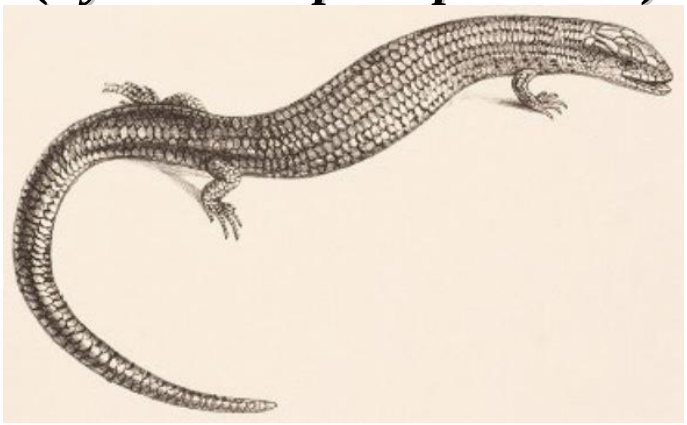
Husbandry Manual – Alpine She-oak Skink (*Cyclodomorphus praealtus*)



1. Introduction.

1.1 Description

This species was formally described in 1995 (Shea, 1995) when it was separated from *C. casuarinae*. *Cyclodomorphus* = *Cyclodus* (like or morph of *Cyclodus* {a genus of European lizard}), *praealtus* = *prae* (very) *altus* (altitude/high).So, we have a lizard that looks a little like *Cyclodus* and is found in high altitude regions. The Alpine She-oak Skink (Alpine Slender Blue-tongue) *C. praealtus* belongs to the reptile family Scincidae, the skinks. This genus is represented in Victoria by two species – *C. praealtus* (alpine regions) and *C. michaeli* (far eastern Victoria). The Alpine She-oak Skink is a robust, medium sized, short-limbed scincid, with a maximum known snout-vent length of about 126mm (Victorian populations, N. Clemann pers. comm., 2015). The tail is relatively short compared to coastal members of the genus (Green and Osborne, 1994). The dorsal ground colour varies from grey to reddish-brown, and from immaculate to strongly patterned. The dorsal scales may have thin, black lateral edges, giving the impression of a series of thin, black longitudinal lines. The lateral scales may be flecked with black and grey. The under surface is greyish-yellow, with brown flecks or longitudinal dark lines. The Alpine She-oak Skink is distinguishable from all other species of *Cyclodomorphus* in having fewer than 60 scales on the underside of the (original) tail. This species is predominantly diurnal, but may be active after dark on warm nights.

1.2 Distribution

This species occurs in alpine grassland and heathland habitats at 1500m+ above sea level within Victoria (four known locations) and various locations in ‘alpine’ regions of NSW.

1.3 Status

The Alpine She-oak Skink is listed as ‘Protected’ in NSW and ‘Endangered’ by both the Victorian State and Commonwealth Governments. The total area of occupancy is believed to be less than 100km^2 “Recovery Plan required.....”

2. Housing

2.1 Design

These lizards have been housed in two different sized aquarium type setups with overhead lighting and heating.
Groups and pairs have been housed in glass based terraria 1100mm wide X 550mm deep X 250mm high and two different height aluminium framed hoods or tops (400 and 550mm high) fitted with sheet metal side and rear walls and insect screening in the front opening aluminium framed doors and overhead panel. Overhead heating provided with no obstruction from roof/ceiling or screen (screening was shown to reduce UV levels from the heat lamps by up to 80%).
Individual animals have been housed in smaller glass aquaria 515mm deep X 270mm wide and 270mm high. Pre-fabricated plastic framed insect screen lids were fitted over the top.

2.2 Position

All husbandry and enclosures have, so far, been indoors. Enclosures described above.

2.3 Base

Glass.

2.4 Substrate

Water is added to compressed peat (as per instruction ratios provided by manufacturer/supplier), to this mix is added sand for a ratio of approx. 2:1 (peat:sand). Sphagnum moss retreat sites are provided in the form of clumps. Regularly sprayed (usually three times weekly) to create a moist retreat site.

2.5 Weather protection

Not applicable, all husbandry thus far indoors.

2.6 Water

Drinking water is available at all times, replaced fresh with clean bowls three times weekly. Water is added to the substrate three times weekly to create a moist (not wet) base.

2.7 Heating/cooling/lighting

Heating is provided by two different types of basking lamp. In the larger enclosures high wattage mercury vapour lamps (Osram Ultra Vitalux© 300W or Mega-Ray© 120W) are utilised with the aim being to provide a basking site of around 35°C. The smaller aquaria are provided with a low wattage 12 volt dichroic halogen lamp, again aiming for a basking site of 35°C (usually on rocks, tiles or carefully stacked pavers). The mercury vapour lamps emit high levels of UVB, in addition to this overhead fluorescent lights (Zoo Med T8 ReptiSun 10.0 UVB) are provided to give additional UVB. UVB emitting fluorescent lamps are provided for all enclosures. The 12 volt basking lamps are not known or expected to produce UVB.
This species has at the time of writing been cooled/overwintered three times at HS. Winter one (2012) was 2°C and resulted in success. During winter two (2013) the lizards were initially held at 5°C but after sometime, and a recorded and consistent weight loss across several individuals, the decision was made to drop them to 2°C resulting in weight stability. Winter three (2014) animals (*n*=9) were kept at 2°C and all weights were stable and indicated success with all animals appearing healthy at weighing intervals and upon spring ‘wake up’.

2.8 Video points

Cameras have been used successfully to remotely observe and record activity for this species. Battery operated remote Scoutguard© cameras were suspended inside of the roof of larger enclosures and successfully picked up skink activity.

2.9 Shelter sites

In the wild Alpine She-oak Skinks are not known to be burrowers. Shelter sites utilised include thick grass tussocks, rocks and other ground litter (including logs and even roofing tiles laid out by researchers through suitable habitat). In captivity Alpine She-oak Skinks have been observed using small ceramic tiles (150x150mm) laid at ground level. Concrete pavers carefully stacked to create different levels, crevices and angles have also been used. Skinks regularly

utilise moist clumps of Sphagnum Moss as retreats when provided. Some lizards have been noted to ‘burrow’/’shimmy’ down into the top layer of substrate if it has started to loosen up a little bit (usually under the moss).

2.10 Mixed species enclosures

No attempt, or discussion around, housing this species with any other taxa at the time of writing.

2.11 Things to avoid

At the time of writing (August 2014) this species is nearing completion of this property’s third winter holding this species. Winter number two presented problems when the lizards were kept at 5°C (lizards losing weight – indicating their metabolism had not dropped enough). Winter numbers one and three animals were/are kept at 2°C and weight loss was minimal (average 7.3 gms, 2014).

3. Transport

3.1 Design

Like all (most?) small skinks this species may be transported in small cloth bags contained within a larger, well ventilated sturdy box of either plastic or wooden construction. If animals are kept between (approx.) 15 and 25°C and subjected to a transport duration of <24 hours then cloth bags will suffice. If the transport conditions and duration are at the higher end of these parameters then a small clump of Sphagnum Moss or similar added to the bag will prevent/reduce the animals suffering from any significant level of dehydration. Longer transport conditions should provide for the animal(s) to move around and access drinking water. When collecting in the field ZV staff have utilised opaque sided plastic containers with clear ventilated lids (ClickClack® 5.7ltr), a substrate of damp peat, clumped Sphagnum Moss and shallow water dish. The water dish is removed while the animals are in transit.

3.2 Nest material

See above.

3.3 How many in box

One animal per bag if being transported in bags. Multiple bags may be placed in a plastic or foam ‘Esky’ or similar plastic or wooden container, keeping bags separated by either shredded paper or similar. The number of bags/animals per box will depend on the size of the box or crate. These animals are light

and so will not squash down or compress shredded paper, as long as the shredded paper is ‘fluffed’ and holding its shape then multiple animals can be contained and transported within. If animals are being transported in boxes with substrate as described above then it is best to do so singly rather than house two animals with no known previous contact or interaction (and likely no keeper observation) for transport.

3.4 Identification

VIE (Visible Implant Elastomer) tags have been used for this species at HS with varying degrees of success (readability has decreased over time). These can be read with the use of small hand held ultra violet torches. Some of the skinks have dark pigmentation at the site of the tags (under hind limb) which can make the reading difficult sometimes. At least one individual has swelling at the site of implant and has been noted to drag this one affected leg (though inconsistently). Trovan© Nanotransponders are *probably* too big for this species (Dr. F. Scheelings pers. comm.).
Physical size differences between individuals has also been used to distinguish when housed as pairs. Photographic ID cards to be developed and tested in the future.

3.5 When to transport

Avoid temperature extremes, if being transported by car utilise the cabin and manufacturer provided climate control A/C unit. If being transported interstate via air avoid the hotter central parts of the day.

3.6 How long in box

Interstate transport usually requires up to 24 hours transport time. If packed and crated as described above (3.3) this shouldn’t present any problems. Animals collected in the field and brought back to HS by ZV staff have spent up to four days kept in the plastic enclosures as described above (3.1).

3.7 Water and food

Water should be provided at any time an animal is kept in a ‘stable’ (non moving) environment where it can move freely about. Food and water are not necessary during transport (if the transport duration falls within times mentioned above).

3.8 Release from box

Upon receipt of the animal(s) or arrival at site of quarantine following field collection the animal(s) can be gently removed from boxes or bags by hand. At this time they should be visually inspected by keepers or vets to assess arrival condition. Experienced skink/small lizard handlers should be utilised for this task.

4. Handling

4.1 Handling bags

Researchers have utilised small plastic ‘zip lock’ bags for short term holding of this species in the field and lab. This practice is not utilised at HS. Small cloth (calico) bags are used for short duration transport on site, or small plastic tubs.

4.2 Nets

Not applicable.

4.3 When to handle

Some evidence suggests that hotter animals are more like to autotomise their tails than cooler animals. Cooler animals are easier to handle from a writhing point of view as well as a hand capture point of view. Caudal autotomy occurred on one occasion during hand capture in the field. Confident and firm handling around the body of these lizards minimises tail loss.

4.4 Capture from nest

This species shelters under provided materials. Items are easy to lift up and expose skink, thus effecting ease of capture.

4.5 Net capture

Not applicable.

4.6 Weighing

Hanging spring scales have been used in the field to weigh this species while being held in plastic bags. Keepers at HS utilise small plastic tubs and digital scales. Weights are taken monthly throughout the year.

4.7 Restraint

As written in 4.3 a firm (not tight) grip around the whole body of the lizards with one hand is advised to minimise struggling and writhing. If the tail is being whipped around or ‘circling’ it is advised to gently hold it still against your hand/wrist to prevent autotomy.

4.8 Measurements

Digital scales are utilised for taking weights. Small desk rulers and/or calipers are used to take other morphometric data. Snout-vent length should be recorded regularly.

4.9 Releasing

Zoos Victoria has only been involved in releasing animals that were held short term (max. three days) in the field after being held in cloth bags and/or plastic tubs. The animals were simply returned to their respective sites of capture where they were gently released by hand at the base of the rock(s) they were collected from and encouraged or guided back underneath. Trial releases to assess survival and establishment may be done in the future.

5. Field trapping

5.1Trap types

No traps known to have been used or trialled. One researcher has laid out a large number of ceramic and concrete tiles in suitable habitat across various long term study sites in the Australian Alps. Results from these transects show that the skinks use them and this use resulted in this species being detected at sites where it was previously unrecorded or recorded in very low numbers.

5.2 When to trap

Activity times for this species are October to March (depending on the season for that particular year – i.e. snow cover still present some years in October).

5.3 Bait

The shelter provided (tile) serves as the ‘bait’. No other bait provided.

5.4 Trap cover

The tile is the trap. The tile is the cover.

5.5 General check

A comfortable and balanced position is taken next to the tile or rock which is then quickly lifted. A quick visual inspection then follows to determine what is sheltering underneath. Care must be taken to avoid putting one’s hand on non-target species, three species of venomous snake sympatrically occur alongside *C. praealtus*, as well as stinging ants *(Myrmecia* spp.), centipedes (Scolopendridae) and spiders (several species of Mygalomorph spider have also been found utilising these tile shelters)

5.6 Removal from trap

Taking into account the hazards mentioned in 5.5 a quick dart of the hand to restrain the *C. praealtus* is required before they disappear into the surrounding grass.

5.7 Restraint

See 4.3 and 4.7.

5.8 Measurements

See 4.8.

5.9 Release

See 4.9

6. Husbandry

6.1 Cleaning routine

Enclosure are spot cleaned three times per week. This consists of manual removal of faeces, uneaten food and any sloughed skin.

6.2 Changing of materials

Sphagnum Moss is replaced or added to as necessary.

6.3 Enclosure maintenance

UVB emitting fluorescent light tubes are replaced every six months. After six months, while still visibly giving off light, the UVB levels have dropped to near pointless.

6.4 Routine animal checks

Animals are checked via direct observation, activity is recorded daily (whether or not animals are seen/unseen, basking, active). If however, animals are not noted as active (when others are and it is expected they should be) they are checked in their shelter area after 10 days.

7. Diet

7.1 Current diet

Alpine She-oak Skinks are fed predominantly snails (believed to be the introduced Garden Snail (*Cornu aspersum/Helix aspersa/Cantareus*

asperses) and crickets. Snails are shelled and cut into appropriate sized pieces (see 7.3) for the size of the lizard(s) being offered. Crickets (*Gryllus* sp. or *Acheta* sp.?) are regularly offered and consumed as well. Crickets are always dusted with a 1:1 mix of Rep-Cal© CALCIUM with VIT.D3 and HERPTIVITE. Small berry laden branchlets from *Coprosma* sp. are offered irregularly. The berries are provided as a substitute for the berries eaten at Falls Creek (*Podocarpus lawrencei*{?}).

7.2 Previous diets

No changes to diet during the time this species has been kept at Zoos Victoria.

7.3 Quantity

Adult skinks are offered three pieces of snail a little bit smaller in size than the skink's head. Adult crickets are usually offered in numbers of 4- 6. *Coprosma* berries are offered on the branch and their specific numbers are generally not taken into consideration but often there is 20+ berries on the branch.

7.4 Dietary changes

No changes to diet other than the seasonal availability of *Coprosma* berries. Different *Coprosma* individuals fruit at different times throughout the sanctuary.

7.5 Live food

Crickets are always offered live.

7.6 When to feed

Being predominantly diurnal it is most suitable to feed these lizards during daylight hours, late morning is usual at HS.

7.7 Where to feed

Chopped snails are offered in low, wide dishes. Crickets are live and free ranging throughout the enclosure. *Coprosma* berries are still attached to the branches and either laying down or the stalk of the branch is poked into the ground and the branch standing up (care must be taken to know where the lizard/s is/are as this species sometimes burrows into the substrate).

8. Breeding

8.1Enclosure size

See '2 Housing'.

8.2 Nesting sites

Not applicable, this species is not known to create nests or dig burrows but rather to utilise ground cover – rocks and dense grass tussocks. It is presumed this species will/would give birth under cover.

8.3 Cover

These lizards are provided with a variety of forms of cover including stacked pavers, clumped and dampened sphagnum moss, small flat granite caps and ceramic tiles (the tiles measure 100X100mm, the granite caps are similar in square millimetre but not square in shape).

8.4 Introduction of animals

After completion and approval of the 'Animal Movement and Introduction Checklist' the skinks are simply introduced to each other by manual capture and movement. In the 2014/15 summer period the females were housed as two singles and one double before the introduction of the males, giving us two pairs and one trio (1M:2F). All animals were initially housed individually following the winter period to ensure regular feeding activity and weight gain.

8.5 Animal checks

Daily during the animals' activity periods (i.e. when the animals have overhead lighting and heating). If however, animals are not noted as active (when others are and it is expected they should be) they are checked in their shelter area after 10 days. Throughout the winter cooling period animals are checked and weighed fortnightly through the 12 and 8°C cool down period (and 12 and 8°C warm up period), and monthly while at 2°C.

8.6 Aggression

Aggression is difficult to categorise and accurately identify as this species (and other *Cyclodomorphus*) are known to vigorously chase as well as bite one another during and leading up to courtship. Other observations noted include one female chasing both other conspecifics (the resident male and another female). The females housed as pairs with males were noted to be chasing and biting their mates in early January. This change in behaviour was interpreted as the females being possibly gravid.

8.7 How long paired

Through the 2014/15 summer period the animals were introduced in December and separated in January following changes in behaviour noted. (see 8.6 Aggression).

8.8 Age estimate

Unknown – best guesses and estimates are used in the field based on the work of one researcher with this species over 15 years.

8.9 Weaning weight and age

Not applicable

8.10 Timeline

9. Record keeping

9.1 Identification

Visible Implant Elastomer (VIE) tags have been trialled with this species but may not be a usable/workable method for long term identification. The darker skin of some individuals (most adults) can make the reading of the tag difficult.

9.2 Daily records

Records are taken daily during the animals' activity periods (usually October to April) with respect to their visibility. Observations include looking for signs of aggression (wounds) or raised scales (indicating mites).

9.3 (ZIMS) ARKS report

Reports are made daily.

9.4 Studbook

No studbook developed for this species

10. Health and Vet care

10.1 Quarantine

Wild caught animals undergo a standard '4 weeks *and* 2 clear faecals' quarantine period. If anything is noted during the faecal examinations it is treated as directed by veterinarians/AWHC staff, with the necessary associated extension of quarantine time.

10.2 Examination and health problems

Most examinations are done 'in hand', with a firm grip of the lizard, exposing necessary/affected part(s) of lizard for close visual inspection. Care is taken to avoid too much 'free swaying' of the tail as it may break (caudal autotomy). Health problems to date include mite outbreaks (*Ophionyssus natricis*? – I.D.

not confirmed), and *Salmonella* (five individuals recorded as shedding the bacteria at time of sampling). One skink was shown post mortem to have liver disease with a possible viral origin, as well as a lung infection (no conclusive results for causation).

10.3 Handraising

Not applicable

11. Appendices

11.1 Transport box designs

Transport for this species has so far only been done utilising plastic Click-clack© brand containers. Opaque sides and transparent lids, external clips hold the lid in place and ventilation holes are drilled into the lid. These were intended as both short-term (in the field) holding quarters and then transport containers. They were set up as miniature versions of their usual housing. Peatmoss and sand substrate, clumped Sphagnum Moss and shallow water dish.

11.2 Suppliers list

Not applicable

11.3 Check list

N/A

11.4 Growth curve

Not known but will be established once the species breeds in captivity.

11.5 Participating institutions

No other zoological institutions are currently holding this animal but all work and research done in consultation with staff at Arthur Rylah Institute.

11.6 Recommended reading.

References:

1. http://www.environment.gov.au/biodiversity/threatened/species/pubs/64721-conservation-advice.pdf

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3. Arthur Rylah Institute, 123 Brown Street, Heidelberg, 3084

4. Green K and Osborne W (1994). Wildlife of the Australian Snow Country. Reed Books, New South Wales.

5. http://www.dse.vic.gov.au/__data/assets/pdf_file/0020/103187/113_Alpine_She-oak_Skink_2001.pdf