

Isabel Pacheco and Darren S. Proppe

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We conducted a seven-week acoustic survey in habitats near the proposed Violet Crown development to quantify the current noise levels and provide preliminary predictions of noise disturbance as sound travels through the property.

A total of five recorders were placed on the property (Figure 1). Recorder 0 was placed at the fence line of the preserve and recorders 1, 2, 3, and 4 were placed 125 m apart in a straight line in the SSW direction (246°), respectively. We recorded 1 minute out of every 10 for the duration of the project - 03/07/2022 at 1500 hours to 04/27/2020 at 0730 hours. Using sound analysis software (Kaleidoscope v5.4.6), we measured the mean sound energy level in decibels (SPL dBA) for each recording. We have provided the average noise level (Table 1) at each location, and predicted noise levels for each location with 5 dB increases in noise at location 0. It should be noted however, that predicted noise levels reflect the sound relationship between points in an environment that is currently devoid of a strong point source of noise. As such, predicted values here may be an overestimate of noise transmission into the habitat.

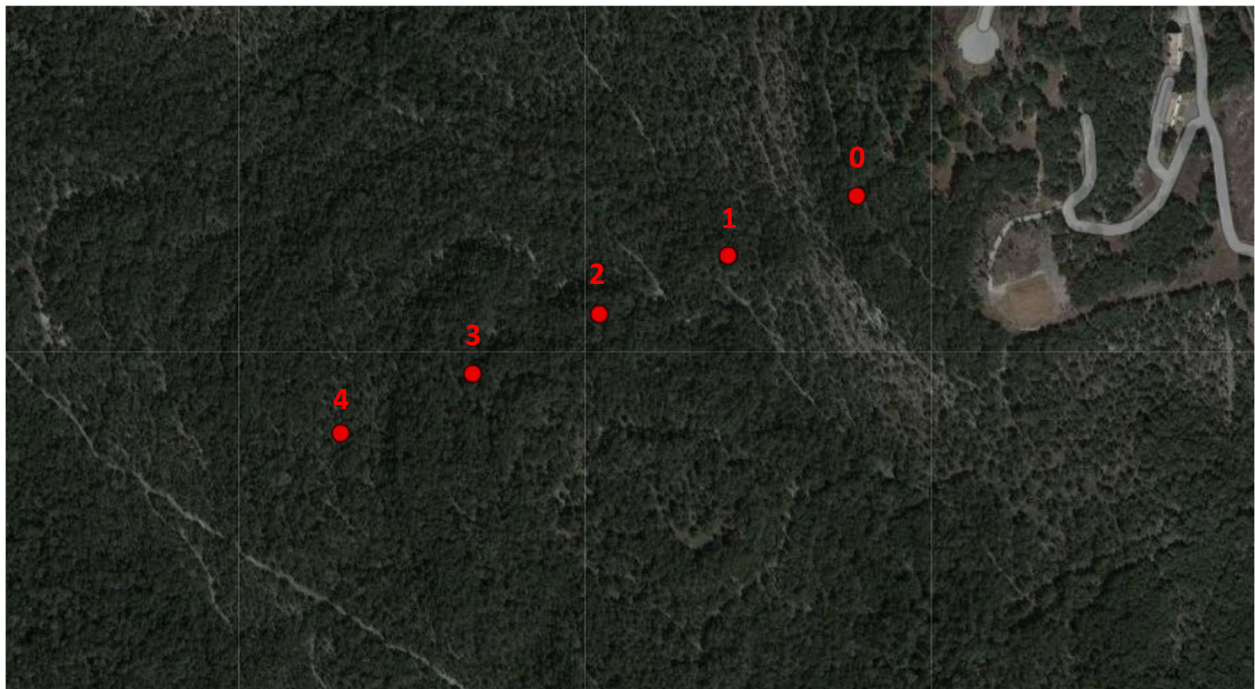


Figure 1. Location of each recorder

Location 0	Location 1	Location 2	Location 3	Location 4
41	38	39	39	36
45	42	40	40	36
50	46	44	44	39
55	51	48	48	42
60	56	51	52	46
65	60	54	56	50
70	65	57	61	54
75	70	60	65	59
80	75	63	70	64
85	79	65	75	69

Table1. Mean measured decibel levels (SPL dBA) in top row (gray background), and predicted levels of sound at each location with simulated increases in noise level at location 0 (light orange background).

Sound levels from music venues typically range from 85-108 dB (Beach and Gilliver et al 2019, *National Library of Medicine*). Impacts on wildlife are known to occur as low as 40 dB, with 20% of scientific studies documenting negative impacts on animals between the 40-50 dB range (Shannon et al. 2016, *Biological Reviews*). For example, several studies on the impacts of noise on population persistence have reported declines in breeding productivity in songbirds (Shannon et al. 2016, *Biological Reviews*). This is especially important considering that the Barton Creek Habitat Preserve is breeding habitat for the endangered golden-cheeked warbler.

Our data indicates that the soundscape of the Barton Creek Habitat Preserve is already on the threshold for negative impacts. Although our current predictions may be an overestimation of sound transmission under the addition of a point source of noise (such as an outdoor amphitheater), we can be relatively confident that noise levels exceeding 85 dB at the source will push the entire survey area over the 40-50 dB threshold. The impacts related to noise will likely begin already during construction, due to the use of heavy machinery. Although the high levels of sound production may be intermittent in a fully functional venue (e.g., during a concert), scientific research has indicated that non-continuous noise sources may also impact animals.

What is next?

We are in the analysis stage of a two-year acoustic study at the Wild Basin Wilderness Preserve. We aim to use these data to quantify sound transmission into oak-juniper habitats with changing point source noise levels (i.e., highway 360). Once the model is complete, we aim to predict potential changes more precisely at the Barton Creek Habitat Preserve in relation to elevation and vegetation as distance increases from the proposed Violet Crown development. Nonetheless, our current data indicate that the Barton Creek Habitat Preserve sits dangerously near the threshold for noise associated habitat degradation. Any elevation in noise level could be detrimental and should be avoid if possible.