

# *Litoria nannotis*

Pamela Gray, 1999 © 2001 James Cook University

Authority: Anderson, 1916

**Common Name:** Torrent Tree Frog, Waterfall Frog

**Description** (Liem 1974; Tyler 1994; Barker *et al.* 1995; Cogger 1996; Williams and Hero 1998): *Litoria nannotis* is a medium sized robust frog with a very broad, bluntly rounded snout. The tympanum is barely visible which is an unusual feature for this genus. The dorsal surface is shargreened, with scattered tubercles giving the appearance of small warts. Dorsal colouration may be yellowish olive, green or slate grey, with a network of extensive dark irregular mottling. There is often a bluish purple metallic sheen on the flanks. Most ventral surfaces of the body are white/cream and granular; although the anterior and antero-ventral surfaces of the thighs and inner surfaces of the tibia and tarsus are smooth. Males often have a dusky brown throat, whilst in females the throat and the ventral surface of the thigh are heavily pigmented with brown. *Litoria nannotis* has one large outer metacarpal tubercle present, and a smaller, more elongated inner metacarpal tubercle on the base of the thumb. Vomerine teeth are prominent, positioned between the choanae. There are large discs present on both fingers and toes. The fingers have strong basal webbing, and the toes are nearly fully webbed. The second finger is longer than the first. The thumb is only a rudimentary, but in breeding males it bears a large spinulated nuptial pad on proximal-dorsal side. *Litoria nannotis* is sexually dimorphic, with adult females considerably larger (SV = 49.1-54.7mm) than adult males (SV = 40.1 - 47.9mm). Distinguishing features of adult male *L. nannotis* are their robust forearms, extremely large prepollex, and heavily spinulated nuptial pad. There are also accessory black tipped spinules on the inner surfaces of the forearm, base of forearm and upper chest region, and scattered on ventral surfaces of the thighs and inner surfaces of the tarsus. Male *L. nannotis* lack a vocal sac, yet still have a distinct mating call that has been described as a short, harsh growl or a repeated 'crawk crawk crawk' (Barker *et al.* 1995). *Litoria nannotis* tadpoles are torrent-adapted, with suctorial mouths on the ventral surface, a very strong muscular tail, narrow tail fins and a ventro-lateral spiracle (Liem 1974). The suctorial mouth consists of two complete papillar rows, one along the edge of the labium and another close to the labial tooth rows. The labial tooth row consists of two entire upper and three entire lower row. The tadpoles body is generally sandy coloured with a dark abdomen, although colouration may vary with different substrates. The tail has a yellowish tinge and numerous dark-brown blotches. Total length of tadpoles is up to 51mm.

**Similar species** (Barker *et al.* 1995; Hodgkison 1998; Williams and Hero 1998): *Litoria nannotis* is most similar to the other frogs in the *L. nannotis* species group, *L. rheocola* and *L. nyakalensis*. *Litoria nannotis* is the largest species within the group, and the only species with an indistinct tympanum. Another feature that distinguishes *L. nannotis* from *L. rheocola* is the large spinulated nuptial pad on adult male frogs. Adult male *L. nyakalensis* have spinulated nuptial pads, but lack accessory spinules on the chest. *Litoria nannotis* demonstrates a microhabitat preference for the splash zone of waterfalls, whereas *L. rheocola* occurs in slower, more open sections of the stream. *Litoria nannotis* tadpoles can be distinguished from *L. rheocola* tadpoles by their darker tail colouration and their yellowish tinge.

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**Range** (Tyler 1994; Barker *et al.* 1995): Historically, *Litoria nannotis* is recorded as occupying perennial coastal streams in Queensland between Cooktown and Townsville at an altitude range between 80 - 1300m. Since 1990 higher altitude populations have undergone declines, with local extinctions recorded in some areas. *Litoria nannotis* is currently known only from sites with an altitude of less than 400m.

**Ecology and behaviour** (Richards and James 1992; Cogger 1996; Hodgkison 1998; Williams and Hero 1998): *Litoria nannotis* is essentially a stream dwelling frog. It is usually observed adjacent to waterfalls in fast-flowing, rocky sections of streams in areas of rainforest or wet sclerophyll forest (Liem 1974; Barker *et al.* 1995). When disturbed they enter waterfalls or swift flowing water and hide under rocks or in crevices beneath the water (Cogger 1996). *Litoria nannotis* is both nocturnal and diurnal (Liem 1974; Hodgkison 1998). Individuals (generally females and juveniles) may nocturnally venture 10m into the streamside forest, and into forest canopy, returning by sunrise. This behaviour may be related to locating efficient feeding sites (Hodgkison 1998). Although displaying high levels of activity at night, *L. nannotis* can be found feeding and basking on wet rocks in the splash zone of waterfalls during the day (Hodgkison 1998). Male *L. nannotis* have been observed performing foot-flagging displays during which they wave their front legs in an arc above their head (Richards and James 1992). Foot-flagging displays are thought to be a substitute for vocal communication in response to noisy streamside environments where vocal signals are hard to hear (Hodgkison 1998). The functional significance of foot-flagging appears to be related more to male-male aggression than to courtship (Richards and James 1992). *Litoria nannotis* are 'sit-and-wait' predators with an opportunistic or 'generalist' diet that mainly consists of a wide range of mobile prey. Both terrestrial and aquatic invertebrates are consumed, including Diptera, Trichoptera, Hemiptera, Coleoptera, Hymenoptera, Blattodea, Aranaceae and Odonata (Hodgkison 1998).

**Breeding biology** (Liem 1974; Tyler 1994; Barker *et al.* 1995; Hodgkison 1998; Williams and Hero 1994): *Litoria nannotis* remain at their breeding habitat all year. Although they do not have a vocal sac, male *L. nannotis* have a loud distinct call, and use vocalisations to attract conspecific females. *Litoria nannotis* is highly adapted to reproduction in a lotic environment with the males bearing a heavily spinulated nuptial pad and accessory spinules on the ventral surface of the body. Although *L. nannotis* have low fecundity, gravid females may be encountered throughout the entire year (Queensland Department of Environment and Heritage 1998). They lay their pigmentless eggs in tough gelatinous masses under rocks in the streambed. The eggs are large (ovidiameter 2.7 – 3.4 mm) when compared with the eggs of other members of the *L. nannotis* group.

**Conservation Status** (Environment Australia 1998): *Litoria nannotis* is currently listed as Endangered (the highest category) under both the Queensland *Nature Conservation Act 1992*, and the Commonwealth *Endangered Species Protection Act 1992*.

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