

DISTRIBUTION AND HABITS OF THE BROWN TREE FROG

LITORIA EWINGI DUMERIL AND BIBRON
IN THE MANAWATU-RANGITIKEI REGION

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SUMMARY: Results of a survey of the present distribution of the brown tree frog (*Litoria ewingi*) in the Manawatu and Rangitikei region of the North Island of New Zealand show that it has spread considerably in the quarter-century since its introduction. A previously undocumented liberation is described and some information on the habits and habitats of the frog, based on observations in the Foxton area, is presented.

INTRODUCTION

The brown tree frog or whistling frog (*Litoria*** *ewingi*) (Fig. 1) is one of several Australian species introduced to New Zealand in the late nineteenth century (Thomson 1922, McCann 1961). Specimens of *L. ewingi* were apparently obtained from Tasmania and privately liberated in Greymouth in 1875 (Marriner 1907). The current South Island distribution is not understood in detail, but the species is abundant in Westland and some parts of Southland (Dr B. D. Bell, pers. comm.). All published accounts of liberations in the North Island refer to those made by Major Wilson near Himatangi in the Manawatu (Falla 1957, Wilson 1959, McCann 1961). His first liberation, made in 1946 with five or six adult frogs obtained from Westland, was apparently unsuccessful. The species became established after a second attempt was made, with spawn, some two years later. Local enquiries indicate that the point of liberation was Lake Kaikokopu, a coastal lagoon four kilometres east of Himatangi. Wilson (1959) reported that the frog had spread many miles, while Falla (1957) and McCann (1961) both reported a spread northwards of 20 miles (32km) from Himatangi.

DISTRIBUTION IN THE MANAWATU-RANGITIKEI REGION

The distribution of *L. ewingi* was determined through field surveys and enquiries via the local press. During surveys frogs were found by their calls at night, and by searching for them in suitable habitats during the day. Fifty four locality records are plotted on the map (Fig. 2); most



FIGURE 1. A newly-metamorphosed brown tree frog (*Litoria ewingi*). Adult frogs reach 3-4cm, but newly-emerged froglets may be as small as 10 mm. The frogs are brown in colour with orange markings on the posterior thighs (see McCann 1961 for full description). Photo: M. J. Meads.

refer to the period 1971-72, but 12 were obtained in 1966 by T. J. Brown (then of Animal Ecology Division, D.S.I.R.).

Twenty five years have passed since the brown tree frog's liberation, and the species is now known to occur in an area of about 900km². It has spread some 26km both north and south of Lake Kaikokopu, while the most easterly locality recorded shows inland movement of about 24km. *Litoria*

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** This species was placed in the genus *Hyla* until the revision by Tyler (1971).

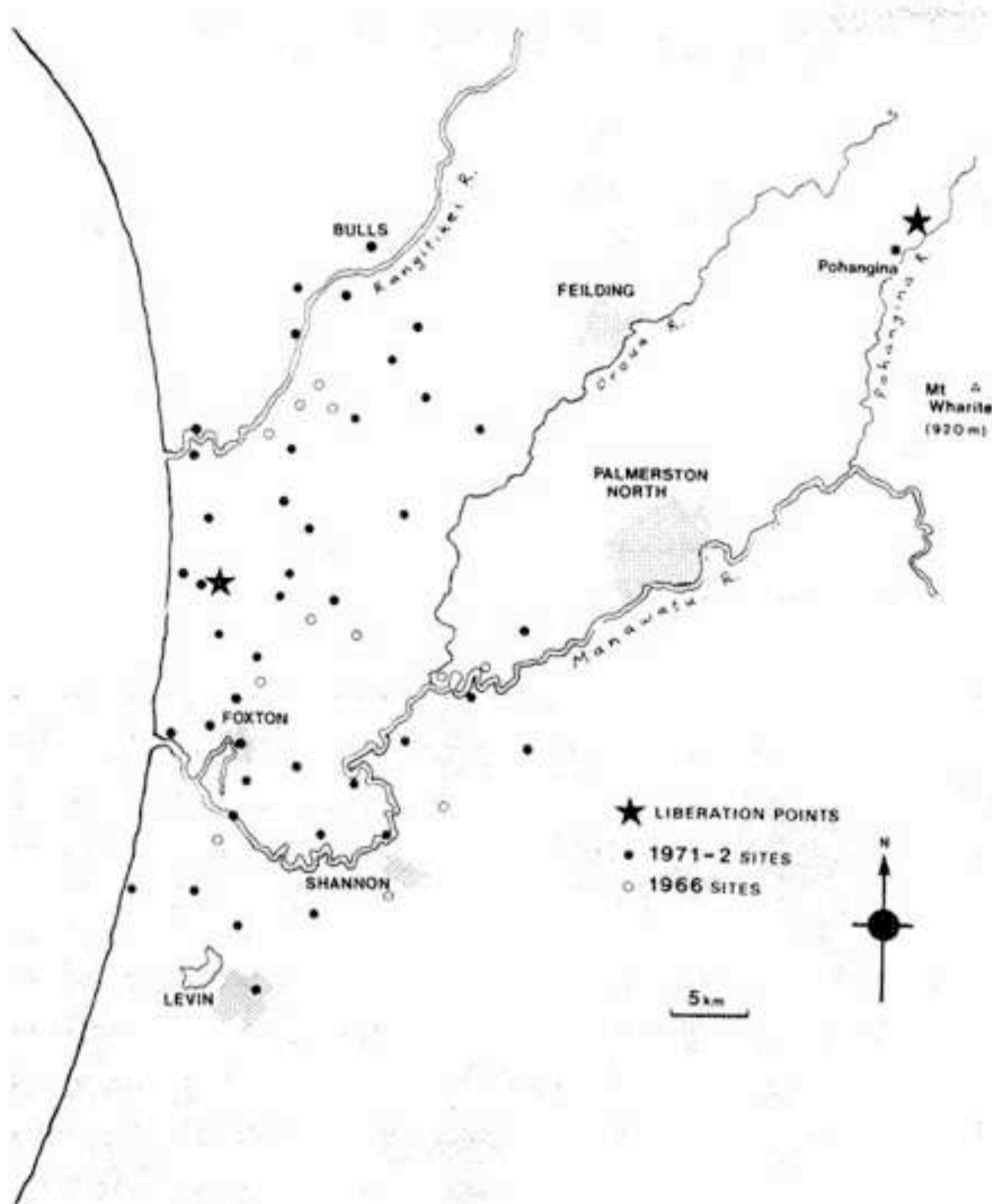


FIGURE 2. Map to show locality records collected for *L. ewingi* in the Manawatu-Rangitikei region. Records from sites in close proximity are represented by a single dot. The position of the Pohangina valley is indicated.

ewingi is apparently continuing to colonize the area, for residents in Bulls and Levin, on the edges of the distribution, speak of the frog's arrival there within the past two or three years. The future rate of spread to the east of the Manawatu plain may perhaps be slowed by the high ground, although the species has successfully colonized high country up to 1200m in Westland (B. D. Bell pers. comm.). Much of the coastal area north and south of the current range is similar to that already occupied and is likely to be steadily colonized. The figures above suggest that in these areas a rate of spread of about one kilometre per year is to be expected.

The possibility that humans have helped the frog extend its range cannot be ruled out, although no obviously anomalous locality records are at hand for the immediate Manawatu-Rangi-

tikei area. However, within the last two years small numbers of frogs have been recorded at Wanganui, Plimmerton and Porirua, presumably after private transfer from the Manawatu.

In 1947 a private liberation was made near Pohangina, a small settlement some 30km north-east of Palmerston North (see Fig. 2). Mr K. Balmer (now of Feilding) collected 30 frogs and several hundred eggs from Rahu, near the Lewis Pass in Westland, and released them in a small swamp on his farm, three to four kilometres north-east of Pohangina. Mr Balmer heard *Litoria ewingi* calling on three occasions before he left the area, the last being two years after the liberation and about 13km south of his farm (Mr K. Balmer, pers. comm.). In 1965, Mr W. Smith, of Palmerston North, heard what he believed was *Litoria ewingi* near the summit of Mt. Wharite, about 10km from Pohangina (see Fig. 2; Mr W. T. Smith, pers. comm.). Several suitable sites near Pohangina were examined for brown tree frogs in January, 1972 and 1973; but no specimens were found, and none of the local residents interviewed had seen or heard the frog in the region. However, the Pohangina valley cannot be ignored as a possible part of the frog's range until more detailed investigations have been carried out.

HABITAT

Litoria ewingi occurs in habitats which are cool and moderately damp and which provide cover during the day. Accordingly, specimens are commonly found sheltering in clumps of monocotyledonous vegetation—grasses; rushes; sedges; flax (*Phormium*); raupo (*Typha*); toetoe and pampas grass (*Cortaderia*); small cabbage trees (*Cordyline*); and, in residential areas, cultivated plants such as *Agapanthus* and red-hot poker (*Kniphofia*). Frogs can also be found under damp pieces of wood and bark, or beneath shaded stones and rocks. Though capable of climbing they are seldom found more than one metre above ground.

Intensively farmed land, which is found in the eastern part of the frog's range, provides suitable habitat where ditches, slow-flowing streams, small ponds and water troughs are available for spawning, and where appropriate vegetation occur

for daytime shelter. The coastal areas of marshes, lagoons and less-intensively farmed land seem to suit the brown tree frog especially well, and generally present abundant cover of vegetation. Spawning needs are met by lagoons and by temporary water which collects in winter and spring and covers the lower-lying land. Similarly, in Australia, Moore (1961) found the species inhabiting coastal lagoons and lake edges, while Watson *et al.* (1971), found the frog associated with temporary and permanent water. In towns, *Litoria ewingi* utilises well-vegetated gardens and ornamental ponds, but it will also shelter among the foundations of buildings, especially where little vegetation is present. This behaviour has been observed in Australia by Harrison (1922), who heard the species calling on wet days from buildings several hundred metres from the nearest water. In Australia, as well as in New Zealand, *Litoria ewingi* requires open water for breeding but is relatively independent of water at other times; many of its habitats are considerably distant from ponds or ditches.

HABITS

Litoria ewingi is primarily nocturnal, but occasionally emerges at dusk or during and after daytime rain. Only rarely is it found out of cover in strong sunlight. The males generally call at night, but they occasionally do so during the day if it is overcast or raining. The call is a cricket-like chirping and is heard throughout the year, except for June and early July in some colder winters and during dry weeks of summer. In Australia the frog calls throughout the year (Harrison 1922, Watson *et al.* 1971).

The breeding season for *Litoria ewingi* is a long one. If conditions are favourable, the species seems capable of breeding at any time of the year. However, most spawning takes place in autumn, winter and spring (March to December). In Australia, Harrison (1922) reported that the species breeds throughout the year, while Watson *et al.* (1971) saw amplexant pairs from February to October. Littlejohn (1963) found the frog breeding from April to December in the Melbourne

area. During wet nights in winter and spring, large numbers of *Litoria ewingi* are seen crossing roads, presumably migrating to spawning sites. The males probably arrive at the sites first and begin calling in chorus to attract the females; this is at least the case in most northern hemisphere anurans (Noble 1931). In October 1971 (during a field survey by members of the New Zealand Herpetological Society), 64 frogs were examined at several sites in the Manawatu. At three locations known to be spawning sites, 94 percent of the 52 individuals caught were males—all in breeding condition. At a further three locations, where no breeding water was available, only two of 12 frogs (17%) were males. This possibly indicates an uneven sex ratio, but seems better explained by sexual segregation occurring by concentration of males at spawning sites.

True hibernation is not known to occur in *Litoria ewingi* in the Manawatu-Rangitikei region. However, in sites which remain cold for long periods during winter, torpid frogs can be found; though elsewhere in the region they may be calling or breeding. Hence, populations in different localities may exhibit considerable variation in their activity, depending on prevailing conditions.

When the Foxton Borough Council chlorinated its water supply in October 1969, many former spawning sites in the town (water troughs and ornamental ponds) received the treated water. Although seeming to have no ill-effects on adult frogs the water is toxic to tadpoles and is not used for spawning (Gill 1970). In the years following this habitat change, however, the frog population of Foxton seems to have sustained no permanent damage.

CONCLUSION

This survey has shown that *Litoria ewingi* has spread considerably during its quarter-century in the Manawatu-Rangitikei area. The species is similarly well established and expanding in the South Island. It seems suited to New Zealand conditions and in time might well spread to become as widely distributed as the green and golden frog (*Litoria aurea*).

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