

A guide to keeping New Zealand lizards in captivity

Authority required

To safeguard them from harm, all of New Zealand's native lizard species (geckos and skinks) are absolutely protected under the Wildlife Act 1953. Written authority from the Department of Conservation is required to keep them in captivity.

'Absolute protection' means that no native lizard species may be collected from the wild, held in possession, or handled or disturbed in any way, without written authority. Unless you have a permit to obtain animals from elsewhere, your only legitimate source of lizards for captivity is another authorised holder. The Department of Conservation, the Society for Reptile and Amphibian Research in New Zealand (SRARNZ), or the New Zealand Herpetological Society (NZHS) can advise you who to contact for captive lizards.

Generally, only the less threatened protected species may be kept in captivity. Rare species may be kept only if the captive-rearing is undertaken by very experienced holders and contributes to an approved conservation programme.

Several categories of holding authority have been established, each requiring progressively higher levels of competence and record-keeping. New holders are asked to demonstrate competence with common species before being permitted to hold rarer species.

Records

It is not a requirement to keep records for lizards in the lower categories, but the development of good husbandry and breeding practices is assisted by careful record-keeping for all animals held. Identify each through diagrams, written description or photographs.

Suggested information

- Source and date of transfer to captivity (include the previous holder's permit number)
- Species' name and geographic origin if known
- Gender
- Distinguishing characteristics
- Length (SVL: Snout to Vent Length and vent to tail, date, and growth rates)
- Date of birth of offspring and parents' identities
- Date of death (and cause if known)
- Date of transfer to another holder (including recipient's permit number)
- Behavioural notes
- Treatment notes
- Other observations

Cages

A purpose-built enclosure is required to keep reptiles in captivity safely. Plastic or glass aquariums are not recommended.

Essential features

- Cover a minimum of 2–3 sides in insect screen mesh, and the balance in other durable materials (plywood, glass, perspex, fibreglass).
- Provide adequate (mesh covered) drainage and weather-proofing.
- Give lizards access to direct sunlight through *mesh*. This provides them with the UV light they require for metabolising calcium and long-term health. Note that glass filters out this beneficial UV light.
- Construct glass or perspex viewing areas so that they form the side of the cage which receives the least direct sunlight.
- Provide adequate ventilation.
- Make cages escape-proof with a close fitting lid or door.
- Provide a lip of 10cm at the entrance to stop ground-dwelling skinks from rushing out.
- Protect the cage from predators such as cats, rats, dogs, stoats, ferrets, owls, starlings and magpies. For safety, use a second layer of stronger mesh (chicken wire or square-section welded mesh) 50mm out from the insect mesh.

Where practicable, design and vegetate your enclosure to replicate the environment normally favoured by the species in the wild.

Although lizards display an enormous degree of variation in habitat, habit and form, the most important aspects of housing for all species are **temperature and humidity**.

Outdoor cages

Lizards prefer outdoor cages where they can bask in natural sunlight, but too much sunlight can be dangerous. The cage should be sited where it provides as varied a micro-climate as possible. Two-thirds of the caged area must be shaded *at all times*. Use wood or other objects on the top of the cage to create shade.

A minimum of 60cm x 60cm x 90cm high is the recommended cage size for geckos. Skinks require a minimum of 60cm x 90cm x 60cm high. Be careful, however, to adjust your cage size to the behavioural needs of individual species. For example, giant gecko *Hoplodactylus duvaucelii* males will kill each other if confined together in the minimum cage size for geckos.

These cage size recommendations will house up to three males and six females *provided* there is ample shade and varied habitat. *Do not* overcrowd the animals, and *do not* increase the floor area of the cage significantly—this may encourage territorial behaviour among males or promote a pecking order among females. Ideally, a pair or 1–2 animals should be kept in one enclosure.

When introducing new animals, rearrange the enclosure to reduce territorial behaviour. Observe the animals carefully following introduction.

A single rock or piece of pumice should be placed in direct sunlight to allow basking and hiding, both of which are essential behaviours for skinks. Plants, tall enough to reach almost to the top of the cage, are essential for arboreal species (geckos). Most species prefer to hide in hollow wood, bark and leaf litter on the floor. Pot plants, pieces of bark, or small branches can offer shade but strips of shade cloth are most effective as a means of shading different areas throughout the day.

Plants

Provide native plants appropriate to the your lizard species to offer another food source (e.g. flowering ti-tree, coprosma berries, flax flowers). Dense or drooping plants provide additional hiding sites, particularly for young lizards.

Gently spray the enclosure plants with tepid water every day during summer. This moisture should be no more than the amount which will evaporate in 2 to 3 hours. Avoid spraying at midday. Adding **Ornithon** to this spray will provide vitamins in the drinking water.

Drainage for plants is essential to ensure that humidity does not exceed safe levels. Holes in the base of your enclosure will allow rain water to pass through, but these must be secured with mesh, even if rocks and soil cover them.

Monitor water levels, temperature and humidity carefully. Aquariums and glass tanks do not offer adequate means of controlling saturation or humidity.

Indoor Cages

Indoor cages are not recommended unless absolutely unavoidable. They should be regarded as temporary arrangements only. Recommended size is 60cm x 60cm x 30cm high.

If you must use an aquarium, avoid exposure to direct sunlight which will overheat the living space rapidly. Monitor humidity levels to ensure that fungal problems do not develop. Fit a wire gauze rather than a glass top, so that your animals receive unfiltered UV-rich light.

A cage made of wood, with a wire mesh back and glass front is more satisfactory. It must be secure, well ventilated and adequately drained. In all other respects, follow the guidelines for outdoor cages.

Indoor cages should be moved outside so that lizards have frequent access to direct sunlight. Alternatively, if long periods of indoor conditions are unavoidable, suspend appropriate full-spectrum lights over the enclosure. There are excellent lights and fittings available. Bulbs have a limited life span and must be changed regularly, so check with manufacturers' recommendations. **Truelight, Lifeglow, Powerglow** and **Sylvania** are recommended brands. Artificial lighting regimes should mimic the hours of natural light.

Water

Supply fresh drinking water at all times using suitable dishes, a drip-feed apparatus, and/or by regularly misting the foliage. Water containers should be wide and shallow, and certainly no deeper than the lateral height of your reptiles. Ensure when misting that you do not saturate the lizards' living space. Outside enclosures should be exposed to natural rainfall.

Small coarse stones placed in water changed daily will provide a surface on which skin sloughing (skin shedding) may be encouraged. Damp areas with bark will also assist lizards to slough skin.

Regular misting of the enclosure during hot months may be necessary.

Feeding

Lizards require a basic diet of live insects and other small forms of life. The amount of food consumed will vary with temperature and climatic conditions. Take care not to feed insects that are or could be contaminated by insecticides.

Offer nectar mixes and fruit purees at the appropriate time of the year; that is, when ti-tree is flowering, or coprosma berries are available. Manuka honey may also be dripped onto the foliage or placed in washable containers. Prepared food should be placed in the shade.

Remove uneaten supplementary foods daily before they spoil and present a disease and hygiene risk.

Monitor consumption daily to determine levels of consumption. Lizards can become overweight and obese. This is usually evident—look for excess fat stored in tails and hind legs. (Be careful though: regenerated tails may give the appearance of excess fat.)

In colder months, and until temperatures increase, remove supplementary food altogether (apart from live insects) if food remains uneaten. Bear in mind, however, that New Zealand reptiles still eat at 5°C.

Be wary of encouraging feeding during days with unseasonably warm temperatures: when the temperature drops, undigested food may remain in the gut and rot. This is something to be particularly aware of if you are shifting animals from an inside environment to the outside, or if using a lighting system.

Live Insects

Do not feed stinging insects, ants, magpie moths, monarch butterflies or caterpillars, centipedes, orange blowflies or horseflies. The best rule of thumb is: **if in doubt—don't**.

- Fruit flies—widely fed to very young lizards—may be collected by placing decaying fruit in a jar near a compost heap.
- Use a natural fruit mixture if you wish to culture fruit flies. Place 5 cm of crumbed stale bread in a large preserving jar. Add 5 cm of pulped or sliced fruit, including skin. Mix $\frac{1}{4}$ teaspoon dried yeast in 1 tablespoon luke-warm water and pour over the fruit in the jar. Add a few fruit flies and cover jar with muslin. Place jar in warm spot until flies hatch. Feed flies to your lizards as required.
- Moths—a preferred food item for some nocturnal species—may be collected using a moth trap. A simple trap can be constructed from a suspended sheet lit from behind with a UV lamp. Moths attracted to the light settle on the sheet.
- Flies—a useful food item for many adult lizards. These are easily obtained using fly traps constructed in a variety of ways.
- Other insects—catch by hand, using a butterfly net swept amongst long grass and other foliage, or place aphid-infested leaves in cage to be picked clean by lizards. Catch crickets in pitfall traps baited with cat biscuits.
- Fresh leaf litter is a fertile source of invertebrates. Replace litter in enclosures regularly, and stir it up to assist foraging.
- Live invertebrate food can be purchased from commercial suppliers to supplement natural sources. **BioSuppliers Live Insects** in Auckland (09 418 2352) are a good source of invertebrates.
- Other lizard holders, or SRARNZ and Herpetological Society members have good knowledge of what to feed lizards.

Supplementary Foods

Since only live foods can satisfy full nutritional needs, provide supplementary foods no more frequently than twice monthly, unless you are offering them as part of seasonal requirements (see above) or a treatment.

- Sweetened liquids such as honey and water are suitable for lizards. Fortify them with vitamins if desired (e.g. **Akat-Vol** vitamin drops). Mashed banana with honey and calcium powder, yoghurt, baby food with banana or pineapple, ant eggs, and fruit with a lot of juice are also beneficial.
- New Zealand lizards rarely take calcium in free form so present it on a monthly basis in **Bone-Gro** or **Rep-Cal**, a veterinary calcium supplement, dusted over live food. Or mix it in with puréed food or honey water. Be careful not to offer excessive amounts.
- Dilute **Ornithon** vitamin and mineral drinking water supplement for aviary birds in the lizards' water, at the rate of 2 spoons for every 4 litres (a measuring spoon is included).
- Offer fruit such as banana, watermelon, stewed apple and virtually any kind of fresh fruit.

Breeding

Different species should be held separately. It is *not* permissible under any circumstances to cross-breed different species or subspecies. If you are not sure of the species you have, do *not* hold them together, or allow them to breed.

Determining gender

Male geckos have a swelling at the base of the tail. A triangle of pores may also be visible in front of the vent. Females do not have these features. For sexing accurately, refer to the attached excerpts from an article by Tony Whitaker.

Breeding of some lizards, particularly the rarer species, is not permitted unless it contributes to an approved conservation programme for those species. Check with your local DOC office before allowing or encouraging your animals to breed.

Before you contemplate breeding, you should be aware that disposal of young may be very difficult—progeny may only be disposed of to other lizard holders, unless you have specific authorisation to dispose of animals elsewhere. Unless the circumstances are exceptional, **disposal of captive-reared lizards in the wild is absolutely forbidden**, for sound ecological reasons.

A pregnant (gravid) female can be detected by weight gain and swelling of the abdomen.

Keep careful breeding records and give copies to holders who may receive off-spring. Remember that you are responsible for not passing on closely related individuals.

Care of young lizards

Most New Zealand skinks and geckos are unusual in that they bear live young. It is advisable to separate these young animals from adults as soon as possible following birth, though gecko young don't always have to be removed.

To minimise threats to young animals, place them in a new enclosure with other skink young. For most New Zealand species, the young can be kept safely with adults when about two years old.

Since the off-spring of many species begin to feed very soon after birth, provide food of suitable size and accessibility within the first twenty-four hours. Young geckos should be held in a smaller cage to ensure they get the food they require. Spray foliage daily with a vitamin mineral supplement diluted in water. Provide leaf litter rich with small insects.

If holding capacity is already tight, lizard owners should have made prior arrangements with other owners to hold young, or should have deferred breeding.

Ailments and problems

Ensure that the cage is not over-crowded, unhygienic or excessively damp. These factors are the most common causes of illness. If, after reading this guide, you are unsure of your husbandry regime, ask for assistance from either a veterinarian or from SRARNZ or NZHS experts.

Sick or injured animals should be separated from healthy ones for treatment. Sick lizards should be placed in a small (30cm x 30cm) enclosure, with ready access to food and water. The enclosure should have at least one side formed from wire mesh. Advice on treatments should be sought through either a veterinarian or SRARNZ and NZHS experts.

- Wounds—clean with warm dilute salt water, tepid camomile water or **Panalog** ointment if available.
- Fungal infection—dark, sooty looking patches can be cured with **Betadine** antiseptic liquid; by ensuring that the animal has access to direct light; and by reducing moisture and humidity levels in the enclosure. If infections persist, seek veterinary advice.
- Red mite—attached to skin particularly in ear openings, around eye folds and limbs. Paint ear holes and armpits with a non-toxic oil (e.g., cooking oil). Ensure that there is *no* oil ingested.
- Sloughing (skin shedding) problems—if skin is retained on toes or feet after several sloughings, the residue may constrict blood supply. In severe cases, toes may drop off. Soften the skin with tepid water or camomile, then gently remove loose skin.

Alternatively, mist daily to soften the skin. Or confine the lizard in a shallow dish where toes are immersed. Soak then gently remove the softened skin using tweezers. Do not force the skin in any way as this can easily remove toes! Be aware of the stress which may be suffered with sudden temperature changes during treatment.

- Euthanasia—placing a severely injured or diseased lizard in the freezer is the most humane method of destroying it. As the reptile's body temperature falls, its metabolism slows until it reaches a state resembling hibernation. Further reduction in temperature results in death.

Death and disposal

Only museums are authorised to hold specimens or parts of protected wildlife.

It is a condition of your permit to keep live lizards that, if any of the animals in your collection die, you must contact the Department of Conservation or forward the specimen to your nearest major metropolitan museum.

The following notes indicate how dead lizards may be handled.

Preservation

All native New Zealand lizard specimens are of scientific value. This is especially so if good collection data is available for each specimen, or it is a rare species, regardless of condition or state of decomposition. Even very badly decomposed specimens can be turned into study skeletons.

If you find a dead lizard in your cage, or in the wild, you should take steps to preserve it immediately. Freeze the specimen in a well-sealed plastic bag for the quickest and most economical method of preservation. This will safeguard preservation options at museums. However, prolonged freezing can lead to deterioration of specimens so contact a museum as soon as you can. Never send frozen specimens without first alerting the museum.

If a freezer is not available, place the specimen in some kind of liquid preservative.

Fixing in formalin

In museums, specimens are 'fixed' in formalin and stored in alcohol. To do this yourself, arrange the specimen in a convenient position for research (generally straight with legs spread for lizards) in a shallow tray and soak it in 10% formalin for 24–36 hours. Commercial formalin is 40% strength so diluted it 1 part formalin to 3 parts water. To accelerate preservation, inject formalin into the body cavity and, for larger specimens, the limbs. If you do not have a syringe then cut slits in the body cavity with a razor blade or sharp scissors. Be careful when opening the body cavity to cut on one side, *not* on the midline. Avoid damaging internal organs. Remove the specimen from the formalin fixative, rinse it and then store it in ethanol (ethyl alcohol) or isopropanol (isopropyl alcohol). The strength of the alcohol for storage varies for different animals—geckos need 70%; tuatara and skinks need 75%.

Storage in alcohol

If you lack these materials or facilities, then preserve specimens directly in ethanol or isopropanol, or store them for short periods in 10% formalin. They may also be preserved in methylated spirits (diluted to 70% with water).

If the specimen is dry and 'mummified' (or nearly so), store it in a dry, well ventilated container.

Labelling

It is *very important* to keep all associated data with your specimen, on a strong label tied securely to the animal with thread (unless of course, there is only one specimen, in which case the label could be loose *inside* the container). Use a water-proof black ink (Indian ink) or soft pencil and write clearly. *Do not* use ball-point pens because the ink will run or bleach in the preservative.

Record as much information as you can for each specimen on species, collector, collection site (map reference, or distance and direction to nearest locality), collection date, habitat, date and cause of death, age, and any other relevant data. If the specimen was bred in captivity, identify date of birth, and date and cause of death, and the specimen's parents, along with the date on which you acquired them.

Notification and disposal

Once the specimen has been preserved, contact a major museum to arrange its disposal (see below for addresses). The national repository for reptile specimens is the Natural History Unit of Te Papa Museum of New Zealand in Wellington. In most instances, it would be appropriate to contact them first for advice on the scientific value of your specimen and the best options for disposal.

The Auckland Museum maintains a large herpetological collection, but there are also smaller collections at the other metropolitan museums. Phone, fax or write to the museum to find out if your specimen should be sent in and how best to pack and ship it.

Addresses

- Natural History Unit
Te Papa Museum of New Zealand
P O Box 467
Wellington
Phone 04 318 7302
Fax 04 318 7310
E-mail raymond@tepapa.govt.nz
- Curator of Land Vertebrates
Auckland Institute and Museum
Private Bag
Auckland 1
Phone 09 309 0443
Fax 09 379 9956
E-mail bgill@akmuseum.org.nz
- Curator of Vertebrates
Canterbury Museum
Rolleston Avenue
Christchurch
Phone 03 366 5000
Fax 03 366 5622
E-mail intail@cantmus.govt.nz
- Curator of Vertebrates
Otago Museum
419 Great King Street
Dunedin
Phone 03 477 2372
Fax 03 477 5993
E-mail mail@otagomuseum.govt.nz
- **Society for Reptile and Amphibian Research in New Zealand (SRARNZ)**
C/o Department of Zoology
University of Otago
P O Box 56
Dunedin
Phone 03 479 7990
Fax 03 479 7584
E-mail phillip.bishop@stonebow.otago.ac.nz
- Bruce Hudson
New Zealand Herpetological Society
P O Box 1
Wellsford
Phone 09 423 7070
Fax 09 423 8492
- BioSuppliers
201 Eskdale Road
Birkenhead
Auckland 1310
Phone 09 418 2352
Fax 09 418 2352
E-mail bugs@biosupp.ak.planet.gen.nz

References

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Department of Conservation
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