



**REPTILES AND
AMPHIBIANS OF
NEW ZEALAND**
A FIELD GUIDE

**Dylan van Winkel,
Marleen Baling and
Rod Hitchmough**

The definitive photographic guide to New Zealand's tuatara, geckos, skinks, frogs, marine turtles and marine snakes.

From the ancient tuatara, the sole surviving member of its order, to the world's largest collection of long-lived and live-bearing lizards, our geckos and skinks, New Zealand's 123 species of reptiles and amphibians represent an extraordinary aspect of this country's biodiversity.

Reptiles and Amphibians of New Zealand is the only field guide to cover all currently recognised species. Key features include:

- Expert and up-to-date information on all 123 species of reptiles and amphibians in New Zealand.
- More than 400 new photographs.
- Range maps for every species.
- Introduction to evolution, conservation, observing and collecting, ecosystems and geographic history.
- Authoritative text on every species, including names, description, distribution, variation and similar species, habitat and natural history.
- Identification keys for each of the major groups.
- Regional checklist and a handy quick guide on the inside flaps.

New Zealand's list of reptiles and amphibians is growing with new discoveries, even as 80 per cent of species are at risk of extinction. This will be the only field guide to cover all currently recognised reptiles and amphibians and will become a go-to book for anyone interested in New Zealand's unique wildlife.

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Black-eyed gecko, *Mokopirirakau kahutare*

Introduction

New Zealand is often recognised as a land of birds, particularly as a centre of diversity for seabirds, but it is New Zealand's herpetofauna – our reptiles and amphibians – that is the most diverse of all native terrestrial vertebrate groups. Moreover, for its relatively small land area, this country supports one of the most diverse lizard faunas of any temperate region in the world. The New Zealand herpetofauna is highly distinctive, and includes the sole surviving member of the ancient taxonomic order Rhynchocephalia (tuatara), a genus of archaic frogs (*Leiopelma*) and the world's largest assemblage of long-lived and live-bearing lizards (geckos and skinks).

The New Zealand herpetofauna currently comprises 123 species or taxa (here, 'taxa' is used because a large proportion of the fauna remains undescribed) from six main groups: tuatara, geckos, skinks, frogs, marine turtles and marine snakes. Most of these (89%) are endemic to New Zealand (meaning they are found only here), while others are vagrant or migrant (marine species; 8%), or are exotic (meaning they were introduced and have naturalised here; 3%). All the endemic species sit in four taxonomic families, two of which are found only in New Zealand – Sphenodontidae (tuatara) and Leiopelmatidae (frogs). All the New Zealand geckos fall within seven genera in the family Diplodactylidae (geckos), and the skinks belong to an almost-endemic genus in the family Scincidae (Eugongylineae skinks). The only species in the New Zealand skink genus *Oligosoma* that occurs outside of the

country is *O. lichenigera*, on Australia's Lord Howe and Norfolk Island groups.

The herpetofauna includes some taxa that were probably present before the New Zealand landmass began drifting away from the ancient supercontinent Gondwana, about 80 million years ago (mya; tuatara and Leiopelmatid frogs). Other taxa (geckos and skinks) are probably more recent colonisers, arriving here after New Zealand's separation from all other continental landmasses, but still tens of millions of years ago. In more recent times, one exotic lizard (a skink) and three exotic frogs from Australia have successfully naturalised in New Zealand. All marine species are vagrant or migrant, and typically occur in the wider Pacific Basin.

All New Zealand's native terrestrial reptiles and amphibians produce few young per year, live relatively long, take a relatively long time to reach sexual maturity and are naïve when it comes to introduced mammalian predators (e.g. rodents, mustelids, hedgehogs, possums and cats). These unique characters, as well as the survival of ancient-lineage species, have come about because of New Zealand's complex geological history, unstable climate and the natural absence of mammalian predators for millions of years. Therefore, recent human influences – in particular, introduced mammalian predators and habitat changes (e.g. brought about by agriculture, logging and urban development) – have led to most of New Zealand's terrestrial herpetofauna

NEW ZEALAND GECKOS

New Zealand geckos have some unique and remarkable characters compared to other members of the large and diverse infraorder Gekkota (geckos), most of which have evolved in response to living in a cool, temperate climate, and in varied and diverse landscapes. Some taxa such as the harlequin gecko (*Tukutuku rakiurae*) of Stewart Island/Rakiura can be active in temperatures not much above freezing, at c. 4 °C. This gecko is found at latitudes as far south as 47°S, making it the second-most southerly occurring species in the world after Darwin's marked gecko (*Homonata darwini*, which has been recorded at 52°S in Patagonia).

Most New Zealand geckos are nocturnal, although the vast majority (probably all) will sun-bask, exposing all or only part of their bodies, for at least part of the day to warm up. Interestingly, all taxa in

the genus *Naultinus* are strictly diurnal, and most are brightly coloured - traits that are uncommon among other geckos worldwide. Globally, only about 25% of all geckos are diurnally active, and only one other genus, *Phelsuma*, has bright green species.

Another feature of all New Zealand geckos is that they are viviparous, a characteristic found in only two other geckos in the world (the tough-snouted giant gecko (*Rhacodactylus trachycephalus*) and the rough-snouted giant gecko (*R. trachyrhynchus*) of New Caledonia). So, instead of laying eggs, female New Zealand geckos retain the embryos inside their bodies and give birth to live young. Along with all but one of the native skinks, New Zealand lizards represent the largest assemblage of live-bearing lizards worldwide. During the long gestation phase

(3 to at least 14 months), females can actively regulate their body temperature (e.g. by sun-basking or moving into shade), and so provide a more stable environment for the embryos developing in the oviduct. They can also move the embryos from risk of predators.

Other distinctive characteristics of our geckos include: being the only geckos worldwide born without specialised egg teeth; having very low rates of annual reproduction (i.e. two young - in extreme exceptions, three - are born per year, and in

some large or southerly species, young are born only every 2 or 3 years); and having unusually long lifespans (up to at least 53 years in the wild).

Most New Zealand geckos are omnivorous, and feed primarily on insects and other small invertebrates. Soft fruits, berries, honeydew and nectar from flowers are eaten seasonally. This frequent consumption of fruit and nectar means that geckos are important seed dispersers and pollinators (ecological roles that are more commonly associated with birds). Geckos

TOP LEFT Raukawa gecko eating cicada. TOP RIGHT Duvaucel's gecko licking honey dew. BOTTOM Forest gecko licking nectar.



Northern striped gecko, *Toropuku* "Coromandel"



Harlequin gecko

Tukutuku rakiuræ (Thomas, 1981)

Endemic



DESCRIPTION

Up to 71 mm SVL; up to 13 g weight

A beautiful and distinctive little gecko from Stewart Island/Rakiura. **Dorsal surface** basal colour brown, green, olive, white, yellow, orange or red; complex and distinctive herringbone markings, bounded by dorsolateral stripes, embellish dorsal surface. Markings usually outlined by a network of fine white, pale green or grey lines. A broad V-shaped marking on top of head between eyes; snout with a longitudinal or oblong-shaped marking medially. **Lateral surfaces** either with an extension of dorsum's herringbone pattern, or mottled with blotches of colour outlined in white or grey. **Ventral surface** grey or pale brown, either uniform or with green or brown speckling. **Eye** colour mustard- to bright yellow. **Mouth lining** pink (but roof of mouth dark grey or blue); **tongue** indigo or dark purple-blue. **Intact tail** equal to or shorter than body length (SVL). Tail annuli distinct on intact tail. **Toes** narrow, without greatly expanded pads. Paired enlarged apical plates at distal end of all digits.

Subdigital lamellae 10–12. **Soles of feet** cream or orange-brown.

DISTRIBUTION

Stewart Island/Rakiura only. Occurs in the southern half of Stewart Island from the Tin Range southwards, and west to Doughboy Bay.

VARIATION AND SIMILAR SPECIES

Highly variable in basal and pattern colours, but herringbone pattern almost invariable. Colour varies from red, orange and yellow to green; some individuals more grey-white with dark (black) outlines. Some evidence that lowland populations are smaller (67–68 mm) and more brown than individuals from higher altitudes, which are larger (> 70 mm) and more green in colour; alternatively, differences may be due to different ages of animals. Unlikely to be confused with any other species.

HABITAT

Lowland, Montane/subalpine

Inhabits lowland and alpine herbfields,

heathland, wetlands and open hill-top fellfield habitats where sphagnum moss, cushion plants, mānuka, little mountain heath, *Olearia* species, tangle fern (*Gleichenia dicarpa*) and sedges grow. Occasionally occurs under slabs of granite on bare rock outcrops.

NATURAL HISTORY

Cathemeral (diurnal and nocturnal; active in the early hours after dark but only on warm nights). Terrestrial, and partially arboreal. Readily sun-basks in the open on vegetation or on branches just above ground. Will also thermoregulate beneath warm objects such as rock slabs (thigmothermic behaviour). Generally active at temperatures above 12 °C, but can be active in temperatures as low as 4 °C. Does not reproduce every year. Gravid females reported year-round, and 1 or 2 young born probably late summer–early autumn. Vocalises with a harsh 'chittering' sound during the day, from dense vegetation (perhaps advertising territory); makes soft chirps and squeals when distressed. One of the most southerly-distributed geckos in the world. Feeds on small invertebrates (*Hemidrus* ground wētā, spiders, cockroaches, amphipods)



and known to eat the bright red berries of little mountain heath. Also eats nectar from flowers.

ETYMOLOGY

Generic name (Māori) meaning 'intricate' and 'beautiful ornamental latticework', referring to the unique dorsal markings of this species. **Specific name** is a Latinisation of the Māori word Rakiura for Stewart Island, where this species is endemic. **Common name** refers to the complex and brightly coloured dorsal patterns.



Egg-laying skink

Oligosoma suteri (Boulenger, 1906)

Endemic



DESCRIPTION

Up to 126 mm SVL; c. 15.8 g weight (but can be much heavier)

A shoreline species frequently inhabiting the splash zone, and may even dive below the water surface in rock pools to escape danger or to forage. Body dorso-ventrally flattened, and scales typically very glossy. Snout long. Prominent brow above eye, and cheek region may appear swollen when viewed from above. **Dorsal surface** typically brown or grey but sometimes uniformly light cream; some individuals almost entirely black. Dorsal and **lateral surfaces** heavily marked with large irregular-shaped brown, golden or black blotches; never striped. **Ventral surface** grey, pink or orange; occasionally lightly speckled with black. **Eye** colour dark brown or black. **Intact tail** equal to or

longer than body length (SVL). **Subdigital lamellae** 17–22. **Soles of feet** pale brown.

DISTRIBUTION

North Island only. Widespread but very fragmented remnant distribution on the mainland from North Cape to Coromandel Peninsula. Also occurs on the Manawatāwhi/Three Kings Islands, and numerous offshore islands off the North Island's east coast.

VARIATION AND SIMILAR SPECIES

Highly variable in colour pattern, from uniform cream to almost uniform black. Juveniles may be mistaken for **shore skink** (*O. smithi*), but distinguished by their more robust body form, glossier scales, and larger eyes with more prominent brows.

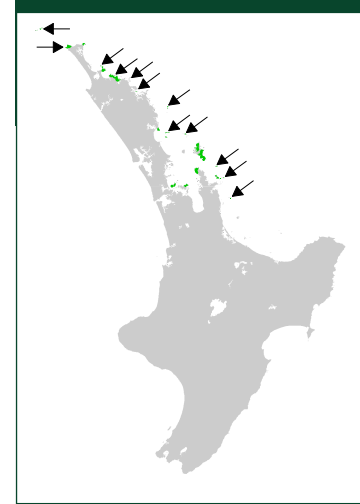
HABITAT

Coastal

Occupies splash zone at boulder and shingle beaches, rock talus and rocky platforms. Takes refuge in spaces between boulders, beneath rocks, in crevices and beneath low-growing vegetation and coastal vines. Will enter rock pools, either moving over top of aquatic vegetation or diving below the surface, holding its breath for up to 20 minutes while clutching onto substrate.

NATURAL HISTORY

Nocturnal; terrestrial. Heliothermic; may sun-bask cryptically from beneath cover or indirectly under warm boulders. Takes cover under rocks and seaweed during the day. Oviparous; the only endemic lizard to lay eggs. Annual reproduction. Mating occurs October–November; gestation period about 2 months within females, and eggs develop over 3 months in nest. Females lay 3–6 small (c. 18.5 x 13.5 mm) white leathery eggs in fine talus or sand beneath boulders or rocks, late January–February; hatching March–April. Sexual maturity at 3 years. Longevity recorded at 12 years. Occurs in high abundance in boulder beach habitats, particularly on offshore islands. Primarily insectivorous but also known to feed on amphipods (small crustaceans),



and to scavenge on carrion washed ashore (e.g. fish, seabird or dolphin carcasses). Can excrete excess salt from their food via nasal salt glands.

ETYMOLOGY

Specific name (Latinisation) acknowledging Henry Suter (1841–1918), a Swiss-born naturalist and conchologist, renowned for work on New Zealand molluscs. **Common name** recognises the significance of this species as the only endemic New Zealand lizard to lay eggs.



Southern bell frog

Ranoidea raniformis (Keferstein, 1867)

Exotic; introduced and naturalised



DESCRIPTION

Males up to 65 mm, females up to 95 mm SVL

A large and common frog, with a loud growling call, that occurs in most regions of New Zealand. **Dorsal surface** green (bright emerald to dark olive) or brown (golden to almost black), with varying degrees of brown spots, blotches or longitudinal streaks. Usually with a visible pale green mid-dorsal stripe. Numerous large tubercles, warts and skin folds on dorsal and lateral surfaces. Dorsolateral cream-coloured stripe (often fragmented), bordered below by a thin black line, extending from nostril to eye and over tympanum towards groin. Another cream stripe runs over upper lip to base of forelimb. Tympana distinct and clearly

visible. **Lateral surfaces** brown with cream spots and flecks; limbs blotched with green or brown. **Ventral surface** creamy white. Breeding males may have dark olive throat. Armpits and groin bright blue; **flash markings** on thighs also blue, may be overlaid with white spots in some North Island populations. Front **feet** lack webbing but hind feet almost fully webbed; finger and toe discs generally not wider than digits. **Tadpoles** with olive-green to black dorsal surface, and creamy white ventral surface.

DISTRIBUTION

Native to Australia; south-eastern areas of New South Wales, Victoria, South Australia and Tasmania. Introduced to New Zealand

from Tasmania in 1867 by the Canterbury Acclimatisation Society, but now distributed widely across the North and South Islands of New Zealand.

VARIATION AND SIMILAR SPECIES

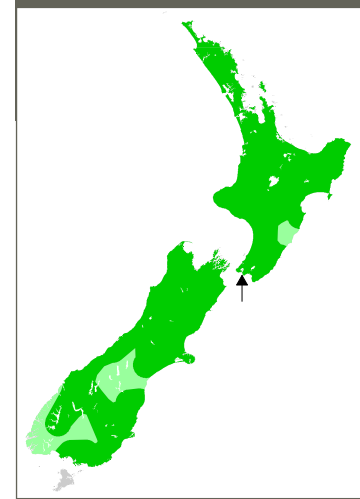
Variable in basal colour from green to yellow or uniform brown. Capable of dramatic colour changes, from light to dark, and vice versa, in minutes. Often confused with **green and golden bell frog** (*R. aurea*), but can be distinguished by its narrower toe pads; more abundant and pronounced tubercles and warts on dorsal and lateral surfaces (vs. smooth); and a green or yellowish mid-dorsal stripe, or lighter colour blotches on dorsal surface that never cross midline. The calls of the two species are distinctive.

HABITAT

Coastal, Lowland, Montane/subalpine, Alpine
Associated with bodies of still water (e.g. dams, ponds, swamps, marshes) and terrestrial vegetation on the edges of bushland, farmland or residential areas.

NATURAL HISTORY

Cathemeral, and avid sun-basker. Found in vegetation close to water sources, but in water bodies without vegetated margins, frogs may be fully aquatic. Spawning occurs in spring-early summer, with egg masses (100s-1000s of eggs) sinking in water after initially floating for several hours. Tadpoles hatch in 2-4 days (tadpole length c. 60-100 mm); froglets appear after 2-3 months. Males produce deep growling call from the water. Call: a short but deep guttural growl - *crawark crok crok crawk*. Tadpoles feed on bacteria, algae and organic detritus. Adults opportunistic



predators, feeding on invertebrates, other frogs and lizards.

ETYMOLOGY

Specific name (Latin) meaning 'rana-like', referring to the Ranid (family Ranidae) frogs, also called the true frogs. **Common name** refers to its southerly distribution in both its native range in Australia and in New Zealand, although the species occurs widely across the North and South Islands. Also known (in Australia) as the growling grass frog, after its growling call.



Green turtle

Chelonia mydas (Linnaeus, 1758)

Native; migrant



DESCRIPTION

Up to 1.5 m in length; 110–200 kg (up to 300 kg) weight

The second largest marine turtle, and only species with resident juveniles consistently present in New Zealand waters. Head small and blunt, with sharp pointed beak and serrated jaw. **Prefrontal scales** 1 pair. **Carapace** oval in shape. Colour can undergo ontogenic colour change, from black at hatchling stage to dark brown or olive as juveniles, and brown or green with brown or yellow shades as adults. Each scute with radiating striations and spots or blotches.

Plastron colour variable but generally off-white, yellow or dark grey-blue or grey-green. **Carapace scutes** smooth, not overlapping. **Vertebral scutes** 5. **Costal**

scutes 4 pairs; first pair not in contact with cervical scute. **Inframarginal scutes** 4 pairs, on bridge. **Flippers** each with a single visible **claw**.

DISTRIBUTION

Occurs globally in temperate, subtropical and tropical waters. New Zealand is the southern distribution limit in the south-west Pacific. Juveniles occur in New Zealand waters year-round (previously thought to be occasional visitors or stragglers), mainly in waters of the northern North Island, with sparse records down to the South Island. Also resident (non-breeding) at the Kermadec Islands (Raoul Island).

VARIATION AND SIMILAR SPECIES

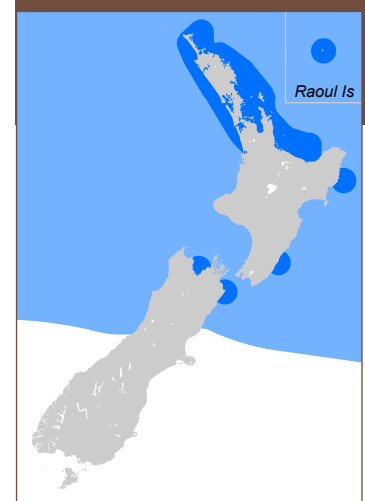
Some Northland juveniles are from the eastern Pacific population. Occasionally referred to as *Chelonia mydas agassizii*, not a currently recognised subspecies but still considered a separate population. These turtles have a narrower and more strongly elevated carapace, and darker skin pigmentation (giving them an overall darker appearance). Green turtle easily distinguished by its single pair of prefrontal scales on head (vs. 2 pairs in all other species). Distinguished from **hawksbill turtles** (*Eretmochelus imbricata*) by its blunt snout, unhooked beak and single claw on each flipper (vs. 2 claws). May be confused with **loggerhead turtle** (*Caretta caretta*) but distinguished by its smaller head and 1 pair of prefrontal scales (vs. 2 pairs); or with **olive ridley turtles** (*Lepidochelys olivacea*) but separated by its 1 pair of prefrontal scales (vs. 2 pairs), 5 vertebral scutes (vs. > 5) and 4 pairs of costal scutes (vs. 5–10 pairs).

HABITAT

Hatchlings found in oceanic waters as pelagic inhabitants, whereas immature juveniles and adults inhabit shallow waters near coastlines (e.g. bays and around islands), especially in areas with seagrass beds.

NATURAL HISTORY

Hatchlings spend 3–10 years in open ocean before migrating to shallower coastal waters as immature juveniles. Remain there for several decades until reaching maturity, then migrate back to natal nesting rookeries. Presence of immature juveniles and resident subadults in northern New Zealand coastal



waters suggests New Zealand may be a transitional developmental area, with adult turtles migrating away on reaching sexual maturity. Nesting occurs year-round on sandy beaches in c. 80 countries (excluding New Zealand). Females nest solitarily every 2–4 years; c. 115 white spherical soft-shelled eggs per nest. Several clutches of eggs laid per season. Egg incubation c. 60 days, and hatchlings emerge at 45–50 mm in length. Does not breed in New Zealand. Diet varies with age: juveniles opportunistic omnivores (e.g. eating worms, jellyfish, salps, algae and seagrass); adults primarily herbivorous (e.g. seagrass, algae, seaweed, jellyfish, crustaceans and sea stars). Capable of diving to depths of 30 m, possibly deeper.

ETYMOLOGY

Specific name (Greek) meaning 'dampness, wetness', referring to aquatic lifestyle.

Common name refers to the colour of its fat (adipose tissue), which turns green when cooked.

Brown- (blue-) lipped sea krait

Laticauda laticaudata (Linnaeus, 1758)

Native, vagrant

Dangerously venomous but inoffensive and docile in nature, and thus disinclined to bite.



HAL COGGER

DESCRIPTION

0.50–0.96 m (up to 1.36 m) total length

A blue and black banded krait from the Indian and western Pacific Oceans. Only one record from New Zealand. Broad black head with cream or pale yellow snout and above eyes. Upper **lips** brownish black.

Eye colour dark brown to black. **Dorsal surface** light or dark steel-blue, with 39–50 transverse black or brown bands (approximately same width as pale bands) along body. **Ventral surface** yellowish. Snout short and blunt. Body cylindrical; tail laterally flattened, forming a paddle.

Nasal scales laterally positioned, with 2 or more internasal scales. **Rostral scale** entire.

Prefrontal scales 2 (i.e. azygous prefrontal

shield absent). **Body scales** smooth and overlapping. **Mid-body scales** usually 17–21 rows. **Ventral scales** enlarged (transversely elongate). **Anal scale** paired (divided). **Subcaudal scales** paired; number differs between sexes (i.e. 30–35 for females; 38–47 for males).

DISTRIBUTION

Occurs along the coasts of India, Thailand and Malaysia; the Gulfs of Siam and Tongking; the coasts of China and southern Japan; the coastal waters of the Philippines, Indonesia, New Guinea, Solomon Islands and New Caledonia. The sole New Zealand record is from Auckland.

VARIATION AND SIMILAR SPECIES

Melanotic individuals known. Sexually dimorphic. Similar in appearance to the **yellow-lipped sea krait** (*L. colubrina*) and **Saint Giron's sea krait** (*L. saintgironi*), but is distinguished by having a dark brownish-black upper lip.

HABITAT

Occurs in coastal waters around rocky areas and coral reefs, usually at depths of 0–15 m, and can dive to > 80 m. Less terrestrial than other *Laticauda* species. Will use raised fossil reefs and rocky shorelines, but rarely travels more than 5 m from water's edge.

NATURAL HISTORY

Primarily nocturnal but may be active during the day. Oviparous reproduction. Females produce 1–7 eggs per clutch, laid in rocky crevices in littoral zone. Does not breed in New Zealand. Feeds predominantly on eels.



ETYMOLOGY

Specific name (Latin) meaning 'broad, flat tail', in reference to the broad, laterally flattened tail. **Common name** refers to the brown or dark blue upper lip.



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