Eleutherodactylus coqui 简体中文 正體中文 **System:** Freshwater_terrestrial

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Amphibia	Anura	Leptodactylidae

Common name coqui (German), Puerto Rican treefrog (English, Puerto Rico), Caribbean tree frog (English), common coqui (English)

Synonym

Similar species *Eleutherodactylus planirostris, Eleutherodactylus martinicensis*

Summary *Eleutherodactylus coqui* is a relatively small tree frog native to Puerto Rico. The frogs are quite adaptable to different ecological zones and elevations. Their loud call is the main reason they are considered a pest. *E. coqui's* mating call is its namesake, a high-pitched, two-note \"co-qui\" (ko-kee') which attains nearly 100 decibels at 0.5 metres. *E. coqui* have a voracious appetite and there is concern in Hawai‘i, where it has been introduced, that *E. coqui* may put Hawai‘i’s endemic insect and spider species at risk and compete with endemic birds and other native fauna which rely on insects for food.

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Species Description
Eleutherodactylus coqui is described as a relatively small treefrog. In Puerto Rico, mature calling males and \"parental males\" (males guarding a clutch) average about 34mm in length from snout to vent (snout-vent length, or SVL), while mature egg-laying females average about 41mm SVL. Like the true treefrogs (family Hylidae), *E. coqui* have well developed pads at the end of each toe that are used for sticking to surfaces. *E. coqui* are extremely variable in colouration. The dorsum (upper surface) is generally grey or grey-brown and uniform in colour, or may have either a dark \"M\" shape between the shoulders, two broad, light dorso-lateral bars (from the snout, through to the eye, to the axila of the rear legs) bordered with black spots and/or a light bar on top of the head between the eyes and a light underside stippled with brown (Campbell, 2000).

Notes
Eleutherodactylus coqui densities are among the highest known for any amphibian in the world (around 20 000 individuals ha-1) (Stewart & Woolbright, 1996). Densities are also known to increase after hurricane disturbances which define the structure and function of an ecosystem (Woolbright, 1996)

Lifecycle Stages
Eleutherodactylus coqui utilise internal fertilisation and, like other eleutherodactylids, the fertilised egg undergoes direct development, rather than passing through a free-living larval (tadpole) stage, so standing water is not required for egg laying. The time period between clutches is around eight weeks (Campbell, 2000).

Uses
Eleutherodactylus coqui themselves form parts of the diets of birds and nocturnal mammals. They are known to form the diet of the giant crab spiders, *Olios* spp. and the Puerto Rican racer (a snake), *Alsophis portoricensis*.

Habitat Description
Eleutherodactylus coqui have been described as a habitat generalist. Quantitaive studies on habitat preferences of *E. coqui* in its native range showed that habitat use was at different heights from the forest floor. Adults were seen to have a wider preference for a range of heights compared to juveniles. Adults have demonstrated a strong positive association with dead, fallen leaves and early successional species, such as *Cecropia*, *Heliconia* and *Prestoea*. *E. coqui* generally have positive associations with shrubs and negative associations with grasses, vines and ferns. Exceptions include *Philodendron angustatum* and *Danea nodosa*, which both have a broad leaf structure and are thus able to provide better structural support than other species in those habitat categories.(Beard *et al.* 2003). Kraus and Campbell (2002) report evidence that the ecological range of *E. coqui* in Hawai'i has continued to expand. Initially the frogs were reported from relatively low elevations (0–670m). Subsequent studies show that a large population has survived and overwintered at 920m elevation. Four other populations have survived two winters at elevations of 1170m. In their native Puerto Rico, *E. coqui* occcur at the upper elevation of 1200m.

Reproduction
Eleutherodactylus coqui reproduce year-round in their native range, but breeding activity is concentrated in the wet season. Female *E. coqui* lay 4-6 clutches of about 28 eggs each (range 16-41) per year. The time period between clutches is around eight weeks. *E. coqui* utilise internal fertilisation and, like other eleutherodactylids, the fertilised eggs undergo direct development, rather than passing through a free-living larval (tadpole) stage, so standing water is not required for egg laying. *E. coqui* are known to utilise the nesting cavities of several bird species in Puerto Rico, including the bananaquit (*Coereba flaveola portoricensis*), the Puerto Rican bullfinch (*Loxigilla portoricensis*) and the Puerto Rican tody (*Todus mexicanus*). Male frogs nest in protected cavities near the ground, such as dead, curled leaves or rolled palm frond petioles. Males, which guard the eggs (to keep them from drying out), are known to leave the nest in severely dry conditions to gather moisture to rehydrate the eggs (Campbell, 2000).

Nutrition
Eleutherodactylus coqui is a generalist nocturnal predator and consumes an estimated 114 000 invertebrates per hectare per night (Stewart & Woolbright, 1996).

General Impacts
Experiments were conducted at two spatial scales to investigate the effects of terrestrial frogs (*Eleutherodactylus coqui*) on aerial and litter invertebrates, plant growth and herbivory, and litter decomposition. Results showed that at both scales, frogs reduced aerial invertebrates and leaf herbivory, but had no effect on litter invertebrates. At the smaller scale, frogs increased foliage production rates, measured as the number of new leaves and new leaf area produced, by 80% and decomposition rates by 20%. These results demonstrate that *E. coqui* may affect ecosystem functions by decreasing prey items and increasing nutrient cycling rates (Beard *et al.* 2003).
In Hawai'i where the population is seen to be expanding, there are concerns of ecological as well as anthropogenic affects. The main pathway for spread has been through the nursery trade and there are concerns that there may be a negative effect on the export nursery trade, should shipments be banned for harbouring frogs. *E. coqui* have spread from horticultural sites where they were first restricted to public land, residential areas and resorts. There are concerns that property value may be affected due to the high biomass of frogs on infested sites (Kraus and Campbell, 2002). The high pitched call of the frog is a disturbance and there are fears this may affect the tourism industry (HEAR, 2004).

Management Info
Preventative measures: Intentional transport of frogs has been banned in Hawai'i (Kraus and Campbell, 2002).
Physical: Hand-capture is a successful method when dealing with small numbers (Kraus and Campbell, 2002).
Non-chemical: A study by Hara *et al* (2010) shows that a hot-water shower treatment of ornamental plants in commercial nurseries is an effective disinfestation treatment for coqui eggs, subadults and adults; thus reducing one major potential pathway for the spread of this species. It is recommended that ornamental plants be treated to a 45 degrees C of water for up to 5 min, as this regime is sufficient to achieve mortality of all stages of the frog while being within the tolerance range of many of the host plants. This method would be most effective in enclosed areas before transportation of ornamental plants. (Hara *et al*. 2010)
Chemical: Field trials are being conducted to evaluate the efficacy of a direct spray application of a concentrated caffeine and water solution for control on 0.1 - 0.5ha infested plots. If these trials are successful, it is hoped that management agencies in the State of Hawai'I will be able to reduce the spread and potential impact of these pest species on a landscape scale (Campbell *et al.* 2002). Spraying of citric acid on infested plants to kill *E. coqui* eggs, juveniles and adults is recommended (CTAHR, Undated) but evidence of efficacy has not been demonstrated.

Principal source:

Compiler: National Biological Information Infrastructure (NBII) & IUCN/SSC Invasive Species Specialist Group (ISSG)

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ALIEN RANGE

[1] BAHAMAS
[1] DOMINICAN REPUBLIC
[1] GUAM
[5] VIRGIN ISLANDS, U.S.
[1] COSTA RICA
[2] ECUADOR
[8] UNITED STATES

Red List assessed species 2: VU = 1; LC = 1;

Chlorodrepanis virens **LC**
Metrosideros polymorpha **VU**

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Summary: The electronic tool kits made available on the Cefas page for free download are Crown Copyright (2007-2008). As such, these are freeware and may be freely distributed provided this notice is retained. No warranty, expressed or implied, is made and users should satisfy themselves as to the applicability of the results in any given circumstance. Toolkits available include 1) FISK- Freshwater Fish Invasiveness Scoring Kit (English and Spanish language version); 2) MFISK- Marine Fish Invasiveness Scoring Kit; 3) MI-ISK- Marine invertebrate Invasiveness Scoring Kit; 4) FI-ISK- Freshwater Invertebrate Invasiveness Scoring Kit and AmphISK- Amphibian Invasiveness Scoring Kit. These tool kits were developed by Cefas, with new VisualBasic and computational programming by Lorenzo Vilizzi, David Cooper, Andy South and Gordon H. Copp, based on VisualBasic code in the original Weed Risk Assessment (WRA) tool kit of P.C. Pheloung, P.A. Williams & S.R. Halloy (1999).
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