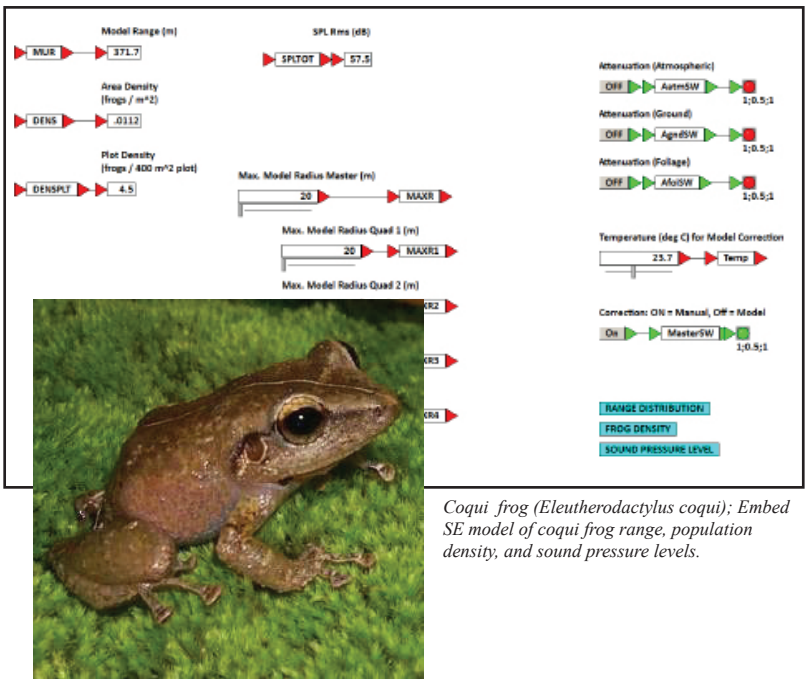
CUSTOMER STORY

University of Hawaii

Hawaii Battling Coqui Frogs with Embed SE



Coqui frog (Eleutherodactylus coqui); Embed SE model of coqui frog range, population density, and sound pressure levels.

"[Embed SE's] vast repertoire of block and mathematical functions make creating a model almost too easy. [Embed SE's] graphics and design capabilities are formidable and powerful."

Francis Benevides
Electronics Engineer and Affiliate Faculty Member
University of Hawaii

Francis Benevides, an electronics engineer and affiliate faculty member with the University of Hawaii at Hilo, has been using Embed SE (formerly called VisSim) for a dozen years to help authorities monitor and contain a frog species that has invaded Hawaii and is threatening to alter two of the islands' vulnerable ecosystems.

The frog in question, the coqui frog (Eleutherodactylus coqui), arrived in Hawaii around 1988, probably on imported nursery plants. Although it is native to and beloved in Puerto Rico, the coqui frog is an invasive species in Hawaii. Without natural predators to keep its population in check, the frog has quickly proliferated, especially on The Big Island, and achieves population densities three times those in its native Puerto Rico habitats.

What's more, the male coqui is a public-noise nuisance in Hawaii. From sunset to sunrise, this one-inch frog's two-part call ("co-KEE") reaches a mean sound level of about 80 decibels (dB) from a meter away; the state health standard is 70dB.

Initial Design

Efforts to locate and analyze the frog populations on the islands—in order to remove them and to study them—focused on capturing, marking and

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INDUSTRY

Academia/Signaling Processing

CHALLENGE

Monitor and contain invasive frog species

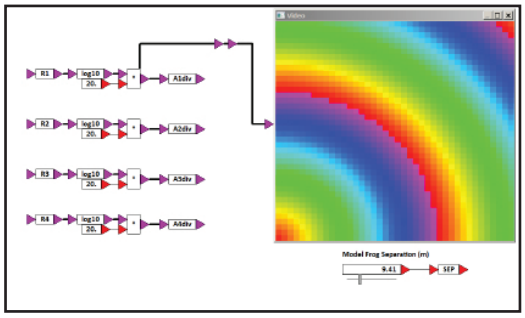
SOLUTION

Use Embed SE to measure and analyze frog acoustics

BENEFITS

- Improved matrix handling facilitates design creation and reduces turn-around time for model development
- Comprehensive math, engineering, and scientific block libraries increases productivity
- Viewer provides easy and free way to distribute models

re-capturing them. Using a model he created with Embed SE that lets him measure and analyze coqui acoustics, Benevides has been able to enhance biologists' and government authorities' containment efforts. His findings help identify where coqui have settled--and are apt to settle--based on factors like temperature and elevation.



False color 2D representation of coqui frog sound attenuation for a given frog separation distance.

Density Estimate

Benevides's Embed SE model provides an estimate of the density of male coqui frogs from average measurements of sound-pressure levels (SPL) taken in the field. As Benevides explains, "The simple model consists of 'coqui sound sources' configured in a rectilinear grid equally spaced from each other. The model varies the spacing between the 'coqui sound sources' until reaching the average SPL value obtained from the field measurements."

Benevides and his team establish 20 x 20 meter plots in the field, take digital recordings of the coqui chorus within the plot, and process the data [filtering out non-coqui sounds] to get the average SPL for Embed SE. "Finally, we count the number of calling coqui within the plot to obtain plot density and compare the empirical plot density data with that predicted by the [Embed SE] model."

Extensive Block Set

Benevides notes that "[Embed SE's] vast repertoire of mathematical functions makes creating a model almost too easy. [Embed SE] with its improved matrix capability is a quantum leap in facilitating ease of design and reducing turn-around time for model development." Embed SE's graphics and design capabilities are, he adds, "formidable and powerful."

Saving Time and Money

Funds to eradicate and control the coqui population need to be used efficiently, and Embed SE helps with that, too, by making it possible to compare the density of the frogs pre- and post-treatment, Benevides notes. "When treating and spraying coqui-habitated areas with citric acid, for example, we need to determine its efficacy. Has it been useful, has it reduced frog numbers or activity?"

Benevides also appreciates how user-friendly Embed SE has proven to be for his colleagues. "[Embed SE] is icon-based, which makes it very easy to teach others. I am especially fond of the free Viewer, which allows my associates, clients, students, etc, the opportunity to run my simulations without having to purchase [Embed SE] software. I can't say the same for other platforms."