



**Title: Low frequency acoustic isolation boxes**

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**Abstract**

Auditory stimulation is an important trigger for male calling in frogs. In our colony of túngara frogs, calling males are available daily and invite the study of the environmental triggers of male signaling. Such study requires acoustic isolation of the males by an attenuation barrier of at least 60 dB, which can be challenging to achieve at their calling range (250-1000 Hz). We constructed small boxes that can insulate noise at the low frequencies. Using a series of prototypes, we tested various materials to determine the best design. The transfer function of each prototype was determined using a probe microphone and loudspeaker. A series of pure tones varying from 250 to 18000 Hz was played and the recordings with the microphone in the box were compared to recordings without the box. The spectral performance of the prototypes was compared among them. The initial design consisted of a cellulose foam box inside a plywood box with a tortuous open passage to the outside for breathing. Variations of this design included creating an offset between the cellulose and wood, adding layers of foam and dense vinyl to the outside, and adding concrete. The cellulose-wood prototype produced an attenuation of about 40 dB at 2000 Hz but only about 20 dB at 500 Hz. Adding a layer of foam and dense rubber to the outside added 20 dB attenuation from 800 to 2500 Hz. There was a small difference between 10-layer and 5-layer plywood. This experiment will help us determine an appropriate design for the isolation boxes that will support a series of studies on male signaling mechanisms in our lab and further elucidate triggers of male calling in frogs.