Husbandry Guidelines For White-browed Scrubwren Sericornis frontalis (Aves: Acanthizidae)



Author: Linda Sass

Date of Preparation:

Western Sydney Institute of TAFE, Richmond Course Name and Number: Captive Animals Cert III ACM30310

Lecturer: Graeme Phipps, Jacki Salkeld, Brad Walker

Disclaimer

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OCCUPATIONAL HEALTH AND SAFETY RISKS

WHS Introduction

There are WH&S risks associated with preforming any task in the zoo industry. While White-browed Scrubwren is not classified as hazardous or dangerous and is unlikely to inflict any serious injury, there are potential WH&S risks from working within the enclosure and surrounding areas.

The following are potential risks that could be present:

Trip, slip and fall hazards - walkways should be kept clear at all times. Depressions and holes need to be identified and filled in. Any slippery surface should be treated so as to reduce the risk of slipping.

Low doorways, branches and perches – Personal injury can occur from low doorways, branches and perches. Anyone working in the enclosure should be made aware of these. If possible perches and branches should not be placed where there is potential for a keeper to run in to them.

Zoonoses – Working with birds carries the risk of zoonoses such as Psittacosis, Salmonellosis and Campylobacter. Following correct hygiene procedures such as hand washing and wearing appropriate PPE (dust mask, gloves) will reduce the risk.

Sun Safety- working outdoors will expose a keeper to the sun and the associated risks. Wearing appropriate PPE (hat, long-sleeved shirt, long pants, sunscreen, and sunglasses) will reduce the risk.

Heavy lifting – seek help with heavy loads and use correct lifting procedures. A trolley or wheelbarrow should be used to transport heavy loads.

All workplaces should be reviewed regularly for hazards and these reported and actioned accordingly.

HM Species Risk Category

White-browed Scrubwren is a Low Risk animal. It is unlikely to cause harm by scratching, biting, butting or compression. There is however a risk of zoonoses with this species from droppings and dander (Psittacosis, etc.). If the appropriate hygiene protocols are in place and acted upon this risk will be reduced.

Workplace Risk Types

Biological

Zoonosis such as Psittacosis, Salmonellosis and Campylobacter are transmittable from affected birds to humans. Use of personal protective clothing (dust mask and gloves), good personal hygiene (handwashing), and sanitation measures will help to prevent the transmission of these diseases.

Chemical

Chemicals such as liquid bleach can be used to disinfect scrubbing brushes used in the aviary. Liquid bleach is irritating to skin and eyes and when in contact with acids liberates a toxic gas. PPE including long sleeved gloves, goggles and a mask should be used at all times. The MSDS and the safe procedure should be located in a location that is known to all staff.

Environmental

Working outdoors carries the risk of excessive sun exposure. Wearing the correct PPE (sunglasses, long sleeved shirt, hat and sunscreen) will reduce the risk.

Ergonomic

Improper lifting of heavy loads can cause injury. Correct lifting procedures and using trolleys and wheel barrows can reduce the risk of injury. The height of benches in work areas can cause discomfort if they are at an incorrect height for the user.

Physical

While capturing birds keepers need to watch their footing and not run to reduce tripping hazards. We tend to focused on the bird not on our feet. The use of a trap cage is a method of capture that eliminates the need to chase White-browed Scrubwren with a net in the aviary.

Psychological

Attachment to the animals we care for is inevitable. When they die we feel this loss. It is important to acknowledge these feelings and get appropriate counselling if needed.

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1 Introduction

Very few White-browed Scrubwren (*Sericornis frontalis*) are kept within Australian zoos, therefore there is a great paucity of information regarding details of the species husbandry. This manual will act as a guide for caring for this species in captivity covering information on taxonomy, housing, diet, handling, behaviour and breeding.

This underrated species is a lively, inquisitive species that is a great addition to any mixed aviary enclosure.

1.1 Current Collection Census and Plan holdings

ZAA Regional Census and Plan (printed Friday 15th April 2016)

Order: Passeriformes Family: Pardalotidae White-browed Scrubwren (*Sericornis frontalis*)

SUMMERTOW	1	1	0	1	1	0	Maintain
Total	1	1	0	1	1	0	

CITES: NA IUCN: NA VPC: NA

TAG: Birds; ASMP: No Regional Program

TAG Notes: No regional implications.

1.2 IUCN Category

White-browed Scrubwren is not listed under IUCN

1.3 C.I.T.E.S. Appendix

White-browed Scrubwren is not listed Under CITES

1.4 National Category

White-browed Scrubwren is not listed under EPBC Act

1.5 State or Territory Categories

This species is not listed under any state or territory legislation as a threatened species.

1.6 Wild Population Management

There is currently no Wild Population Management for White-browed Scrubwren.

1.7 ASMP Category of management

The category listed for White-browed Scrubwren is "No Regional Program" meaning "TAG has evaluated this taxon and sees no need for regional management or resourcing. Within and between-institution management may occur, but this is not coordinated or overseen by the Australasian Species Management Program".

1.8 Key Personnel

Not Applicable for this species.

1.9 Captive Management details

There are no regional implications for this species.

1.10 Population Viability Assessment

As there are only two animals listed in the RC&P this species is not viable in captivity. There are birds keep outside the program that could be included to make the population viable. White-browed Scrubwren are common in the wild, so this may be the reason for the lack of concern. The paucity of information make the husbandry of this species difficult.

2 Taxonomy

2.1 Nomenclature

Class Aves Order Passeriformes Family Acanthizidae Genus Sericornis Species frontalis

2.2 Subspecies

Sericornis frontalis has ten sub-species. These are as follows:

• *S. f. balstoni* Ogilvie-Grant, 1909 – coastal W Western Australia from Shark Bay and its islands S, including Houtman Abrolhos, to Dongara-Jurien Bay region.

• *S. f. maculatus* Gould, 1847 – SW Western Australia (from Dongara S to Bremer Bay-Hopetoun region).

• *S. f. mellori* Mathews, 1912 – S Western Australia (from Bremer Bay-Hopetoun, and extending N patchily to inner wheatbelt) E along coast, including Archipelago of the Recherche, to SE South Australia (E to S Yorke Peninsula and coastal Gulf St Vincent).

• S. f. ashbyi Mathews, 1912 – Kangaroo I, off South Australia.

• *S. f. laevigaster* Gould, 1847 – NE Queensland (S from Cairns and Atherton Tablelands) S to NE New South Wales and to W slopes of Great Dividing Range.

S. f. tweedi Mathews, 1922 – coastal and subcoastal areas from Queensland-New South Wales border S to R Hunter and inland to W slopes of Great Dividing Range.

• *S. f. frontalis* (Vigors & Horsfield, 1827) – coastal and subcoastal area from EC New South Wales (R Hunter and inland to W slopes of Great Dividing Range) S, except in S Victoria, to E coast of South Australia.

• *S. f. harterti* Mathews, 1912 – coastal S Victoria (around Cape Otway and E to Wilson's Promontory).

• S. f. rosinae Mathews, 1912 – Mt Lofty Ranges, in South Australia.

• S. f. flindersi S. A White & Mellor, 1913 – islands in E Bass Strait (Hogan, Kent and Furneaux Groups).

(HBW Alive, n.d)

2.3 Recent Synonyms

Acanthiza frontalis Vigors and Horsfield, 1827 (HBW Alive, n.d)

2.4 Other Common Names

Other common names for *S.frontalis* are Scrubwren, Brown Scrubwren, Spotted Scrubwren, Spotted Scrubwren, Buff-breasted Scrubwren and Pale-breasted Scrubwren (HBW Alive, n.d).

3 Natural History

White-browed Scrubwren is a sedentary bird, endemic to Australia (Magrath et al., 2000) and it is the most common and widespread of Australia's five species of scrubwren. (Birds in Backyards, n.d)

Despite White-browed Scrubwren being a wary and alert species they are inquisitive. As they are sedentary, remaining in the same patch of vegetation (Birdlife Australia, n.d) there have been many studies on their ecology (Magrath et al., 2000; Magrath & Whittingham, 1997; Maurer, Magrath, Leonard, Horn & Donnelly, 2003; Whittingham, Dunn & Magrath, 1997). Over 30,000 individuals have been banded (Birdlife Australia, n.d).

White-browed Scrubwren is known to cooperatively breed with either a single pair or a dominate pair and a subordinate male (Magrath & Whittingham, 1997). This strategy has many reproductive benefits, such as relatives within a breeding group having a better chance of successfully breeding (Magrath et al., 2000). Studies have found that there is a variety of social organization within these cooperatively breeding groups. (Magrath & Whittingham, 1997). Magrath & Whittingham (1997) found through genetic analyses that no females were related to the dominate males in the group.

3.1 Morphometrics

3.1.1 Mass And Basic Body Measurements

White-browed Scrubwren have a minimum of 10.5 cm length and a maximum of 15cm (HBW Alive, n.d). The average is 12cm (Birds in Backyards, n.d). The average weight is 12g -14g (HBW Alive, n.d)

3.1.2 Sexual Dimorphism

Both sexes are similar, but females are slightly duller, particularly on the face (Figure 1 & Figure 3) in comparison to males (Figure 2) (Australian Museum, 2016).



Figure 1: Sexual dimorphism in White-browed Scrubwren (HBW Alive, n.d)



Figure 2: Male White-browed Scrubwren (Linda Sass)



Figure 3: Female White-browed Scrubwren (Linda Sass)

3.1.3 Distinguishing Features

White-browed Scrubwren has a dark olive-brown back, grey throat and dull red-brown rump, belly and flanks. It has white lines above and below the eye (Figure 4) (Australian Museum, 2016).

The Large-billed Scrubwren, *Sericornis magnirostris* of which shares part of its range with the White-browed Scrubwren is a lighter, uniform brown and doesn't have any markings on the face. The larger Yellow-throated Scrubwren, *S. citreogularis*, has a redbrown eye, a darker the face and has yellow on the eyebrow, wings and throat (Birdlife Australia, n.d).



Figure 4: Male White-browed Scrubwren (Linda Sass)

3.2 Distribution and Habitat

A sedentary bird, White-browed Scrubwren has a range extending from northern Queensland, in a coastal band through South Australia to the mid-Western Australian coast, and Tasmania (Figure 5) (Birdlife Australia, n.d; Birds in Backyards, n.d).



Figure 5: Distribution of White-browed Scrubwren (HBW Alive, n.d).

White-browed Scrubwren are found usually in pairs in a variety of habitats in dense undergrowth such as eucalypt (*Eucalyptus*) forest, rainforest, mallee, coastal heathlands, sand dunes and inland sandplains. They will occupy disturbed areas with sufficient cover. It is usually seen low down in the thick vegetation. (Birds in Backyards, n.d; HBW Alive n.d).

3.3 Conservation Status

White-browed Scrubwren is not globally threatened. It is common in its range although locally susceptible to fire, land clearance and predation by feral cats (HBW Alive n.d). This species is secure in all states and territories in Australia that it is found (Birds in Backyards, n.d; Birdlife Australia, n.d). White-browed Scrubwren is not accessed under IUCN red list criteria. (IUCN Red List, 2012).

3.4 Longevity

3.4.1 In the Wild

According to a banding study, White-browed Scrubwren can live up to 15 years Australian Government, n.d).

3.4.2 In Captivity

There is no data on the lifespan of White-browed Scrubwren in captivity.

3.4.3 Techniques Used to Determine Age in Adults

Juvenile birds can be distinguished from adults by the lack of pronounced markings, but the age of mature birds is hard to determine without accurate records.

4 Housing Requirements

4.1 Exhibit/Enclosure Design

When planning an exhibit for White-browed Scrubwren, the following principles should be taken into consideration at the design stage:

- Budget
- Keeper, animal and public safety
- Keeper access
- Does the exhibit allow for natural behaviour?
- Is it the correct size?
- What plants will be used?
- Is it the correct habitat?
- Aspect
- What services are needed and where will they be located?
- Public education graphics

4.2 Holding Area Design

A holding area for White-browed Scrubwren, would need to provide for the basic requirements of the species such as shelter, perches, food and water. The smallest enclosure for this species consists of an aviary 3m x 1.5 m per pair (Sass, 2016). If this were not a planted aviary White-browed Scrubwren would require a third of the area to be brush for cover.

4.3 Spatial Requirements

There are no specific spatial requirements for White-browed Scrubwren but the General Standards for Exhibiting Animals in New South Wales state;

"The size and shape of enclosures must provide freedom of movement, both horizontally and vertically".

After discussions with the Head Bird Keeper at On the Perch Bird Park, it is suggested that the minimum enclosure size would be 3m x 1.5m per pair. An enclosure of this size would need to have sufficient cover and would be too small for the bird to forage naturally so sufficient live food would need to be fed. Ideally any enclosure larger than this minimum would be of more benefit to this species in terms of breeding and long-term wellbeing (Sass, 2016).

4.4 Position of Enclosures

While there is no specific aspect required for White-browed Scrubwren, a north facing flight would be ideal.

4.5 Weather Protection

White-browed Scrubwren need an aviary that provides shelter from adverse weather conditions. The aviary should have areas of open space and covered areas.

4.6 Temperature Requirements

No heating is required for White-browed Scrubwren.

4.7 Substrate

Areas of gravel in the flight would be required in order to keep the floor dry and allow for radiant heat which in turn would attracts insects for food.

Plants within the aviary need soil which would also harbor insects that the birds would forage for.

Sand in the covered shelter area allows for easy replacement on a regular basis (see Section 5.1).

4.8 Nestboxes and/or Bedding Material

White-browed Scrubwren sleep among the shrubs and brush within the aviary, so it is important to have enough plants and added brush to accommodate all occupants.

4.9 Enclosure Furnishings

White-browed Scrubwren spend much of the time on the ground foraging amongst rocks and timber so these are vital enclosure furnishings.

4.10 Sustainability considerations for Housing

Housing for White-browed Scrubwren is usually an outdoor aviary so energy use would be minimal. Resources used for building enclosures should be from a sustainable source. Recycling and reuse of excess materials will reduce any impacts from building an enclosure. If lighting is used as an insect attractant, solar should be considered.

5 General Husbandry

5.1 Hygiene and Cleaning

The following tasks should be undertaken on a regular basis (see Table 1 Appendix 1) to ensure the good hygiene within the exhibit:

- Food dishes should be washed with warm soapy water disinfected and left to air dry on a daily basis.
- Once a week water dishes should be scrubbed free of algae build up.
- Perches and aviary surfaces can be cleaned with warm soapy water.
- Accumulative droppings on floor can be scraped, and faeces buildup on plants can be sprayed with a hose.
- Floor substrate such as gravel, sand, or soil should be raked/turned to remove visual build up.
- Dry brush in shelters should only be replaced off breeding season, half can be replaced, then the alternate half the next time.
- Perches and floor substrate can be replaced if necessary due to faeces or loss of quality.
- Weeds should be identified and removed from the exhibit
- Pest control should done regularly

The use of chemicals within an enclosure holding White-browed Scrubwren should be kept to a minimum. Chemicals such as bleach are harsh and should be avoided. Mild disinfectants can be used as an alternative, always follow the safety precautions for each chemical. Disinfectants that can be used include Milton, eucalyptus disinfectant, and F10. All items disinfected should be rinsed thoroughly.

5.2 Record Keeping

Managers, vets and keepers of captive animals cannot make informed decisions about the animals in their care without complete and accurate records. Records should be as accurate and complete as possible and include the following at a minimum:

- Species
- Sex
- Acquisition date
- Parents
- Provenance (if applicable)
- Location (enclosure number)
- Disposal Date (ISIS, 2015).

5.3 Methods of Identification

The Australian Bird and Bat Banding Scheme recommends size 02 leg rings for Whitebrowed Scrubwren (Environment Australia, 2000). Each individual should have its own identification number.

5.4 Routine Data Collection

General husbandry should be recorded on a routinely basis. This should include:

- Dietary changes
- Internal movements
- External movements
- Medical history
- Breeding history
- Other observations Husbandry manual

6 Feeding Requirements

6.1 Diet in the Wild

White-browed Scrubwren are insectivorous, feeding mostly on insects and other small arthropods (BirdsinBackyards, n.d). While the main source of energy is from protein (Shephard, 1990), they will occasionally consume some seeds (BirdsinBackyards, n.d).

Several studies have suggested that White-browed Scrubwren do not suffer from a major change in seasonal food availability (Cale, 1994; Ford, Huddy, & Bell, 1990). White-Browed Scrubwren specialise in foraging on the ground but will also forage off the ground and it has been shown that ground foraging occurs more often in winter than summer (R. D. Magrath et al., 2000).

6.2 Captive Diet

As there are very few White-browed Scrubwren in captivity (OEH, n.d) and there is little in the way of written material, the principles of feeding more common insectivorous birds is applied.

White-browed Scrubwren should be supplied with sufficient amounts of live food (Figure 6). Mealworms, termites, maggots can all be bred (Martin, 1980). Mealworms can be bred, but maintaining the correct conditions can be difficult. The correct amounts of moisture and temperature need to be maintained to ensure a constant supply (Martin, 1980). A more reliable source is to purchase from insect breeding wholesalers that specialise in the breeding of mealworms such as Pisces Enterprises. Termites can also be kept in a drum with damp hessian and timber but they can be difficult to maintain. If it is possible to collect termites on a daily basis, this is preferable. Maggots can be bred in warmer weather by keeping damp bran in trays outdoors, but can smell unpleasant and is not very social near the public (Martin, 1980).



Figure 6: Male White-browed Scrubwren feeding on a mealworm (Linda Sass)

Insects can be encouraged into the enclosure by several different methods. Leaf litter can provide a natural environment for a supply of insects (Shephard, 1990). A planted aviary will also encourage insects (Figure 7). A compost heap within the enclosure attracts insects, and a night light attracts insects overnight.



Figure 7: An example of a planting within an enclosure that holds White-browed Scrubwren (Photo by H.Sass)

A general softbill mix should also be supplied. The following is the recipe used at On the Perch Bird Park:

Softbill Mix

750grams Kangaroo mince 3 boiled eggs, mashed 400grams grated cheese 600grams turkey crumbles ½ cup insectivore mix Mix together until combined.

This mix feeds the entire mixed collection of carnivorous and insectivorous birds at On the Perch Bird Park. Kangaroo mince is readily available from larger supermarkets and turkey crumbles from any produce store. It is difficult to state how much each individual White-browed Scrubwren consumes. It is important to supply more than needed in mixed collections.

6.3 Supplements

Insectivore mix is provided as a supplement in the aviary (Appendix 2).

6.4 Presentation of Food

On a daily basis, mealworms are to be scattered around the enclosure several times a day. Termites are supplied in a tray to prevent escape and avoid black ants eating them. Browse can be supplied. Any native species is suitable. These should be placed on the floor of the aviary as White-browed Scrubwren spend the majority of the time on the ground.

6.5 Sustainability aspects of feeding including Food security considerations

Wherever possible food for White-browed Scrubwren should be sourced locally to reduce "food miles". Mealworms can be breed on site and insects encouraged into the aviary by composting waste fruit and night lights. The softbill mix (see Section 6.2) used at On the Perch Bird Park uses locally sourced waste cheese from Bega Cheese (kindly donated), and eggs from our own chickens.

7 Handling and Transport

7.1 Timing of Capture and Handling

Capture of White-browed Scrubwren should occur in the morning to increase the chances of them entering the trap cage due to increased hunger. This would also coincide with before open hours for most facilities (Sass, 2016).

7.2 Catching Bags

Catching bags are not relevant to this species.

7.3 Capture and Restraint Techniques

As the best aviary for White-browed Scrubwren is a largely planted aviary, physical capture methods are extremely difficult to carry out. The exception to this is if there is a smaller area to contain the bird, such as a secure air-lock or adjacent walk-way. In this instance the bird can be hunted into a smaller area where an experienced person can catch with a padded net. This method has the potential to cause stress on the bird (Sass, 2016). The preferred method of capture is by mechanical means using a trap-cage baited with livefood. If the trap cage is left permanently in the aviary and used as a feed station White-browed Scrubwren can become conditioned to enter the trap-cage without fear. A temporary sliding door can be added held with a string line that is held by the capturer at some distance to the cage and once the target bird enters the door can be lowered rapidly. The White-browed Scrubwren can then be caught by hand and placed in a carry box (Sass, 2016).

In the case of no permanent trap-cage, a trap-cage can still be used. The cage can be baited with livefood and placed in the White-browed Scrubwren favourite place in the aviary. Again a string line is attached to the door and after the target species enters the cage the door is dropped (Sass, 2016).

To restrain a White-browed Scrubwren the best way is by hand. A gentle touch is required. The bird should be held firmly but gently to prevent injuring the bird and to keep it calm.

7.4 Weighing and Examination

If White-browed Scrubwren are require to be weighed they can be placed in a calico bag inside out to prevent the bird becoming tangled in loose threads. The bag can be hung on a set of digital hanging scale.

White-browed Scrubwren should be held gently but firmly for any examination (Sass, 2016).

7.5 Release

Early morning is the best time to release White-browed Scrubwren as this gives the bird sufficient time to find food and adjust to the new aviary. Generally before 12pm in summer and 9am in winter would be recommended. The door of the transport cage should be opened facing a wall in the aviary so the bird only flies a short distance before stopping. This gives them time to inspect the new surrounding environment without being exhausted. This also reduces the risk of them flying rapidly towards a light source such as an open netted wall as they can collide with a rigid surface and cause injury to themselves (Sass, 2016).

7.6 Transport Requirements

7.6.1 Box Design

A transport box suitable for an individual White-browed Scrubwren should be made of 6mm plywood with dimensions 150mm in height and 300mm wide by 300mm deep. The box should be fully enclosed except the front which should be 6mm mouse and vermin wire mesh or aluminum fly wire to minimise beak rubbing. The front should also be covered with black shade cloth for privacy and to reduce cool drafts during transport i.e. airports. Ventilation holes 4mm in diameter should be on all sides and top except the bottom. There should be 2 doors, one fitted with a rubber flange for input and the other an open door for release. Both doors must be able to be screwed shut, ensuring the screws are short so not to protrude into box (Sass, 2016).

7.6.2 Furnishings

A perch should be provided that is 5cm above the bottom of the box.

7.6.3 Water and Food

As White-browed Scrubwren have a high metabolic rate, a constant supply of food is necessary. Food that should be included in the transport box include insectivore rearing mix and madeira cake. These should be provided in a lightweight container that is secured to the box. Similarly, water can be provided in a sponge in a secured lightweight container. Optionally a mealworm tube (small PVC pipe, filled with bran and mealworms) can also be secured to the box to provide a constant supple of livefood during the trip. If a keeper accompanies the birds, mealworms can be feed periodically through ventilation holes to prevent escape of the bird (Sass, 2016).

7.6.4 Animals per Box

Only one animal per box should be transported to prevent aggression.

7.6.5 Timing of Transportation

Transport can occur at any time of day but it should be as quickly as possible to reduce the time the animal is in the box.

If the transport is to be no more than 10 minutes the above food requirements are not necessary. The above type and dimensions of box should be used in all cases for transport regardless of the duration (Sass, 2016).

7.6.6 Release from Box

See Section 7.5

7.7 Sustainability aspects of animal transportation

Transport of White-browed Scrubwren can be by road or air.

According to The David Suzuki Foundation, compared to driving, air travel has a greater climate impact per passenger kilometre, even over longer distances

(TheDavidSuzukiFoundation, 2014). There is some evidence that over longer distances air travel may be more efficient due to the disproportionate burn of fuel on take-off (Bland, 2012).

To ensure animal transportation is sustainable, each case should be accessed individually.

8 Health Requirements

8.1 Daily Health Checks

A simple visual examination of White-browed Scrubwren may not be enough to determine illness. Birds possess a "Preservation Reflex" whereby the bird will not show physical signs of illness in an attempt to protect themselves from attack by predators or lose their positon in the pecking order. Quite often a bird will be in the advanced stages of illness before signs can be seen (Cannon, 2002).

Daily Health checks are vital to monitor the health of White-browed Scrubwren. These should be done at the beginning of each day during the first Aviary check. By distant examination the following should be noted:

- Changes in behaviour activity, calling
- Eyes open and clear
- Nostrils open and clear
- Feathers in good condition
- Fecal material- colour, consistency.

Signs of illness include:

- Lethargy
- Discharges from eyes and nostrils
- Decrease in preening
- Untidy feathers
- Change in fecal matter
- Lack of appetite

8.2 Detailed Physical Examination

8.2.1 Chemical Restraint

No chemical restraint is recommended for White-browed Scrubwren

8.2.2 Physical Examination

If it is determined that a physical examination of White-browed Scrubwren is necessary, the bird should be captured and restrained with as little stress to the animal as possible. See Section 7.3 Capture and Restraint Techniques.

Once the bird is held gently but securely a thorough examination can take place. Observations should note the following:

- Any abnormality in any part of the body
- Weight of the bird is the keel prominent? (indicates an underweight bird)
- Close inspection of the vent dirty, swellings?

- Feathers damage, malformed?
- Wings and legs move freely?
- Over grown claws?

Any abnormalities should be noted and reported to management and a vet if necessary (Cannon, 2002).

8.3 Routine Treatments

Routine treatment for White-browed Scrubwren should include worming with a suitable product at the recommended dosage.

At On the Perch Bird Park our White-browed Scrubwren are in a mixed species exhibit. We worm each enclosure every 3 months with Avitrol Plus as per manufacturer's instructions and with the advice of a Vet. Careful consideration is taken to the weather with extremely hot days avoided so the birds don't drink excessive amounts of water and potentially overdose on the worming treatment.

After periods of heavy rain aviaries are as risk of Coccidiosis outbreaks. At On the Perch we administer a Coccidiosis (toltrazuril (Baycox)) treatment at the dose of 3ml per 1000ml water to all enclosures including that which houses White-browed Scrubwren after heavy rain events as a preventative measure.

8.4 Known Health Problems

There is little known about health problems specific to White-browed Scrubwren. None the less as a bird they are potentially susceptible to any health problem that can affect birds in general.

8.5 Quarantine Requirements

While it is important for any bird going in and out of an establishment to be quarantined, it can be problematic to quarantine softbills such as White-browed Scrubwren. It is vital that stress is keep to a minimum for any bird held in quarantine so a suitable well planted aviary should be established for and softbills including White-browed Scrubwren. The quarantine period should be 30 days with the birds wormed twice during this time. Ideally fecal matter should be tested. Standard quarantine procedures should be observed. These include:

- Quarantine housing should be as far from the rest of the facility's collection as possible
- All equipment must be disinfected
- Staff should attend to quarantined animals last and disinfect feet and wash hands thoroughly before and after
- Waste (droppings, spoilt feed and water) should be kept separate and disposed of properly

9 Behaviour

9.1 Activity

White-browed Scrubwren are an active bird, constantly foraging for insects for much of the day (BirdsinBackyards, n.d), finding shelter at night in the branches of shrubs.

9.2 Social Behaviour

White-browed Scrubwren are known to be in pairs (BirdsinBackyards, n.d) but are also found in family groups consisting of both males and females either closely related or unrelated. (L. Whittingham, A, Dunn, & Magrath, 1997). One study found that there were most commonly in groups consisting of one female and two males (L. Whittingham, A et al., 1997).

9.3 Reproductive Behaviour

White-browed Scrubwren are cooperative breeders with helpers being the previous offspring (L. Whittingham, A et al., 1997).

Observation have been made of the pair held at On the Perch Bird Park passing a mealworm back and forth from bill to bill. This is suggestive of courtship behaviour, but further observations need to be done.

9.4 Bathing

White-browed Scrubwren will bath in an open water dish, and enjoy a shower of rain or a spray from the overhead watering system.

9.5 Behavioural Problems

If kept in a large planted aviary there should be little in the way of behavioural problems with White-browed Scrubwren as they will be able to keep themselves busy foraging for insects, reducing boredom and stress.

9.6 Signs of Stress

The usual signs of stress in a bird should be looked out for. These include lethargy and loss of condition.

9.7 Behavioural Enrichment

As most of the day is spent foraging for food, the following can be used as behavioural enrichment for White-browed Scrubwren

- Digging over a section of the aviary floor creating a place for the bird to dig and hunt for insects
- Providing termites
- Providing a compost heap
- Installing a moth trap
- Installing a night light to attract insects into the aviary overnight.

9.8 Introductions and Removals

While White-browed Scrubwren co-exist quite well with others, it is important to watch for signs of aggression when introducing a new bird. The same is true if a bird is removed. The dynamics of the group could change and potential problems occur. Careful monitoring of the group is necessary to pick up problems (Hale, 2008).

9.9 Intraspecific Compatibility

In wild populations family groups can be quite dynamic with changes in the group occurring as deaths occur or pairs disperse. (L. Whittingham, A et al., 1997). This constant change in dynamics would indicate that white-browed Scrubwren will tolerate their own species quite readily, and accept new members into a group without too much fuss.

9.10 Interspecific Compatibility

From observations at On the Perch Bird Park, White-browed Scrubwren seem highly compatible with a variety of other species of bird. At On the Perch Bird Park they are housed with many other species in a mixed collection, including parrots, pigeons, finches and a variety of other softbills, such as fairy wrens, honeyeaters, chats and curlews. Consideration should be given to the various niches that each group inhabit within the aviary. Problems could arise when there is too much competition for resources.

9.11 Suitability to Captivity

They seem to be highly adaptable to captivity becoming accustomed to people within a walk-in aviary very quickly. While they are not completely tame they will readily come close to pick up offerings of mealworms.

10 Breeding

10.1 Mating System

Mating system of White-browed Scrubwren is in either pairs or in trios consisting of a dominant pair and a subordinate male within a co-operative group (HBWAlive, n.d; R. Magrath, D & Whittingham, 1997; L. Whittingham, A et al., 1997; L. A. Whittingham & Dunn, 1998). Co-operative breeding occurs in groups where animals as well as the breeding pair help to rear the offspring (Ambrose & Davies, 1989). When co-operative breeding occurs, Ambrose and Davies (1989) suggest that subordinates may be better placed in the family group by receiving access to resources and learning how to rear offspring, with the eventual possibility of inheriting the occupied territory as older birds die. For the dominant pair, the acceptance of subordinates into a co-operative breeding system provides defense of the territory and increased breeding success (Ambrose & Davies, 1989). The dominant female builds the nest and incubates the eggs (R. Magrath, D & Whittingham, 1997). The White-browed Scrubwren has a notable variety of mating strategies, with groups consisting of a mixture of related and unrelated animals within the group (L. Whittingham, A et al., 1997).

10.2 Ease of Breeding

As there is a distinct lack of White-browed Scrubwren in captivity, both within private and zoo systems, it could be assumed that this species is quite difficult to breed.

10.3 Reproductive Condition

10.3.1 Females

Female White-browed Scrubwren do not have a breeding plumage so do not change appearance for breeding. Little to no information is documented for the breeding condition of White-browed Scrubwren but as with all softbills birds would need to be in good condition to be able to breed. Active, birds in good feather condition and good weight, should be capable of breeding, provided they are the correct age.

10.3.2 Males

The same applies for the breeding condition of males. As with all softbills, healthy animals should be able to breed. Also, male birds do not have a breeding plumage.

10.4 Techniques Used to Control Breeding

Separation of sexes should be used to prevent White-browed Scrubwren from breeding. Conversely, providing adequate food and nesting sites and material are required if wanting to breed this species.

10.5 Occurrence of Hybrids

There is evidence of *Sericornis frontalis* hybridising with *S. keri*, (Atherton Scrubwren) in the wild (Joseph & Moritz, 1993). Due to this it would be unadvisable to house *Sericornis sp.* together as there is the possibility of them hybridising.

10.6 Timing of Breeding

White-browed Scrubwren are known to breed between July to January (BirdsinBackyards, n.d; R. D. Magrath et al., 2000).

10.7 Age at First Breeding and Last Breeding

It is unknown the age at which White-browed Scrubwren begin to breed or the age of last breeding.

10.8 Ability to Breed Every Year

It could be assumed that if adequate food and the correct conditions were provided White-browed Scrubwren would be able to breed every year if of breeding age. There is no physiological reason this would not be the case.

10.9 Ability to Breed More than Once Per Year

In the wild White-browed Scrubwren have been noted having up to six clutches in a season. (R. D. Magrath et al., 2000). This could be due to the co-operative breeding system this species employs.

10.10Nesting, Hollow or Other Requirements

This species builds a large, round nest, with a side entrance, constructed of grass and plant material, lined with fine grass and feathers. The nest is usually placed near the

ground in thick vegetation but can also be a few metres off the ground in a tree (BirdsinBackyards, n.d; Campbell, 1900). Campbell (1900) noted the dimensions as being between 12.5 -15 cm diameter, with the side entrance being 2.5cm across.

10.11 Breeding Diet

An increase in food should be provided at the beginning of the breeding season. No changes would be required to diet with the exception of an increase in quantity. Care should be taken to provide sufficient food if young are present. Food requirements would be greater at this time.

10.12Clutch Size

Clutches size in this species is usually between 2 -3 eggs but 4 are known (R. D. Magrath et al., 2000). Eggs are swollen oval in shape with a glossy surface. The colour varies from warmish white to light purplish-buff, splashed and streaked with short marks of purplish-brown, sometimes chestnut, thickest on the apex (Campbell, 1900). Eggs are laid at two days intervals (Campbell, 1900; R. D. Magrath et al., 2000).

10.13Incubation Period

Incubation is between 17 -22 days with all eggs in a clutch hatching approximately at the same time (R. D. Magrath et al., 2000). One study suggested that this implies that hatching usually takes place over a few hours, or perhaps that it occurs overnight (R. D. Magrath et al., 2000).

10.14Age at Fledging

White-browed Scrubwren fledge at 15 days after hatching (Campbell, 1900; R. D. Magrath et al., 2000).

10.15Age of Removal from Parents

Young were fed by the adults for between 6-7 weeks after leaving the nest (R. D. Magrath et al., 2000) so the offspring should not be removed before this. Due to the cooperative nature of this species it would be possible to leave the young within the group, with careful monitoring should be undertaken and it is assumed the enclosure is of sufficient size.

10.16Growth and Development

As with most softbills, young leave the nest relatively early fully feathered and able to fly (Sass, 2016). Juvenile birds are duller than the female with a more diffuse pattern, black on forehead reduced or lacking, throat streaks lacking and iris much darker (HBWAlive, n.d).

11 Artificial Rearing

11.1 Incubator Type

Yolks in many softbills are less than 30% of the total egg mass (Vince, 1996). Smaller yoked eggs require high turning rates (Gowland, 2017) up to 30-60 times a day(Vince, 1996). It is important to incubate horizontally (Vince, 1996). While there are many brands of incubator on the market the choice is up to each individual preference and budget. Any incubator should be capable of having a high turn rate for the first half of incubation. At this point the eggs can then be move to an

incubator that rocks (Gowland, 2017).

11.2 Incubation Temperatures and Humidity

Research has found the ideal dry bulb temperature for a small egg is 37.5°C and the wet bulb Temperature between 30-31.1°C. The ideal relative humidity is 58% (Vince, 1996).

11.3 Desired % Egg Mass Loss

Charting the weight loss of the egg, preferably on a daily basis will increase hatch rates (Vince, 1996). Ideally by hatching the egg should lose approximately 12 to 15 percent of its fresh weight. Corrective measure can be made if the weight is outside this amount (Vince, 1996). Humidity can be altered accordingly. If the egg has lost less than 12% the humidity should be decreased and if it has lost more than 15% humidity should be increased (Gowland, 2017; Vince, 1996)

11.4 Hatching Temperature and Humidity

Eggs should be moved to a separate hatching incubator once the chick has internally pipped. The egg no longer needs to be turned. The humidity should be at maximum relative humidity and can be either still air or moving. The temperature should be the same dry-bulb temp as incubation. Often the parents communicate with the chick while it hatches. It may be beneficial to play recorded vocalization to encourage hatching (Vince, 1996)

11.5Normal Pip to Hatch Interval

While the exact pip to hatch interval for White-browed Scrubwren is unknown this can be monitored by candling. Once the air cell size and shape has changed this indicates internal pip (D.Gowland). At this stage the egg/s can be moved to a hatcher (see Section 11.4).

11.6 Brooder Types/Design

Any small container that is easy to clean and maintain temperature and humidity in would be suitable. The substrate should be wood shavings or hay so the young can grip to help prevent foot and leg problems.

If the young were hatched in a nest and put into care due to the parents abandoning the nest or dying, the nest can be used to house the chicks. Care should be taken regarding hygiene if this were the case.

11.7 Brooder Temperatures

Brooder temperatures should be between 35-37.2°C. Relative humidity should be similar to incubation. Observations of the chick will indicate the suitable temp. A panting chick indicates it is too hot and a lethargic or shivering chick is too cold. Brooder temperatures are gradually reduced as the chick feathers up (Vince, 1996).

11.8 Diet and Feeding Routine

Birds do not to be feed for the first 12- 24hours. Between days 1 to 6 a slurry of insectivore rearing mix (see Appendix 2) feed with an eye-dropper or syringe.

From Day 6 thicken food and add sliced pinkie mice and chopped insects (Vince, 1996). Solid food should be offered using a pair of blunt nosed tweezers or forceps. As with any hand reared insectivorous softbill feeding is required every 15 minutes during daylight hours (FitzGerald, 2017).

11.9 Specific Requirements

There are not specific requirements for this species

11.10Pinioning Requirements

This species has no requirement to be pinioned

11.11Data Recording

Data recorded should include:

- Individual identifier
- Location of animal
- Date and time of recording
- Weight of egg or chick
- Temperature of incubator or brooder
- Relative humidity of incubator or brooder
- Feed amount consumed if chick
- Food type

11.12Identification Methods

Numbered closed rings can be placed on the bird's leg when they are a few days old. The rings can be placed over the soft bones of the foot. Open bands can be fitted to older birds. The correct size is important and care should be taken so as not to injure the bird (Vince, 1996). 02 leg rings are recommended (see Section 5.3).

11.13Hygiene

Incubators need to be disinfected at the end of each season to avoid the growth of bacteria (Vince, 1996). All care should be taken to keep the chicks in a clean environment including any feeding implements. Keepers should wash hands thoroughly before and after handling chicks and the food items.

11.14Behavioural Considerations

As the risk of imprinting is high due to the frequency of feeding, care should be taken to spend the minimum time with the chicks as is necessary.

White-browed Scrubwren need to learn to forage for food so any opportunity should be given to the chicks to do so once they fledge. This can be achieved by leaving live insects in with them between scheduled feeds.

11.15Use of Foster Species

No applicable for this species

11.16Weaning

Weaning of White-browed Scrubwren can be difficult because they feed so often and this needs to happen at the young birds own pace. The parents are known to stop feeding at 6 -7 weeks of age (see Section 10.15) so ideally weaning should have occurred by this age.

11.17 Rehabilitation Procedures

Whether White-browed Scrubwren are being rehabilitated for release to the wild as rescued birds or into an aviary as hand reared captive birds they need to learn to fly. Cage size can be increased gradually to build up strength while in a safe environment It is also important to ensure they are capable of finding food.

12 Acknowledgements

All staff at On the Perch Bird Park, and especially Steve Sass, Head Bird Keeper for all the support and guidance I could ever wish for.

Adam FitzGerald and Vanessa March for valuable knowledge and advice.

Daniel Gowland for sharing valuable information.

Steven Jackson for developing a standard captive management manual, for which this guideline is based upon (Jackson, 2002).

Graeme Phipps for support and guidance in preparing this Husbandry Manual and also throughout the entire course.

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14 Glossary

CITES - Convention on International Trade in Endangered Species of Wild Fauna and Flora

Dander – a powder of "feather dust" that is produced by the feathers of birds

EPBC Act - The *Environment Protection and Biodiversity Conservation Act 1999* is the Australian Government's central piece of environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places

Insectivorous - an animal that predominantly eats insects

ICUN - The *International Union for Conservation of Nature* is the global authority on the status of the natural world and the measures needed to safeguard it.

Sedentary - an animal that doesn't move far from one spot.

15 Appendix 1

Table 1: Example cleaning schedule of an enclosure holding White-browed Scrubwren

Task	Daily	Weekly	Bi-	Bi-annually	Annually
			Monthly	-	-
Water dishes emptied and refilled	Х				
Food dishes replaced and washed	Х				
Water dishes scrubbed		Х			
Perches scrubbed to remove faeces		Х			
Faeces cleaned from aviary surfaces		Х			
Accumulative droppings removed		Х			
Floor substrate turned/raked		Х			
Rodent bait stations checked and bait		Х	Х		
replaced if needed					
Dry brush in shelter replaced				Х	
Replace perches if required					Х
Replace floor substrate if required					Х

16 Appendix 2

Insectivore Rearing Mix Ingredients

Meat meal, fish meal, blood meal, whey protein, soy protein, mannan oligosaccharides, β -glucans, lysine, methionine, vegetable oils, omega-3 and omega-6 fatty acids (including EPA & DHA), carotenoids, taurine, 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.

17 Analysis

Protein (min)	52 %
Fat (min)	12 %
Carbohydrate	18 %
Fibre (max)	5 %
Calcium	2 %
Taurine	500mg/kg
Carotenoids	50mg/kg
Metabolisable Energy (ME)	16 MJ/kg

http://www.wombaroo.com.au/birds/finch/insectivore-rearing-mix