3 for this) Read the birds behaviour Know Fright, Flight, Fight (FFF) distances Wear Personal Protective Equipment (PPE)
Getting a Zoonotic Disease	Practice personal hygiene methods by washing hands before and after eating, food prep, smoking, going to the toilet, touching animals and animal wastes Disposing of animal wastes correctly Wear Personal Protective Equipment (PPE)
Back injuries through raking, lifting and using equipment or machinery	Practice correct techniques Read the OH&S guidelines Keep your back straight at all times Bend at the knees
Reactions to Cleaning Products	Practice correct use by following directions of dilutions Read all directions before use Do not inhale, ingest or have direct contact with the product Wear Personal Protective Equipment (PPE)
Knife and Secature Injuries	Practice correct techniques Put equipment back where it belongs when not in use Sharpen knives and secatures regularly

2. Taxonomy

2.1 Nomenclature

The terminology of Macaws was formed from the Brazilian spoken “Tupi” Indian name.

Table 4. Taxonomy of the Blue and Gold Macaw.

Kingdom	Animalia
Phylum	Chordata
Class	Aves
Order	Psitticiformes
Family	Psitticidae
Genus	<i>Ara</i>
Species	<i>ararauna</i>

A Guide to Macaws (2003)

2.1 Subspecies

The nominate species of the Blue and Gold Macaw comes from America and is characterised by its blue and yellow feathers.

There are 2 unnamed subspecies of the Blue and Gold Macaw although their exact geographical location in the wild has not been documented. They are individually characterised with one having a metallic aquamarine blue body with an orange-gold breast and the other having a pastel blue back with a yellow breast and fine brown feathers that lay across the facial patch.

The Large Macaws (1995)

2.2 Recent Synonyms

There are no recent synonyms recorded.

The Blue and Gold Macaw is a part of the parrot family, Psittacidae as classified under its taxonomy. It is a bird that is known as a Blue and Gold Macaw, *Ara ararauna*, a parrot or a psittacine.

2.3 Other Common Names

Blue and Yellow Macaw

3. Natural History

3.1 Morphometrics

To date, various studies are being carried out on the biology of the Blue and Gold Macaw including its diet in the wild, nesting sites, breeding and flocking behaviours.

Tambopata Macaw Project (Ongoing)

3.1.1 Mass and Basic Body Measurements

Table 4. Measurements of the Blue and Gold Macaw.

Average length	81 – 89 cm
Weight range	900 – 1200gms
Height	76 – 86 cm
Wingspan	106 – 113 cm
Tail length	45 – 50 cm

www. Wikipedia.org

3.1.2 Sexual Dimorphism

The female and male Blue and Gold Macaw are similar in size, weight and colour. All species of Macaws are monomorphic, which means that there are no obvious differences between the sexes, not even by their plumage or physical indicators.

Macaws. A Complete Pet Owner's Manual (2002)

3.1.3 Distinguishing Features

The Blue and Gold Macaw is a large bird with blue plumage covering the whole back, wings and tail. The underwings, undertail and underbelly are all a dark yellow colour starting from the sides of the face and covering the entire breast, stomach and thighs with darker blue primary feathers. At the centre of the body underneath the throat there is a black patch. The fore crown of the head is a lime green colour that fades into blue. Both sides of the facial area have large white patches that are marked with thin, black feather lines around the eyes. The beak is black and the feet are dark grey.

A Guide to Macaws (2003), Macaws. A Complete Pet Owner's Manual (2002)

The Blue and Gold Macaw is often mistaken with the Blue-Throated Macaw, *Ara glaucogularis*. From afar the two species look the same but up close they can easily be distinguished by the throat markings. On the Blue-Throated Macaw the throat patch is blue and is larger than the black throat patch of the Blue and Gold Macaw. Most of the plumage covering the back, wings and tail are a light blue colour. The underbelly and undertail are light orange in colour starting from the sides of the face and covering the entire breast, stomach and thighs. Both sides of the facial area have large white patches that are marked with thin, blue feather lines around the eyes, in contrast to the black feather lines around the eyes of the Blue and Gold Macaw. The beak is black and the feet are dark grey.

Macaws. A Complete Pet Owner's Manual (2002)

3.2 Distribution and Habitat

The Blue and Gold Macaw is widely distributed throughout Northern, Central and Southern America. Its distribution ranges from as far North as Panama to as far South as Argentina, however it is more commonly found in Central and South America (see Figure 1). Throughout this range the Blue and Gold Macaw remains in places such as Colombia, Southern Venezuela, Brazil, Guianas, Trinidad, Bolivia, Northern Peru, Eastern Panama, Eastern and Western Ecuador, Guyana and Tobago.

The natural home of the Blue and Gold Macaw include areas of lowland forests. The preferred habitat is humid forests, where they inhabit seasonally flooded rainforests, Babacu palm swamps and deciduous woodlands in lowland forests. Macaws are great travellers and require extensive areas of forests for foraging and nesting.

A Guide to Macaws (2003), Macaws. A Complete Pet Owner's Manual (2002), The Large Macaws (1995)



Figure 1. The distribution of the Blue and Gold Macaw in South America.

3.3 Conservation Status

The Blue and Gold Macaw is not listed as being extinct or endangered in the wild under the IUCN Red List criteria. It is the only species of macaw that remains common in the wild. They are, however, subject to the threat of humans and the desire to hunt, trap and capture them for the pet and breeding trade as well as habitat destruction increasing across Central and South America.

All Macaw species have now been listed in the Convention on International Trade of Endangered Species (CITES) of wild flora and fauna list to monitor the commercial trade of the species.

A Guide to Macaws (2003)

CITES states that the purpose of regulating the wildlife trade is, “*to ensure that no species becomes or remains subject to unsustainable exploitation because of international trade. Their influence is often to strengthen their support for restrictions on the trade in wildlife*”.

CITES (2003)

CITES provides 3 levels of protection for wildlife that are listed under 3 appendices:

Appendix 1 = Species threatened with extinction but are endangered and trade is permitted only in exceptional circumstances.

Appendix 2 = Species which would become endangered unless trade is regulated.

Appendix 3 = Species that need to be included at the request of a party who already regulate trade in the species that also need the co-operation of other countries to prevent unsustainable or illegal exploitation.

The Blue and Gold Macaw is listed under Appendix 2 (on the 6th of June 1981) and are a species that might become threatened by international trade if it is not controlled.

www.CITES.org (2005)

3.4 Diet in the Wild

Macaws are arboreal feeders and are more omnivorous than any other parrot with a well developed sense of taste. The macroniche of the Macaw allows it to forage for various berries, fruits, nuts, plants, leaf buds and some flesh in forests. Macaws in the wild will consume animal carcass if it is available as it is a high source of protein. They have also been observed catching lizards and small mammals on occasion to supplement their diet, especially when rearing chicks.

A Guide to Macaws (2003), Macaws. A Complete Pet Owner's Manual (2002)

Macaws eat large amounts of tough, unripe fruits. This premature fruit is high in acids and tannins so Macaws avoid indigestion by consuming a type of fine clay called *kaolin* that is found from nearby river banks in the Amazon rainforest. The clay provides a source of salts and minerals, which help to settle the digestive system and neutralises the toxin build-up from eating unripe fruit.

The Sunday Telegraph (2004), www.zoonews.ws

All parrots need to gnaw. It is an innate behaviour that is needed to keep the beak sharp and short. In the wild the abundance of trees are available to satisfy this need. In Peru up to 20 different species of plants have been observed as being eaten by the Blue and Gold Macaw. These include *Mauritia vinifera* from Buriti trees; *Astrocaryum*, *Bactris* and *Maximiliana* from tree palms, *Hura crepitans* from Jabillo trees, palm fruits of Inaja (*Maximiliana regia*) and Tucuma (*Astrocaryum spec.*).

Munn (1988) and Forshaw (1989) from the Large Macaws (1995)

3.5 Longevity

3.5.1 In the Wild

50 + years.

3.5.2 In Captivity

50 – 120 years.

The Complete Pet Owner's Handbook (2003)

3.5.3 Techniques Used to Determine Age in Adults

Determining age in mature birds is often impossible. However if the bird has a leg band then you might be able to work out the bird's age. Leg bands are an identification system having the breeder and sometimes the bird's birth date engraved on the leg band.

However, age can also be determined by looking at the bird's eyes. A young Macaw will have dark brown pupils while an adult bird will have white rings around the pupils. Powder down can also be an indicator as the older the bird gets the more powder down it will have.

4. Housing Requirements

4.1 Exhibit/Enclosure Design

Blue and Gold Macaws are large birds that require large enclosures. The larger the aviary, the better, as more room encourages a healthy, well exercised pair to breed with long-term success. The enclosure should be constructed with materials that can withstand both the weather and the powerful beak of the macaw.

Macaws. A Complete Pet Owner's Manual (2002)

There are many different types of aviaries that are available to choose from, each with their own advantages and disadvantages. The two best types of aviary for macaws are:

1. Conventional Flight Cages – These are large walk in aviaries that extend to the floor. A Flight Cage is designed to have more length than height to allow the bird to fly.

Advantages:

- Highly recommended for pairs that are in excellent condition and have no problems with flying
- The long cage provides space for flight which improves the health status of the bird
- The long cage provides room for the birds to exercise
- Flight cages encourage a bird's natural instinct which is flying
- Allows for easy access inside the aviary for the keeper to clean, water, feed, capture, maintain and check the nest box.

Disadvantages:

- If the Flight Cage is too big the birds may not breed because of too many distractions
- Weak flying birds do not cope well in Flight Cages and can starve from not being able to reach the food/water source
- Weak flying birds can injure themselves trying to fly
- Long perches in Flight Cages can assist weak flying birds but defeat the purpose of a Flight Cage
- Perches encourage walking and not flying

2. Suspended Aviary – These are large aviaries that does not extend to the ground, or have a solid floor. These aviaries are suspended on legs or hung from above with a sand pit directly underneath it.

Advantages:

- These aviaries are more hygienic as any extra food and waste falls through the bottom wire and can be raked away
- These aviaries are more easily cleaned
- Suspended Aviaries still allow the bird to fly and exercise
- Suspended Aviaries decrease the amount of rodents getting inside the aviary

Disadvantages:

- Long suspended aviaries make it difficult for capturing
- Suspended Aviaries can be hard to set up
- Suspended Aviaries can be an inconvenience to the keeper to install cage furniture and remove food/water dishes
- Large food items can get stuck in small gauge wire bottoms
- The birds' feet can get sores or cuts on them from walking on the wire bottom floor for long periods of time

A Guide to Macaws (2003)

4.2 Holding Area Design

A spacious cage or aviary should be considered for temporary holding, the cage should facilitate enough room to move around the enclosure. The holding area should also include favoured toys and browse (foliage) to eliminate stress from being moved from its spacious enclosure.

4.3 Spatial Requirements

The recommended aviary minimum size requirements for a Conventional Flight Cage is 3m long x 2m wide x 3m high. Larger Flight Cages are recommended though if you have the space.

The recommended aviary minimum size requirements for a Suspended Aviary is 2.5m long x 1.25m wide x 2.5m high.

The recommended spatial requirements for a nest box are 1.25m long x 40.5cm squared.

A Guide to Macaws (2003)

The flight design for most macaws is a recommended minimum spatial requirement of 10m long x 6m wide x 6m high.

The Large Macaws (1995)

At Taronga Zoo, a pair of Blue and Gold Macaws have been successfully bred in an off-exhibit aviary measuring 6m long x 6m wide x 2.5m high.

Breeding Action Plan (1999)

The recommended bar spatial requirements for cages are $\frac{3}{4}$ to $1\frac{1}{2}$ inches wide.

The recommended wire gauge requirements for aviaries are 12 gauge welded wire 1 inch by 1 inch because macaws are strong chewers.

The Complete Pet Bird Owner's Handbook (2003)

4.4 Position of Enclosures

All aviaries should face north or east if in the southern hemisphere to get the maximum amount of sunlight needed for vitamin D.

4.5 Weather Protection

Aviaries should be built semi open with $\frac{3}{4}$ of the aviary being uncovered and $\frac{1}{4}$ being covered. Most aviaries have colour bond fencing for the sheltered area. This will help to protect the birds from extreme weather conditions.

4.6 Temperature Requirements

The Blue and Gold Macaw is a tropical bird that comes from hot, humid habitats where the temperature is always warm and the humidity is high, however, parrots are hardy birds that can survive quite well in conditions different from their natural habitats. Birds should be kept warm and a temperature of 20 – 30°C is ideal. Humidity is very important for birds and the higher the humidity, the better.

4.7 Substrate

The use of substrate is important for the ease of cleaning, decreasing contamination and helping to keep the aviary disease free. It is best to have the aviary sitting on concrete with a substrate such as sand, untreated woodchips or soil on top to help with cleaning.

WHAT NOT TO USE: Do not use sawdust, treated woodchips, artificial grass or palletized grasses as the birds may ingest them and become ill.

A Guide to Macaws (2003)

4.8 Nest boxes and/or Bedding Material

Most parrots are hole nesters and are highly adaptable to using a variety of nesting sites. This can include a man made-wooden box, a wooden barrel and even a plastic drum. The size of the entrance hole should be just large enough for the parent birds to pass through. The size of the nest box must be big enough to allow the bird to turn around inside the box comfortably and should therefore be three times the Macaw's own body length in height and one body length in width and depth. This is more desired as the birds can defend the nest box, has less light penetrating inside the nest box and makes the birds feel more secure.

The material that is best used to make a nest box out of is wood. Wood acts as an insulator, keeping the birds cool in summer and warm in winter. It also provides environmental enrichment for the birds, as they will chew at the wood. Environmental enrichment stimulates the bird to behave in a way that is similar to how it would behave in the wild.

If a vertical style of nest box is used then a wooden ladder secured on the inside of the nest box will be necessary to allow the adults and eventually fledging chicks to climb easily to the entrance of the nest box. This also helps the parents so they do not fall on top of their eggs and crush or break them.

It is useful to place a substrate that is between 10 – 20 cm of potting mix or fresh, non toxic, large sized wood shavings, inside the nest box as it will provide behavioural chewing material for the parents and also prevents the chicks from developing splayed legs as it gives them something to grip and hold on to once they have hatched.

A Guide to Macaws (2003)

Macaws are known to kick out the bedding material as soon as you put it in. They will do this as they prefer to make their own by chewing on the entrance of the nest box and perches. Nest boxes need to be replaced every time they are destroyed, which is about once a year. An external, horizontal nest box is ideal for Blue and Gold Macaws, as the females are clumsy and will run down into the nest box and squash or crush the eggs if she feels threatened.

Personal Communication, Dylan Lewis (2005)

4.9 Enclosure Furnishings

The 3 main basic pieces of furniture needed inside an aviary are the nest box, food/water dishes and perches. Anything else added to this is a bonus for the bird as it provides environmental enrichment.

Nest Box – The best place to position the nest box is in the highest place possible at the rear of the enclosure, mounted vertically on the side or back wall under the shelter. This will make the birds feel more comfortable and secure as they can look out of the nest box at the aviary and the door so they can see if anyone is entering the aviary, it also helps to reduce the amount of sunlight that can penetrate the inside of the nest box. Positioning the nest box up high and under shelter will have a higher chance of the birds breeding as macaws like dark, secluded nest sites.

Food/Water Dishes – The sheltered area of the aviary is also the best place to have the food and water dishes. Food in dishes that are not under shelter can become wet when it rains or dry out when it is sunny. It is also best to have the dishes away from where wild birds can defecate in the dishes from above. Water dishes are a must for any animal. Not only do animals need water for drinking but for bathing in as well. This means that a pond or some sort of water source is essential for the animals bathing needs. Water dishes can be positioned next to the food dish, making sure that it is secured to the aviary so it can't be knocked over. Food and water dishes must be cleaned with the animals being given fresh food and water on a daily basis. Food and water that is not changed can become stale, fermented or contaminated and will attract vermin.

Perches – Perches are an important consideration for the aviary. In the wild, parrots have a wide variety of perches to choose from on which to roost. The positioning of perches is just as important as the positioning of the nest box and food/water dishes. There should be a selection of perches of varying thickness that are positioned horizontally and vertically in the aviary. The recommended minimum perch diameters for macaws are 2 inches thick. They must be strong to be able to withstand the gnawing and peeling. To have easy access to the other cage furniture the perches need to be placed in front or beside them. Perches can be constructed of almost any non-toxic, indestructible material. Every aviary should contain at least two perches. This allows the birds to exercise their zygodactyls skillfully handled feet, to roost and sleep comfortably. Macaws are birds that love to chew on things so wooden perches don't last very long and will need to be replaced regularly. Perches are best placed at either end of the aviary to encourage flying from one perch to the other.

A Guide to Macaws (2003), Macaws. A Complete Pet Owner's Manual (2002)

Behavioural enrichment furniture is good to have as it helps to stimulate the mind of the animal. Macaws are highly intelligent birds who become bored quickly so they need lots of stimuli. This can include a companion, toys, wooden puzzles, natural branches, mealworm sticks, fruit sticks and anything to chew on.

5. General Husbandry

5.1 Hygiene and Cleaning

Most pathogenic diseases that affect Macaws can be easily prevented by practicing good hygiene, quarantine and separation methods. Keepers must ensure that personal hygiene is also practiced. This is upheld by washing your hands before, during and after cleaning duties.

Aviary hygiene should be performed daily by washing the food and water dishes and equipment in an antibacterial, phosphorus free solution. The aviary can be cleaned by firstly removing any uneaten food, faeces and rubbish from the aviary; raking the floor of the aviary; changing the water in the dish and scrubbing it out and by hosing down the aviary using a hard spray to wash away the faeces. The whole enclosure can then be hosed down using a light spray to water the plants and freshen up the aviary.

Ponds are not advised to be in aviaries because of faeces or dirt getting in the pond and algae build up.

EAPA

Keeping your bird's environment clean by doing the same regime daily will help to reduce the chances of fungal infections and viral disease infecting your birds.

A Guide to Macaws (2003)

5.2 Record Keeping

This is important to assist in maintaining the health of the bird. Records that need to be kept are identification numbers, any health problems, veterinary examinations and treatments, behavioural problems, breeding information, diet changes, internal and external movements, body mass and measurements and daily diary entries.

5.3 Methods of Identification

Methods of identification for birds are used to aid better record keeping of captive populations. This can be done using leg bands, chromosome mapping and microchips, which are implanted under the bird's skin and into the breast muscle of the bird. Microchips and stainless steel leg bands are highly recommended for macaws. Leg bands are put on the bird only when they are young (normally 28-34 days of age). If it is on the right leg, it means that the bird is a male. If the leg band is on the left leg, it means that the bird is a female or of unknown sex. A closed leg band is a form of temporary identification and will have a combination of numbers and letters on it to indicate the owner, year of birth and code number. A microchip implant is a form of permanent identification and will have a combination of numbers and letters on it to indicate the owner, year of birth and code number. Photos of a Macaw's facial patches can also be used to identify individual birds as the facial feather tract patterns on each bird are unique. Birds are identified to show ownership, sex, breeding records, capture and release records and research.

The Complete Pet Bird Owner's Handbook (2003)

5.4 Routine Data Collection

Routine data collection is necessary for record keeping and includes things such as distant examinations, close examinations, physical examinations, inoculations, faecal floats, breeding information and behaviour.

6. Feeding Requirements

6.1 Captive Diet

Macaws are omnivores, which means that they eat almost anything from meat and insects to vegetable and plant matter. The best type of diet for a Macaw is one that is varied, balanced and provides a wide range of vitamins and minerals. Finding the right balance between food type and quantity is a vital ingredient when feeding.

A mixed diet of seeds, sprouts, commercial parrot pellets, fruits, nuts and greens provides a balanced, healthy and nutritional diet. It is important to know that a diet of only one of these food items is not healthy diet. A diet that is formulated will eliminate foods that can cause the storage of excess fats and nutritional deficiencies that can cause disease and death.

Macaws. A Complete Pet Owner's Manual (2002)

Macaws require high levels of plant-based fats in their diet. For this reason the diet should include nuts and soaked and sprouted seeds such as sunflower seed, safflower seed, mung beans or pumpkin squash. The daily diet should consist of 50% sunflower seed, 20% larger nuts, 30% beans, fruits and vegetables and commercial pelleted parrot food.

As nuts are such a necessity in the diet, a range of these can be given. These include almonds, walnuts, hazelnuts, peanuts, Brazil nuts, palm nuts and macadamia nuts. As Brazil and macadamia nuts have an extremely hard shell, some Blue and Gold Macaws will waste them because they can't open the shell. In this case it is best to pre crack the nuts before feeding to reduce food waste.

Fresh foods can be offered on a rotating roster, which is helpful in reducing boredom and creates environmental enrichment.

A Guide to Macaws (2003)

WHAT NOT TO FEED: Do not feed avocado, apple seeds, apricot pits, uncooked beans, cherries or peach pits as these are all toxic to Macaws.

The Complete Pet Bird Owner's Handbook (2003)

The diets of Macaws successfully used in captivity of private Macaw owners are as follows:

Michael Grixti, a private bird breeder, feeds his Macaws a range of fruits, nuts, vegetables, boiled corn, sprouted peas for protein and sunflower seed. A calcium block is specially made up to be dissolved in the water. The Macaws are fed in the late afternoon with added vitamins, minerals and the occasional wormer.

Personal Communication, Michael Grixti (2004)

Dylan Lewis, another private bird breeder, feeds his Macaws a varied diet of pre mixed parrot mix that he gets from a company called Avigrain, a fruit and nut mix without the shell, shelled nuts including almonds, brazil nuts and walnuts, a vegetable mix of all types of vegetable with liquid calcium on it and muesli. Food is given in two stainless steel dishes that are half full with one dish per bird. Seed is given in the morning and vegetables are given in the afternoon. The cost of feeding amounts to approximately \$100 for two weeks.

Personal Communication, Dylan Lewis (2005)

The diets of Macaws successfully used in captivity at Taronga Zoo is as follows:

A psittacine mix consisting largely of soaked and sprouted seeds (sunflower, wheat, milo, maize and canary) and pulses (lima bean, mung bean, black-eyed peas, lentils, barlotti beans and chick peas). Added to this are chopped greens, apples and calcium carbonate powder.

For all Macaw species a selection of fresh fruits and vegetables are added to the above mix and are cut into pieces the size of a 50 cent coin to allow ease of manipulation by the birds.

Parrot pellets and a selection of whole nuts including almonds, pecans, brazil, macadamia, peanut and hazel nuts are also given.

Breeding Action Plan (1999)

The suggested diet of Macaws in captivity include:

Cooked pasta, fruits, vegetables, nuts, seeds, hot peppers, cooked beans, chicken thigh bone (Macaws like to pick out the marrow), cuttle bone and a mineral block.

www.exoticbird.com

6.2 Supplements

Food items that can be added to improve the diet are things such as commercial pelleted diets. Pellet foods are a good way of ensuring that your Macaw receives a balanced, nutritional diet. However it is possible to over supplement your bird's diet with added vitamins and minerals which can result in serious problems such as hypervitaminosis D3. This is a condition where too much calcium is absorbed into the soft tissue and organs of the bird's body which can cause death. Vitamin and mineral supplements are not needed for birds that are eating a formulated diet and only need to be given to old birds or birds with health or physical problems.

During the breeding season the diet should change slightly. Dry seed should be fed more frequently as it is high in fats and proteins and extra calcium needs to be fed more as well. A pair of Macaws desire fresh fruits and vegetables before, during and after breeding or when feeding chicks in the nest box. If a diet of 50% pelleted food is given then there is a better chance of the bird's breeding and containing a much brighter, healthier plumage. Bird's that are breeding and laying eggs can benefit from a calcium supplement as long as you are not providing too much and that the supplementing stops after the breeding season.

A Guide to Macaws (2003)

6.3 Presentation of Food

Food can be presented to Macaws in a securely attached feeding dish on the side of the aviary once or twice a day. Macaws are curious, messy animals who like to test and explore the contents of their aviary. They are very good at picking up their dish and throwing it on the ground. To stop this from happening a secure dish underneath a wire grate needs to be placed in the aviary to ensure that the Macaw gets its nutritional intake from not spilling its food and eating contaminated food off the ground.

Macaws. A Complete Pet Owner's Manual (2002)

A salad is recommended in the early morning, so that the food does not spoil. These include foods such as your fruits and vegetables. Feeding at this time of day mimics the Macaws natural innate behaviour to start eating early before the tree-top feeding frenzy of their competitors begins. In the late afternoon seeds and nuts can be fed.

Macaws. A Complete Pet Owner's Manual (2002), The Sunday Telegraph (2004)

Behavioural enrichment feeding includes things such as:

- Making the bird work for its food
- Scattering the food around the aviary
- Giving nuts in the shell
- Hiding the food in toys or kongs
- Providing mealworm and fruit sticks

Macaws. A Complete Pet Owner's Manual (2002)

7. Handling and Transport

7.1 Timing of Capture and Handling

Macaws are a diurnal species. This means that they are awake during the day and asleep during the night. The best time for capture and handling to take place is in the late afternoon or night time.

7.2 Catching Bags

The best type of catching bag to use for capturing a Macaw is a hessian bag that has iron forced mesh otherwise known as shade cloth. This material is good to use because it is low in expenditure, readily available and effective to use.

7.3 Capture and Restraint Techniques

Large birds, like Macaws, can be caught using a net, towel and gloves. Capture should be fast and safe to avoid stress and injury to the bird, with minimal handling. When using a net to capture a Macaw the correct method is to make sure that the bird is all of the way into the bottom of the net. The net can then be tilted to prevent the bird from escaping. Once the bird is in the net its long tail can be used as a second handle to keep the bird in the net. Most Macaws, when netted, do not struggle.

The Large Macaws (1995)

Macaws can be restrained by having a firm grip around the back of the neck, with the thumb and fore finger of one hand restricting the movement of the head and holding the wings folded against the body with the other hand, so that the primary feathers and feet are restrained. To help with restraining the Macaw, a towel can be wrapped around the body to immobilize the bird and assist the wings and feet from getting free.

One of the most important things to remember when restraining a Macaw is to not let it manipulate its beak out from your grip as it will turn around and bite you.

A Guide to Macaws (2003), Bird Care 1 Class Notes (2004)

Macaws are from the parrot family and are very intelligent birds. When dealing with tame Macaws the process can be easier. This can be done by training the bird with food rewards to get it to go in and out of a transport box on its own without the fear of being harmed in the process.

7.4 Weighing and Examination

Weighing a Macaw chick can be done by placing it in a margarine tub and placing it on scales remembering to tare the scales so that you are not including the weight of the tub as well. An adult Macaw can be weighed by placing it in a hessian bag and hanging the bag on scales.

Examination should include the bird's wings being stretched out to full length, checking for any abnormalities, breakages or parasites. The bird's temperature, heart rate, respiratory rate and physical condition should all be monitored and recorded regularly to ensure that the bird is in good health.

7.5 Release

This should be done as soon as possible as birds should not be restrained for long periods of time, otherwise they will become stressed.

Turn the bird around so it is facing away from you. Remove your hand from the tail and body first and then the head last. Give the bird a little push so they don't turn around to attack you. Release should be done on the floor of the aviary so the bird can adjust to the new surroundings and will be less likely to panic or flutter and harm itself.

WHAT NOT TO DO: Do not release a bird in mid air or throw it into the aviary. This is dangerous and stressful for the bird as it can seriously hurt itself from not being able to adjust to its new surroundings where it doesn't know where anything is located.

Birds. Their Management, Care and Well-Being (2004)

7.6 Transport Requirements

Transporting is a stressful time for a bird and should therefore be fast and safe. The transport box should be clearly labeled "THIS WAY UP", "LIVE ANIMAL", "HANDLE WITH CARE" and full details of where and who the bird is going from and to.

7.6.1 Box Design

The design of the transport box depends on the size of the avian species and its needs during transportation. Transport cages should be spacious enough so that the bird is comfortable. Macaws should be transported in pet carriers or boxes that can withstand the chewing capabilities of the bird's large, strong beak. A cheap, suitable box that could be used for transportation is a cat or dog carry cage. These are ideal as they have space, ventilation and materials that are not as easily chewed through. Cat or dog carry cages are built with air holes on the sides so ventilation won't be a big problem. By having holes on the sides of the box you can be assured that your bird won't suffocate as it will still get ventilation even if the cages are stacked one on top of the other. If a cage only has air holes on the top of it and the cages are stacked on top of each other then the bird will not get sufficient air flow and will most likely die.

A Guide to Macaws (2003), Macaws. A Complete Pet Owner's Manual (2002)

7.6.2 Furnishings

For short or long trips, wooden perches will need to be securely placed inside the transport box. This is essential to prevent the bird from getting a disease called avian bumble foot. The perch should be fixed across the width of the box at about one third of the box's height. This will allow the bird to sit upright without hitting its head. The use of perches prevents the bird's feet from cramping, which happens if the bird is left to stand on a flat surface for a long period of time.

A Guide to Macaws (2003)

7.6.3 Water and Food

Water must always be available during the transportation process. Food however, doesn't as most of a Macaw's diet consists of perishable food and will spoil and make the bird sick. If the bird is to go on a flight that is longer than 24 hours then a small amount of seed can be given.

A Guide to Macaws (2003)

7.6.4 Animals per Box

Each box should only contain one animal whilst being transported. This avoids the birds from fighting as transportation is a stressful and nerve racking experience.

A Guide to Macaws (2003)

7.6.5 Timing of Transportation

Macaws are a diurnal species, which means that they are awake during the day and asleep during the night. The best time for transportation to take place is in the late afternoon or during the night.

7.6.6 Release from Box

The best time to release from the box is during the day. The box should be placed on the floor of the aviary and have a window that the bird can see out of so that it can see its new surroundings and get used to its new home. After a short time open the door of the box and let the bird come out on its own.

8. Health Requirements

8.1 Daily Health Checks

A Distant Examination (DE) is essential to ensure that the animal is not sick, injured, missing or dead. Observations to look out for include the cere having scaly face mites or discolouring; the eyes are clear and fully open; the beak having a normal shape and fitting together; the bird has an appetite; the head is in an upright position; wings are held up against the body; legs are moving freely with no swellings or lesions; the general appearance with feathers looking clean and unruffled; the chest bone is not sticking out; there are no discharges emitting from the nose, eyes or cloaca; changes in behaviour and faeces are of normal colour with no blood.

Bird Care 1 (2004)

8.2 Detailed Physical Examination

Birds need to be examined from a distance because if birds are captured and handled too much it is more likely that the stress the bird goes through from handling may be enough to kill the bird. This is called the “preservation reflex” in birds. In the wild birds are constantly subject to predators so they will try to appear as healthy as possible for as long as possible to prevent them from being attacked. Birds will therefore try to maintain as normal an outward appearance for as long as possible. By doing this the bird uses up energy stores and will start to show signs of illness.

Before a physical examination is performed the bird will need to be captured and restrained. The handling and restraint of avians should be safe and comfortable for both you and the bird. Have the behaviour and physical characteristics of the bird in mind and minimise stress by using a towel to keep the bird’s head and eyes covered at all times. To avoid the bird from stressing and yourself from getting bitten, it may be best to chemically restrain the bird. This will allow the examination to be performed quicker and with no hassle from trying to physically restrain the bird yourself and perform the exam at the same time.

A detailed Physical Examination (PE) is essential to ensure that the animal is not sick, injured or infested with parasites. It includes looking over the bird, doing a distant examination first. A blood test should be taken, as well as a faecal test. The bird should be palpated for any broken bones or an emaciated keel bone; the body temperature taken; claw clipping and the joints in the foot checked for easy movement.

Bird Care 1 (2004)

8.2.1 Chemical Restraint

A chemical called Halothane can be used to restrain a Macaw. The Material Safety Data Sheets (MSDS) should always be read for directions of correct use before any chemicals are used.

Personal Communications, Graeme Phipps, Andrew Titmus (2005)

8.2.2 Physical Examination

A Physical Examination (PE) is not as involved as a detailed one. It includes wing spanning (one at a time) to look for ecto parasites and any fractures or breakages; the bird being weighed and feathers are not clumped together.

Bird Care 1 (2004)

8.3 Routine Treatments

Routine treatments involve doing distant examinations, providing fresh food and water daily, health check ups, cleaning, hygiene, regular worming, topical lice and mite spray,

8.4 Known Health Problems

Macaws are long living, robust animals. The most common illnesses in adult macaws are all caused by malnutrition. Poor nutrition can cause calcium deficiency, vitamin D poisoning (hypocalcaemia), gout, beak overgrowth, feather plucking and beak deformities.

Blue and Gold Macaws that are housed beside or near Cockatoos and African Grey Parrots can get an allergic reaction to the powder down of these birds which can result in severe respiratory problems.

A Guide to Macaws (2003)

Major health problems with avians are zoonotic diseases. This can affect both birds and humans. Some of the most common zoonotic diseases include Salmonellosis, Giardiasis (internal parasite), Lice (external parasite) and Chlamydiosis (also known as psittacosis or parrot fever and Bird Flu, (these diseases and some others are described in more detail below).

The Complete Pet Bird Owner's Handbook (2003)

Of the many different diseases that can affect the health of birds, the diseases described below are of greatest concern to people working with birds.

All of section 8.4 is referenced as a mixture of the following:

The Complete Pet Bird Owner's Handbook (2003)
A Guide to...Australian White Cockatoos. Their Management, Care and Breeding (1999)
Bird Care 1 (2003)
Animal Health and Well Being (2004)
Australian Reader's Digest (2005)

INFECTIOUS DISEASES

Avian Flu, (also known as Bird Flu)

SIGNS:

- Sneezing
- Coughing
- Fever
- Increased temperature
- Flu-like symptoms

CAUSE:

- Viral disease (influenza)
- Zoonosis by touching chicken or duck faeces or blood and then putting the hand to the face or nose
- Spread by airborne transmission e.g. sneezing, coughing
- Highly contagious respiratory infection in birds
- An epidemic that could outbreak to become a global pandemic
- Birds and humans can be vectors carrying the disease

TREATMENT:

- Antiviral drugs such as “Tamiflu” (oseltamivir) is suggested to be taken

PREVENTION:

- A vaccine is currently being researched
- Reducing the amount of virus circulating within the domestic poultry population
- Quarantine animals and humans showing signs
- Wear PPE such as face masks and gloves
- Good hygiene and general husbandry
- Don't over-crowd animals

CONTROL:

- Culling of affected flocks

Australian Reader's Digest (2005)

Proventricular Dilatation Disease, (PDD-formerly called the Macaw Wasting Disease)

SIGNS:

- Weight loss
- Regurgitation
- Undigested food in the droppings
- Diarrhoea
- General weakness

NEUROLOGICAL SIGNS:

- Loss of balance
- Tremors
- General weakness

CAUSE:

- Viral disease of the digestive tract that affects the nerves. These nerves stimulate contractions through the digestive tract that are essential for the movement and digestion of food.

TREATMENT:

- General supportive care
- A soft, easily digestible diet
- Medicine to help stimulate digestive tract contractions
- No cure is available – a vaccine is being developed

PREVENTION:

- Good husbandry
- Quarantine
- Give a healthy diet
- Perform distant examinations on the bird/s daily
- Keep records

Psittacine Beak and Feather Disease (PBFD)

SIGNS: Acute form – Rapid onset

- Weight loss
- Depression
- Diarrhoea
- Crop problems
- Death

Chronic form – Gradual onset

- Feather lesions
- Retained feather sheaths
- Blood within the feather shaft at the base of the quill
- Short, clubbed or pinched feather tips
- Deformed, curled feathers
- Beak lesions, overgrowth, fractures or decay
- The powder down feathers are affected first

CAUSE:

- Viral disease
- Infects and kills the rapidly dividing cells of the beak, feathers and the immune system of parrot-like birds resulting in beak abnormalities
- Birds become very susceptible to secondary bacterial, fungal, viral and chlamydial infections
- Highly contagious in psittacines

TREATMENT:

- No effective therapy exists
- A vaccine is being developed
- The disease is considered to be fatal
- Most birds showing signs don't survive any longer than 6 – 12 months
- Severely affected birds should be euthanased

PREVENTION:

- Good hygiene and husbandry
- Quarantine all new arrivals and those showing signs
- Perform distant examinations on the bird/s daily
- Keep records

CONTROL:

- If an outbreak occurs, sterilize the entire aviary/enclosure and do a test to make sure that cleaning and disinfecting has been effective in eliminating the virus

External Parasite – Lice

SIGNS:

- Hair/feather loss (alopecia)
- Scratching (pruritis)
- Inflammation (erythema)
- Anaemia
- Sighting the lice

CAUSE:

- A dirty environment
- Not providing the bird with water to bathe in regularly

TREATMENT:

- Wash hair/feathers with an insecticide
- Treat the bird using sprays
- Treat the environment, aviary or cage regularly

PREVENTION:

- Good hygiene and general husbandry
- Purchase healthy birds
- Quarantine new birds
- Regular health assessments
- Perform distant examinations daily
- Give fresh food/water daily

Internal Parasite – Giardiasis

SIGNS: In animals

- Weight loss
- Diarrhoea
- Dry, flaky skin
- Itching
- Feather picking

In humans

- Weight loss
- Diarrhoea
- Stomach upset

CAUSE:

- Protozoal disease
- Crowded, unsanitary conditions
- Drinking contaminated water

TREATMENT:

- Medications are available
- Give antibiotics
- Give supportive treatment

PREVENTION:

- Give fresh, clean food and water daily
- Do not over-crowd birds
- Quarantine new birds
- Good hygiene and husbandry

Salmonellosis

SIGNS: In animals

- Signs are variable depending on what organ system/s are affected

In humans

- Gastrointestinal upset
- Diarrhoea
- Cramping
- Vomiting
- Fever
- Headache

CAUSE:

- Bacterial disease
- Gastrointestinal upset by the transmission of contaminated foods

TREATMENT:

- Medications are available
- Give antibiotics
- Give supportive treatment

PREVENTION:

- Give fresh, clean food and water daily
- Dispose of uneaten food daily
- Good hygiene and husbandry
- Thorough hand washing prior to and following the handling of animals, eating, smoking and going to the toilet

Chlamydiosis, (also known as Psittacosis or Parrot Fever)

SIGNS: Acute form

- There are no distinctively characteristic signs
- Suggestive signs include general signs of a sick bird
- Watery, yellow or lime-green urates
- Sneezing
- Conjunctivitis
- Loss of appetite
- Weight loss
- Depression
- Ocular and nasal discharge

Chronic form

- Weight loss
- Diarrhoea
- Poor feathering

NEUROLOGICAL SIGNS: In animals

- Seizures
- Tremors
- Paralysis

In humans

- Transmitted to humans infrequently
- Fever
- Headache
- Cough
- Chills
- Weakness
- Occasionally pneumonia

CAUSE:

- *Chlamydophila psittaci* is the name of the organism causing the disease
- Young and newly acquired birds are at higher risk of developing the disease
- Highly contagious in psittacines

TREATMENT:

- Medications are available
- Give antibiotics such as Tetracycline
- It can be given orally, injected, ingested by pellets or as a food additive
- Continue antibiotics for 45 days
- Give supportive care
- Severely affected birds should be euthanased

PREVENTION:

- Good hygiene and husbandry
- Isolate and quarantine new birds for at least 30 days
- House suspected birds separately
- Perform recurring tests
- Clean and disinfect the aviary, food/water dishes and furniture
- There is no current vaccine available

Ringworm

SIGNS:

- Appears as circular areas of hair loss (alopecia) which are red, flaky and crusty
- Lesions can be spread to form larger areas

CAUSE:

- Fungal disease of the skin
- Highly contagious

TREATMENT:

- Medications including oral drugs are available
- Give antibiotics
- Give supportive treatment
- Topical preparations
- Anti fungal washes

PREVENTION:

- Good hygiene and husbandry
- Minimize contact with affected animals
- Thorough hand washing prior to and following the handling of animals, eating, smoking and going to the toilet
- Wear Personal Protective Equipment (PPE)

8.5 Quarantine Requirements

The period of strict isolation that is designed to prevent the spread of disease for all parrot species is a minimum of 40 days. This is to ensure that a bird is not carrying any diseases, however if it is, the disease should become present during the quarantine period of time. The quarantine period is also designed to protect established birds from getting any health problems or diseases that a new bird might be suffering from.

As extreme precaution has to be undertaken in the quarantine facility, strict hygiene has to be maintained. The air supply inside the quarantine room needs to be different to the air from other bird users, as does the food and water dishes, cleaning equipment, clothes and materials. The lighting needs to be dull and the noise level needs to be kept to a minimum. During the quarantine period birds should be wormed at least twice and have their faeces analyzed by a veterinarian.

A Guide to Macaws (2003), Macaws. A Complete Pet Owner's Manual (2002)

9. Behaviour

9.1 Activity

In the wild, Blue and Gold Macaws have a daily routine. They will bask in the morning sun before setting off to feed. At midday when it is the warmest part of the day the birds will look for shade. As it becomes cooler the birds will come out to feed again. At dusk they will return to a bare tree before flying off to their own roosts for the night. This is an integral part of a macaw's natural flocking behaviour.

Tambopata Macaw Project (Ongoing)

9.2 Social Behaviour

Blue and Gold Macaws are highly social, gregarious birds that are usually seen in pairs, family groups or small flocks of up to 25 birds (of both sexes) in rainforests, gallery forests and in dense Savannah. They screech together in the early hours of the morning and late afternoon as they roost. They will also chew wood and branches all day long in the forage for food in their native habitat. Macaws communicate between members of their same species by nipping and preening each other.

A Guide to Macaws (2003)

9.3 Reproductive Behaviour

All Macaw species mate side by side whilst making a lot of noise.

Personal Communication, Michael Gixti (2004)

Breeding behaviour observations at Taronga Zoo have shown that Blue and Gold Macaws become very temperamental when breeding and spend a lot of time in their nest box. They display severe aggression and attack keepers as they vocalize loudly at anyone approaching their aviary.

Breeding Action Plan (1999)

9.4 Bathing

Routine bathing or showering is vital for the bird to maintain good plumage and skin conditions. An ideal way to bathe Macaws is to install a water misting system on top of the aviary. Other ways to promote bathing is to place a bird-bath or pond in the aviary. However, in my experience Macaws prefer to have water spraying on them from above as this mimics how the birds would bathe in the wild. Macaws love to bathe and will do so whilst hanging upside down with one foot and spreading their wings out wide.

9.5 Behavioural Problems

In captivity Macaws can develop stereotypic behaviour from habitual and exaggerated acts that a macaw may refer to if bored or stressed. If the stereotypic behaviour develops it can manifest in a number of ways. The most common behavioural problems with Blue and Gold Macaws include:

- Screeching repeatedly – This occurs mainly in young macaws when they go through their adolescent stage between 18-36 months of age. The young birds do this to attract the attention of its owner if it is feeling ignored, neglected or bored.
- Feather plucking – This happens when a young bird begins to pull feathers from its wing or breast with the plucking turning into chewing. This may be caused by behavioural problems or a skin infection, dietary deficiency or a disease.
- Biting – This is not intentional unless the bird is unhappy. Nipping is an innate natural response in the wild that the bird is imitating to achieve a result.

A Guide to Macaws (2003), Macaws. A Complete Pet Owner's Manual (2002)

9.6 Signs of Stress

Blue and Gold Macaws are strong willed animals that do not stress very often. When they do however, they tend to scream loudly. When they are stressed the white skin patch around the face of a Macaw turns red as if they are blushing.

Personal Communication, Michael Grixti (2004)

9.7 Behavioural Enrichment

An enriched environment helps to stimulate the animal's behavioural and mental well being. In the wild behavioural enrichment consists of a macaw interacting with its natural environment which provides mental stimulation. This includes a macaw searching for food, playing with other macaws, preening, bathing and chewing.

In captivity a macaw can be mentally stimulated by:

- Supplying non-toxic fresh branches complete with leaves and bark (and replacing them when they become frayed or worn down) for the macaw to chew on.
- Providing suspended fibre ropes for the macaw to hang from or to chew on (and replacing them when they become frayed or worn down).
- Providing toys such as pine cones, wooden kitchen spoons, cardboard rolls, any non-toxic wooden item or commercial pet shop toys.
- Playing the television or radio.
- Giving the bird company, love and companionship
- Having room to fly

Macaws. A Complete Pet Owner's Manual (2002)

9.8 Introductions and Removals

Introductions of Blue and Gold Macaws is a difficult and dangerous procedure as pair bonding needs to be done at a young age to ensure the compatibility between the pair as they grow up together. Blue and Gold Macaws are a monogamous species that pair up for life. If one bird dies another can slowly be introduced but there is a possibility that the widow won't take to the new bird. Introductions can be done by placing the new bird in a small cage inside the aviary. This is so that the birds can see and hear each other so they get used to the new situation. If the new bird is introduced straight into the aviary it is likely that they won't take to each other and they will fight. The male will harass the female and will display dominance over the territory.

Removal of Blue and Gold Macaws is not recommended if the pair are compatible. If the pair have bred they should be left together with their young so they can raise the chicks on their own. These birds become very aggressive when breeding and nesting with both the male and female displaying aggression whenever someone walks near or enters the aviary.

Personal Communications, Michael Grixti (2004) and Dylan Lewis (2005)

9.9 Intraspecific Compatibility

In captivity the Blue and Gold Macaw out of all the macaw species is the easiest bird to tame as they are an adaptable bird that can also be re-socialised easily. They can be housed with birds of the same species as long as aggression and fighting does not occur.

www.zoonews.ws

9.10 Interspecific Compatibility

In the wild all birds engage in intraspecific and interspecific interactions. Both of these bonds between the different species is carried out during the day as they socialize with con-specifics and other species and is stopped when the birds go to their roosting sites before nightfall.

In the wild macaws are gregarious animals that forage, feed, eat clay and roost together usually in pairs, family groups or flocks of not more than 25 birds. By being in company with another bird/s they feel more secure as they can look out for each other and sound an alarm to the other birds by screeching if anything is wrong.

www.centralpets.com

9.11 Suitability to Captivity

The Blue and Gold Macaw is easily adapted to captivity and is tamed quickly. It is an animal that is easily trained and are used often in bird flight shows, circuses, zoos and as pets. This species of Macaw is the most common kept in captivity and they take quite well to it.

10. Breeding

10.1 Mating System

The Blue and Gold Macaw is a monogamous species. Macaws form life long commitments to their mates once compatible. Males are referred to as ‘cocks’, females as ‘hens’ and juveniles as ‘chicks’.

10.2 Ease of Breeding

Aviculturists suggest that Macaws can reproduce 10 – 30 times faster in captivity than in the wild. Captive bred birds have proven to be relatively easy to breed and will breed regularly in captivity.

www.users.cnnw.net

The most important thing when breeding Blue and Gold Macaws is compatibility between the pair. A leading aviculturist by the name of Stewart Williamson of North West Parrot Aviaries in NSW has been quoted, “*Macaws are not hard to breed...it is finding compatible breeding pairs that is the hard part*”. Following this are providing breeding triggers such as diet changes, including more calcium and green vegetables; the environment including a nest box of suitable size; a compatible pair and weather including rainstorms and increased humidity.

www.parrotsociety.com

10.3 Reproductive Condition

Mating is an activity for birds and they will only perform if all environmental conditions are right. There must be a sufficient, steady supply of food and water, the bird must be in good health and it must feel comfortable and secure in its environment. The Blue and Gold Macaw can only be housed in pairs because the birds will fight.

10.3.1 Females

Female Blue and Gold Macaws reach sexual maturity at 4 – 6 years of age.

10.3.2 Males

Male Blue and Gold Macaws reach sexual maturity at 5 – 7 years of age.

10.4 Techniques Used to Control Breeding

If pairing up a male and female for the first time then an L-shaped aviary that is divided up into two sections is the best type of housing. The male should be housed in the small section and the female in the larger section. This is so that the two birds can see each other through one wall and the female can retreat down to the other end, away from where the male can see her. This behaviour between the birds should show if and when the female has accepted the male and is ready to breed.

Personal Communication, Graeme Phipps (2005)

For Blue and Gold Macaws to breed successfully, each aviary must have fully covered sides and back, if housed beside or near other Macaws, otherwise they will not breed. This is because the male birds will be able to see and hear each other and they will spend more time displaying dominance and aggression rather than trying to breed.

Personal Communication, Dylan Lewis (2005)

If a pair of birds is currently being housed together but you do not wish to breed them then the removal of the male from the aviary to separate the sexes is the easiest method to control breeding. The only problem with separating an already compatible pair is the stress factor. Macaws are gregarious birds that will resort to self-mutilation from being separated and will pluck their feathers from being alone, stressed and bored. If there is no other housing available then the next best thing would be to remove the nest box. This would be preferred because the birds will still be together and they will not stress out as much.

10.5 Occurrence of Hybrids

In captivity there have been occurrences of cross breedings of the Blue and Gold Macaw with other species of macaws from a different genera. It is advised not to crossbreed because deformities can occur and males will be sterile if hybrids are bred. Hybrids look normal but they do not have the same genetics that a pure blood would have. Macaws do not hybridise in the wild.

Table 5. Hybrid types of the Blue and Gold Macaw.

Blue and Gold Macaw	cross	Scarlet Macaw	is called a	Catalina
Blue and Gold Macaw	cross	Green Winged Macaw	is called a	Harlequin
Blue and Gold Macaw	cross	Hyacinth Macaw	is called a	Caloshua
Blue and Gold Macaw	cross	Military Macaw	is called a	Miligold

www.exoticbird.com

10.6 Timing of Breeding

Breeding season is usually in spring and early summer. Blue and Gold Macaws breed in swampy forests, in the north from October to March and in the south from early December. Macaws are seasonal breeders although some pairs will breed almost year round.

www.petplace.netscape.com

10.7 Age at First Breeding and Last Breeding

The Blue and Gold Macaw is sexually mature at 5-6 years of age. Males mature more slowly than females.

www.parrotchronicles.com

10.8 Ability to Breed Every Year

The Blue and Gold Macaw is a hardy bird that can survive in the most extreme conditions. As long as the conditions are right they will breed every year. In the wild, a pair needs to form a bond and find a hollow that is unoccupied and close to a body of water. The ability to breed is also affected by the amount of time it takes for the parents to raise the young.

Personal Communication, Michael Gixti (2004)

10.9 Ability to Breed More than Once Per Year

The Blue and Gold Macaw can breed more than once a year in captivity. This is because aviculturists double, triple and even quadruple clutch from the parents. A pair will breed and then have a break before they breed again. In the wild Macaws do not have a high reproductive rate. This is due to time it takes for the parents to raise the young.

Personal Communication, Dylan Lewis (2005)

10.10 Nesting, Hollow or Other Requirements

The Blue and Gold Macaw is a Psittacine, of which most are cavity nesters and they nest in hollows in dead Aguaje palm trees high up from the ground alongside a river. The recommended spatial requirements for a nest box or hollow are 1.25m long x 40.5cm squared.

A Guide to Macaws (2003)

10.11 Breeding Diet

During the breeding season, the diet should change slightly. Dry seeds or nuts should be fed more frequently as it is high in fats and proteins, and extra calcium needs to be fed more as well. A pair of Macaws desire fresh fruits and vegetables before, during and after breeding, or when feeding chicks in the nest box. If a diet of 50% pelleted food is given then there is a better chance of the bird's breeding and containing a much brighter, healthier plumage. Birds that are breeding and laying eggs can benefit from a calcium supplement as long as you are not providing too much and that the supplementing stops after the breeding season. Blue and Gold Macaws have also been observed catching lizards and small mammals on occasion to supplement their diet, especially when rearing chicks.

A Guide to Macaws (2003)

WHAT NOT TO FEED: Do not feed excess amounts of silver beet or spinach as it contains oxalates which bind with calcium and reduces the availability of calcium to growing chicks.

Breeding Action Plan (1999)

10.12 Incubation Period

24 – 26 days.

10.13 Clutch Size

2 – 4 eggs laid a day apart.

10.14 Age at Fledging

90 – 100 days old. Young are independent at 2 years of age as they stay with their parents for a year after fledging in the wild.

10.15 Age of Removal from Parents

In the wild young naturally disperse from the nest after 3 months of age. In captivity young should be removed from the parents at 64 days of age, as long as they are properly weaned.

10.16 Growth and Development

The developmental stages for a Blue and Gold Macaw are as follows:

Table 6. Developmental stages.

24 - 26	days	Incubation
27 - 29	days	Hatch
10 -31	grams	Birth weight
7 - 10	days	Eyes open
12 -16	days	Pinfeather
18 - 29	days	Leg band age
1 - 65	days	Gain weight
47 - 65	days	Peak (weight gain ceases)
85 - 95	days	Average weaning age
95 - 100	days	Self feeding
90 - 100	days	Fledging age
1000 - 1200	grams	Adult weight
2	years	Independent
5 - 6	years	Sexual maturity

A Guide to... Incubation and Handraising Parrots (1998)

11. Artificial Rearing

11.1 Incubator Types

There are many different types of incubators that are available to choose from, each with their own advantages and disadvantages. The four types of incubators are:

1. Hand–turn

Advantages:

- You can turn the eggs from outside the incubator
- This saves individual turning of eggs
- You do not have to wash your hands as much

Disadvantages:

- Time consuming as parrot eggs need to be turned at least 3 times a day for almost the entire duration of the incubation process
- Becomes tedious
- Provides no realisable benefits
- Needs monitoring once a day to ensure that humidity, temperature and development are right

2. Auto–turn

Advantages:

- These incubators are preferred
- Modern units are virtually vibration free
- Reduces the workload

Disadvantages:

- Is more expensive
- Does not provide a natural movement
- Vibration from the turning mechanism may damage the small embryo
- The quality of the turning or rolling action can jerk or rock the eggs
- Needs monitoring once a day to ensure that humidity, temperature and development are right

3. Fan-forced

Advantages:

- Distributes warm air evenly throughout the unit
- Provides a more stable environment

Disadvantages:

- Is more expensive

4. Still Air

Advantages:

- The eggs do not get chilled from moving air
- There is no need to worry about a fan breaking

Disadvantages:

- Vary in temperature at different levels
- Contain zones that differ in temperature from the thermometer location
- Requires extra work

Recommended incubators include the fan-forced, auto-turn Brinsea Octagon 20 MK 111, the fan-forced, auto-turn Marsh Rolex, AB Newlife 75 MK4 and Brinsea Hatchmaker. These incubators are middle of the range prices, have smooth turning motion and have precise, fan-forced temperature control.

A Guide to... Incubation and Handraising Parrots (1998)

11.2 Incubation Temperatures and Humidity

Incubator dry temperature is 37.2°C +/- 0.2°C. Incubator wet bulb thermometer humidity is 27.75°C.

A Guide to... Incubation and Handraising Parrots (1998)

11.3 Desired % Egg Mass Loss

The ideal weight loss for a parrot egg between Day 1 and external pip is 15 – 17% of the egg's original weight when the egg is laid.

A Guide to... Incubation and Handraising Parrots (1998)

11.4 Hatching Temperature and Humidity

Needs a higher level of humidity.

11.5 Normal Pip to Hatch Interval

3 – 4 days prior to the hatch date.

11.6 Brooder Types/Design

A brooder is an enclosure fitted with a heat source and a fan in which chicks are brooded until they develop feathers and can regulate their own body temperature. You can make one yourself with your own materials or buy one. Recommended brooders include the fan-forced Lyons Intensive Care Unit, the fan forced WAPE Parrot Brooder, the AB Newlife Brooder and the Brinsea Octagon 20 Parrot Rearing Module.

A Guide to... Incubation and Handraising Parrots (1998)

11.7 Brooder Temperatures

Table 7. Brooder temperatures.

Day	Temp in °C	Day	Temp in °C
1	36.5	21	30
2	36	22	29
3	35.5	23	29
4	35	24	29
5	34	25	29
6	33	26	29
7	32.5	27	29
8	32	28	28
9	32	29	28
10	32	30	28
11	32	31	28
12	31.5	32	28
13	31	33	28
14	31	34	28
15	31	35	28
16	30	36	28
17	30	37	28
18	30	38	27
19	30	39	27
20	30	40	27

A Guide to... Australian White Cockatoos (1999)

11.8 Diet and Feeding Routine

There are 3 different types of ways to feed baby parrots, each with their own advantages and disadvantages. The three types of feeding are:

1. Spoon Feeding

Advantages:

- Produces quieter birds
- Accommodates any formula
- More pleasurable
- Stimulates natural feeding
- Easiest method of feeding

Disadvantages:

- Possible imprinting
- Messy
- Slow
- No chick control
- No volume control

2. Syringe Feeding

Advantages:

- Cleaner
- Quicker
- Produces quieter birds
- Volume control

Disadvantages:

- Danger of killing the chick through aspiration
- No chick control
- Lumpy formulas can not be fed

3. Crop Tube

Advantages:

- Cleanest method
- Quickest method
- Avoids imprinting
- Total volume control
- Total chick control

Disadvantages:

- Lumpy formulas cant be fed
- Difficult to use on some weaning birds
- Not as tame

The temperature range of food is 37.7°C – 43.3°C.

A formula for most psittacine chicks is as follows:

METHOD A:

6 Purina High Protein Monkey Chow Biscuits soaked in water for 20 minutes and then cooked in a microwave oven or on the stove top. The cooked biscuits are blended in with the following ingredients.

3 teaspoons smooth peanut butter
3 teaspoons human oatmeal cereal
3 teaspoons apple sauce
3 teaspoons creamed corn human baby food
3 teaspoons mixed vegetables human baby food
2 teaspoons plain yogurt
1 banana

Mix all ingredients together until smooth and then heat to the required temperature mentioned above.

Hand-feeding and Raising Baby Birds (1996)

METHOD B:

¼ cup ground raw peanuts
¼ cup ground almonds
¼ cup wheat germ
¼ cup ground canary seed
1 cup ground sunflower kernels
4 crushed wheat biscuits
1 tablespoon glucose powder
1 tablespoon calcium powder
1 tablespoon cornflour

Mix in all ingredients until smooth and store in a sealed container next to porridge.

Bob Lynne (2005)

METHOD C:

1 tablespoon sunflower meal
1 tablespoon raw peanut meal
2 teaspoons almond meal
2 teaspoons farex
2 teaspoons egg and biscuit mix
2 teaspoons canary rearing food
Add calcium sandos and mineral supplements one feed a day.

Bob Lynne (2005)

11.9 Specific Requirements

11.10 Pinioning Requirements

This is not recognised as a humane way to inhibit a bird's flight. Pinioning is permanent and cannot be undone. It is, however, the best way to render a bird completely flightless for the life span of the animal. Pinioning is best to be done the day after hatching with the last joint of one of the wings clipped off.

11.11 Data Recording

The cage number, species of animal, age, sex, microchip number, weather conditions and the parents behavior should all be recorded in the daily diary for further identification and records.

11.12 Identification Methods

Eggs can be identified by their shape, size, colour, weight and texture. A Blue and Gold Macaw's eggs are glossy white and oval shaped with a pointed end and a smooth, shiny surface. A Blue and Gold Macaw egg is approximately 46.4mm x 35.9mm in size.

When each egg is laid the date and upright position should be penciled on the egg so you can work out when it will hatch without rotating it too far and drowning the embryo.

WHAT NOT TO USE: Do not use felt tip pen or any ink pen to write the data on the egg as they are absorbed into the egg embryo causing birth defects, mutilations and/or death.

Personal Communication, Graeme Phipps (2005)

11.13 Hygiene

Strict hygiene must be practiced when handling eggs and chicks. Prevention is the best method for ensuring the health of the animal.

11.14 Behavioural Considerations

Blue and Gold Macaws are easily imprinted on humans or those who feed them. If you do not wish for this to occur then it is best to leave the chick in the nest box for the parents to rear.

11.15 Use of Foster Species

This is not recommended as it is very hard to determine the age of adults and whether or not they are inexperienced or too old in rearing young. Macaws have also been known to throw eggs out of the nest. This is more likely to happen if the eggs are not their own.

www.funnyfarmexotics.com

11.16 Weaning

12 – 16 weeks / 50 – 55 days of age they should begin weaning and weigh 1120 grams.
The maximum crop weight is 80 – 110 mls per feed.

www.parrot.org

11.17 Rehabilitation Procedures

12. Acknowledgements

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14. Glossary

Altricial – The bird is born with no feathers and the eyes are closed. Chicks are dependant on their parents to raise them as they are defenseless from hatch until fledging age.

Arboreal – Of or living in trees.

Diurnal – In or of the day; occupying or most active during the day.

Endothermic – An animal that generates heat from within the body and has some form of insulation to keep it there.

Epidemic – A disease outbreak that affects a lot of people.

Innocuous – Harmless.

Intraspecific Compatibility – Able to coexist with an animal/s within the species of animal chosen.

Interspecific Compatibility – Able to coexist with an animal/s between or among the species of animal chosen and another species.

Genus – A group of animals or plants with common structural characteristics, usually containing several species.

Genera – Plural of Genus.

Gregarious – Living in flocks.

Macroniche – Links feeding with areas of food e.g. arboreal nectarivores.

Malnutrition – Lack of foods necessary for health.

Monogamous – Mating of a single male with a single female involving no other individuals of either sex. Usually the bond remains in place through the breeding season and in some cases may extend through the adult life of two animals.

Monomorphic – There are no obvious differences between males and females.

Morphometrics – The study of forms of animals and of words and their structure.

Nomenclature – A system of names for things; terminology of a science.

Omnivore – Animals that eat both plant and animal materials.

Pandemic – An epidemic that is global.

Pathogenic – An agent causing disease.

Pinioning – Cut off pinion of the outer part of a bird's wing (flight feathers) to prevent flight.

Precocial – The bird is born with feathers and the eyes are open. Chicks are not dependant on their parents to raise them as they can defend for themselves.

Quarantine – A period of strict isolation designed to prevent the spread of disease.

Sexual Dimorphism – A difference of form, build or colouration between the sexes of the same species; term relating to a noticeable difference between genders of a species.

Supplements – Thing or part added to improve or provide further nutrients.

Stereotypic – Seeming to conform to widely accepted mental picture or type.

Taxonomy – A scientific classification of living and extinct organisms.

Zygodactyl – Feet with 2 toes that face forward and 2 toes that face backward

Zoonosis – Diseases and parasites that can be transmitted from animals to humans and vice versa.

15. Appendix

Appendix 1. ASMP Exotic Bird Tag; No Regional Program; Management Level 3

Table 1. Australasian Species Management Program.

Location	Actual	Planned	Follow Captive Animal Management Plan
Adelaide	2.2.0	2.2.0	Maintain; breed on request
Auckland	2.0.0	2.0.0	Maintain for free flight bird show
Beerwah	0.0.0	2.0.0	Aquire
Kula Eco	0.1.0	1.1.0	Aquire
Melbourne	1.1.0	1.1.0	Maintain
Mogo	0.0.0	1.1.0	Aquire as available
Palmgrove	0.0.1	2.2.0	Aquire
Perth	1.1.0	1.1.0	Maintain
Sydney	3.1.0	2.2.6	Aquire; breed to requirements
Wellington	1.1.0	1.1.0	Breed to requirements in 2003
Totals	10.7.1	15.11.6	

Regional Census and Plan (2003)

Appendix 2. Avigrain Ingredients from 3 separate mixes.

Premium Large Parrot Food contains:

Fruits – Papaya, pineapple, banana, coconut, raisins

Nuts – Brazil nuts, walnuts

Seeds – Flaked corn, whole corn, pumpkin seeds, sunflower seeds, safflower seeds

Vegetables – Carrot

Legumes – Cooked soybean, cooked chickpea, Cooked green split peas, peanuts, peanut kernel

Others – Tropical biscuits which contain 8 grains and nuts with vitamins and minerals

Protein (12.2%) Fat (14.2%) Fiber (11.8%)

<http://www.hagen.com/usa/birds/addinfo/livingworld.cfm>

Tropical High Performance Parrot Biscuits contains:

Fruits – Apple, orange oil (for flavour)

Nuts – None

Seeds – Corn, wheat, rice, sunflower kernel, flaxseed, oat groats

Vegetables – Beetroot

Legumes – Soybean, peanut kernel

Others – Lecithin, kelp, vitamins, minerals

Protein (22.0%) Fat (11.0%) Fiber (3.5%)

<http://www.hagen.com/usa/birds/addinfo/tropical.cfm>

Tropimix Large Parrot Mix contains:

Fruits – Papaya, pineapple, banana, coconut, raisins

Nuts – Brazil nuts, almonds, walnuts

Seeds – Flaked corn, whole corn, milo, wheat, sunflower kernel, dehulled pumpkin seeds

Vegetables – Carrot, potato

Legumes – Cooked soybean, cooked chickpea, cooked green split peas, peanut kernel

Others – Tropicana sticks which contain 8 grains and nuts with vitamins and minerals

Protein (12.5%) Fat (12.0%) Fiber (3.2%)

<http://www.hagen.com/usa/birds/addinfo/tropimix.cfm>

These products are available from all pet shops.