PEST ALERT
United States Department of Agriculture • Animal and Plant Health Inspection Service

Caribbean Tree Frogs in Hawaii

First spotted in Hawaii in 1992, invasive Caribbean tree frogs have been a threat to the State's agriculture, tourism, and native ecosystems ever since. In just 10 years, burgeoning populations of two species, the coqui frog *(Eleutherodactylus coqui)* and the greenhouse frog *(E. planirostris),* have become established on Maui, Oahu, Kauai, and Hawaii's main island.

Native to the Caribbean, coqui and greenhouse frogs were accidentally imported to Hawaii hidden away on plants and flowers destined for nurseries throughout the State. With its tropical climate and a lack of natural predators, Hawaii has become a perfect second home to these invasive species.

The coqui frog, known for its piercing chirp, is much easier to detect than the quieter greenhouse frog. Many residents and tourists have experienced sleepless nights as a result of the incessant chirping of the male coqui frog.

In an effort to protect Hawaii's natural resources and preserve the islands' inherent tranquility, the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (APHIS) is working to develop environmentally sound strategies to manage coqui and greenhouse frog populations. Scientists at APHIS' National Wildlife Research Center (NWRC) Hawaii field station in Hilo, in cooperation with the State Department of Agriculture and the University of Hawaii's College of Tropical Agriculture and Human Resources, have already discovered several promising new methods.

The coqui frog is bigger than the greenhouse frog, but both are a threat to Hawaii's native ecosystems and agriculture. APHIS photo by Lori Oberhofer.

Identification

Coqui frogs are about the size of a quarter, and greenhouse frogs are about the size of a dime. Both species are light-brown to dark or reddish in color and have variable patterns, including light stripes down the back. The coqui frog, however, is distinguished by the loud, continuous chirping of the male. Beginning at dusk and continuing until dawn, male coqui frogs move into the trees and call "ko-kee" over and over to attract females. The noise from a group of frogs can exceed 70 decibels, rivaling the sound of a lawnmower or chainsaw.

The male frog is responsible for protecting the egg clutch laid by the female. The eggs are less than a quarter inch in diameter with about 2 to 3 dozen eggs per clutch. During the early stages of development, the eggs are milky white, but they become translucent to transparent just before hatching. Juvenile frogs hatch after 2 or 3 weeks. Unlike most frogs, which begin their life cycle as tadpoles, Caribbean tree frogs hatch into fully developed froglets.

The egg clutch is laid by the female and guarded by the male.

Caribbean tree frogs hatch into fully developed froglets.

These photographs were taken by Dr. Arnold Hara of the University of Hawaii, and reproduced by permission.

Habitat

Caribbean tree frogs are primarily nocturnal, seeking shelter during the day in moist areas covered by brush or debris. They prefer hot, humid environments that receive lots of rain. In Hawaii, coqui and greenhouse frogs have taken up residence around commercial plant industries, homes, resorts, public parks, and forested areas. Caribbean tree frogs have been reported at more than 320 locations covering approximately 2,000 acres on the islands of Hawaii, Maui, Oahu, and Kauai. In their native range on Puerto Rico, coqui populations can reach densities of 8,000 frogs/acre. Because Hawaii's climate is similar to that of Puerto Rico, researchers believe that, without intervention, Hawaii will soon have comparable populations.

The incessant mating call of the male coqui frog has kept many residents and tourists awake at night. APHIS photo by Lori Oberhofer.

To discourage Caribbean tree frogs from invading your property, create a habitat that won't provide protection from the sun.

- Remove from the ground leaves, compost, woodpiles, and any debris that holds moisture.
- Rake fallen leaves from under trees and bushes.
- Trim tree vines and cut dead or dying leaves off trees like the banana, palm, monocot, and heliconia.
- Make sure outdoor storage areas are solidly constructed and free of holes or cracks.
- Drain any containers that catch rain water.

Damage

In their native range, Caribbean tree frogs consume a diet consisting mostly of insects. While this is beneficial in the Caribbean, it could be devastating to Hawaii, which doesn't have any native amphibian species. The majority of Hawaii's native forest birds are partially or entirely dependent on insects for food. If coqui and greenhouse frogs spread to forest bird ranges, the frogs could outcompete native, endangered species. At peak densities in Puerto Rico, coqui frogs, with their voracious appetites, can consume 47,500 prey per night per acre. Because these frogs consume such an abundance of insects, biologists are also concerned that they could lead to the extinction of Hawaiian arthropods like native spiders, which have already been negatively affected by the establishment of other invasive predators.

Hawaii's vital floriculture and nursery industry is also at risk. Grower sales of Hawaii's flowers and nursery products totaled a record $83.4 million in 2000, a figure that puts Hawaii's sales behind only Florida and California. An infestation of Caribbean tree frogs could jeopardize local plant sales as well as exports. Several inter-island shipments of nursery products have already been rejected due to Caribbean tree frog infestations. Residents and nurseries are extremely leery of buying infested plants and bringing the noise of the coqui frog back to their neighborhoods. Homeowners are also concerned about property values while resorts worry that chirping frogs will drive tourists away.

Control

NWRC is the only Federal research facility devoted exclusively to resolving conflicts between people and wildlife through the development of environmentally sound, effective, and acceptable methods. The center's Hilo, field station is ideally located to allow research biologists to develop new tools to resolve damage and concerns posed by Caribbean tree frogs. Managed by APHIS' Wildlife Services program, the field station has come up with several promising means for managing and in some cases eradicating Caribbean tree frog populations in Hawaii.

Caffeine and citric acid have both proved effective as pesticides during tests. While the use of caffeine requires special authorization, citric acid is already on the Environmental Protection Agency's list of nonregulated, minimum-risk pesticides.

In addition to pesticides, the use of hand capturing and habitat modification can also be effective, but only on a small scale. In order to remove large populations of frogs, scientists are looking to citric acid and other natural products that can easily be applied to trees and shrubbery where Caribbean tree frogs are likely to be found.

NWRC's goal is to provide a variety of control options that will meet the needs of homeowners, resorts, nurseries, forest rangers, and others who may be experiencing problems associated with Caribbean tree frogs. Through these efforts, NWRC's scientists hope to preserve Hawaii's precious natural resources and return quiet to the night.

Additional Information

For additional information about Caribbean tree frogs, call 1–866–4USDAWS or visit WS' Web site at http://www.aphis.usda.gov/ws.

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