

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.



[view this species on IUCN Red List](#)

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. Quantitative 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* occur 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 disinfection 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)

Review: Dr. Fred Kraus, Department of Natural Sciences. Bishop Museum Honolulu, Hawaii. USA

Publication date: 2008-12-30

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

BIBLIOGRAPHY

27 references found for *Eleutherodactylus coqui*

Management information

[Bomford, M., 2003. Risk Assessment for the Import and Keeping of Exotic Vertebrates in Australia. Bureau of Rural Sciences, Canberra.](#)

Summary: Available from: <http://www.feral.org.au/wp-content/uploads/2010/03/PC12803.pdf> [Accessed August 19 2010]

[Campbell, E.W., and F. Kraus. 2002. Neotropical frogs in Hawaii: status and management options for an unusual introduced pest. Pp. 316-318 in Timm, R.M., and R.H. Schmidt \(eds.\), Proceedings of the 20th Vertebrate Pest Conference. Univ. of California Press, Davis, California.](#)

[Campbell, E. W.; F. Kraus, S. Joe, L. Oberhofer, R. Sugihara, D. Lease, and P. Krushelnysky., 2002. Introduced Neotropical tree frogs in the Hawaiian Islands: Control technique development and population status. In *Turning the tide: the eradication of invasive species: 406 - 414. IUCN SSC Invasive Species Specialist Group. IUCN. Gland. Switzerland and Cambridge. UK.*](#)

Summary: Population status and management studies in Hawaii. In *Turning the tide: the eradication of invasive species.*

[Campbell, T. S. 2000. The Puerto Rican Coqui \(*Eleutherodactylus coqui* Thomas 1966\). The Institute for Biological Invasions.](#)

Summary: Information on description, economic importance, distribution, habitat, history, growth, and impacts and management of species.

Available from: <http://invasions.bio.utk.edu/invaders/coqui.html> [Accessed 13 September 2004]



GLOBAL INVASIVE SPECIES DATABASE

FULL ACCOUNT FOR: *Eleutherodactylus coqui*

[Centre for Environment, Fisheries & Aquaculture Science \(CEFAS\), 2008. Decision support tools-Identifying potentially invasive non-native marine and freshwater species: fish, invertebrates, amphibians.](#)

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).

The decision support tools are available from:

<http://cefas.defra.gov.uk/our-science/ecosystems-and-biodiversity/non-native-species/decision-support-tools.aspx> [Accessed 13 October 2011]

The [guidance document](#) is available from http://www.cefas.co.uk/media/118009/fisk_guide_v2.pdf [Accessed 13 January 2009].

[College of Tropical Agriculture and Human Resources \(CTAHR\). UNDATED. Control of Coqui Frogs in Hawaii I. University of Hawaii I at Manoa.](#)

Summary: Information on description, economic importance, distribution, habitat, history, growth, and impacts and management of species.

Available from: <http://www.ctahr.hawaii.edu/coqui/background.asp> [Accessed 13 September 2004]

Gee II, David E., pers. comm. 2006. Wildlife Biologist, Guam Division of Aquatic & Wildlife Resources and Guam team member of the Pacific Invasives Learning Network (PILN).

[Gulf States Marine Fisheries Commission \(GSMFC\), 2003. Eleutherodactylus coqui \(Thomas\). University of Southern Mississippi/College of Marine Sciences/Gulf Coast Research Laboratory.](#)

Summary: Information on description, economic importance, distribution, habitat, history, growth, and impacts and management of species.

Available from: http://nis.gsmfc.org/nis_factsheet.php?toc_id=204 [Accessed 13 September 2004]

Hara, Arnold H., Jacobsen, Christopher M., Marr, Shenandoah R. and Niino-DuPonte, Ruth Y., 2010. Hot water as a potential disinfestation treatment for an invasive anuran amphibian, the coqui frog, *Eleutherodactylus coqui* Thomas (Leptodactylidae), on potted plants, International Journal of Pest Management, 56: 3, 255-263

[Hawaiian Ecosystems at Risk Project \(HEAR\), 2004. Alien Caribbean Frogs in Hawaii, Problematic frogs trouble people, environment.](#)

Summary: Information on description, economic importance, distribution, habitat, history, growth, and impacts and management of species.

Available from: <http://www.hear.org/AlienSpeciesInHawaii/species/frogs/> [Accessed 13 September 2004]

[Kaiser, B., and K. Burnett. 2006. Economic Impacts of E. coqui frogs in Hawaii. Interdisciplinary Environmental Review 8:1-11.](#)

Summary: Available from: http://homepage.mac.com/ondinebak/HI_Research1_files/KaiserBurnettCoqui.pdf [Accessed 2 May 2007]

Kraus, F., and E. Campbell. 2002. Human-mediated escalation of a formerly eradicable problem: The invasion of Caribbean frogs in the Hawaiian Islands. Biological Invasions 4(3): 327-332

Summary: Information on description, economic importance, distribution, habitat, history, growth, and impacts and management of species.

Kraus, F., E. W. Campbell, A. Allison, AND T. Pratt. 1999. Eleutherodactylus frog introductions to Hawaii. Herpetological Review 30:21-25.

[Louis A. Somma. 2008. Eleutherodactylus coqui. USGS Nonindigenous Aquatic Species Database, Gainesville, FL.](#)

Summary: Information on description, economic importance, distribution, habitat, history, growth, and impacts and management of species.

Available from: <http://nas.er.usgs.gov/queries/FactSheet.asp?speciesID=60> [Accessed 13 February 2008]

General information

Beard, K. H., A. K. Eschtruth, K. A. Vogt, D. J. Vogt, and F. N. Scatena. 2003. The effects of the frog *Eleutherodactylus coqui* on invertebrates and ecosystem processes at two scales in the Luquillo Experimental Forest, Puerto Rico. Journal of Tropical Ecology 19: 607-617.

Summary: A study of the impact species has on native fauna and flora along with some discussion of possible reasons for its invasiveness elsewhere.

Beard, K. H., S. McCullough, and A. K. Eschtruth. 2003. Quantitative Assessment of Habitat Preferences for the Puerto Rican Terrestrial Frog, *Eleutherodactylus coqui*. Journal of Herpetology 37(1): 10-17.

Summary: A study on the habitat selection of species in its native range.

Beckham, Y. M., K. Nath., and R. P. Elinson. 2003. Localization of RNAs in oocytes of *Eleutherodactylus coqui*, a direct developing frog, differs from *Xenopus laevis*. Evolution and Development 5(6): 562-571.

Summary: A genetic study that contains background information on species.

[Christy MT, Clark CS, Gee DE, Vice D, Vice DS, Warner MP, Tyrrell CL, Rodda GH, Savidge JA \(2007\) Recent records of alien anurans on the Pacific Island of Guam. Pacific Science 61\(4\): 469-483.](#)

Summary: Abstract and link to full text.

Available from: <http://uhpjournal.wordpress.com/2007/09/01/pacific-science-vol-61-no-4-2007/> [Accessed 6 September 2008]

Eldredge, L.G. 1988. Case studies of the impacts of introduced animal species on renewable resources in the U.S.-affiliated Pacific Islands. in B.D. Smith, ed. Topic reviews on insular development in the U.S.-affiliated Islands. Univ. Guam Marine Lab Technical Report 88, pp 26-46.



GLOBAL INVASIVE SPECIES DATABASE

FULL ACCOUNT FOR: *Eleutherodactylus coqui*

[ITIS \(Integrated Taxonomic Information System\), 2004. Online Database *Eleutherodactylus coqui*](#)

Summary: An online database that provides taxonomic information, common names, synonyms and geographical jurisdiction of a species. In addition links are provided to retrieve biological records and collection information from the Global Biodiversity Information Facility (GBIF) Data Portal and bioscience articles from BioOne journals.

Available from:

http://www.cbif.gc.ca/pls/itisca/taxastep?king=every&p_action=containing&taxa=Eleutherodactylus+coqui&p_format=&p_ifx=plglt&p_lang= [Accessed December 31 2004]

[IUCN, Conservation International, and NatureServe. 2006. Global Amphibian Assessment. Downloaded on 4 May 2006.](#)

Summary: The Global Amphibian Assessment (GAA) is the first-ever comprehensive assessment of the conservation status of the world's 5,918 known species of frogs, toads, salamanders, and caecilians. This website presents results of the assessments, including IUCN Red List threat category, range map, ecology information, and other data for every amphibian species.

Available from: <http://www.globalamphibians.org/> [Accessed 5 November 2006].

Low T, 1999. Feral Future: the Untold Story of Australia's Exotic Invaders. Viking Press/Penguin Books Australia Ltd, Ringwood, Victoria, Australia, 380 pp

McCoid, M.J. 1993. The new herpetofauna of Guam, Mariana Islands. Herpetological Review 24:16-17.

Snell H and Rea S, 1999. The 1997-98 El Niño in Galapagos: can 34 years of data estimate 120 years of pattern? Noticias de Galapagos 60: 11-20

Stewart, M. M., and L. L. Woolbright. 1996. Amphibians. In D. P. Reagan and R. B. Waide (eds.), The Food Web of a Tropical Rain Forest, pp. 363-398. Univ. of Chicago Press, Chicago.

Wiles, G.J. 2000. Recent record of reptiles and amphibians accidentally transported to Guam, Mariana Islands. Micronesica 32: 285-287.

Woolbright, 1996. Disturbance influences long-term population patterns in the Puerto Rican frog, *Eleutherodactylus coqui* (Anura: Leptodactylidae). Biotropica 28:493-501.