Gill Lab Takes Flight!

In June, Gill lab visited San Juan, Puerto Rico to present in the 2022 Ornithological Conference

Novel soundscape approach reveals avian community signaling changes in response to threat

El nuevo enfoque del paisaje sonoro revela cambios de señalización de la comunidad aviar en respuesta a la amenaza

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Avian signaling is driven by multiple factors including threats and during breeding many threats (e.g., predation, parasitism, competition) elicit responses in individuals. Do these changes only occur randomly or do they accumulate, creating a community response to threat? Soundscape analysis has been used to characterize acoustic activity in many habitats and to connect bird diversity to metrics or acoustic indices (AIs). General behavioral change (e.g., dawn chorus) has been described with AIs but connecting specific behavior to change in AIs remains poorly tested. What happens to the collective signaling in bird communities presented with threats to survival and reproduction and is detection of behavior change possible with AIs in diverse situations? Using observable patterns of behavior change we connect induced changes in behavior with changes in soundscape metrics. Utilizing a set of microphones, we recorded soundscapes and observed behavioral responses before, during and after presenting threat stimuli in two habitats. We analyzed recordings with a suite of AIs in order to connect changes in acoustic index values with behavioral observations and then compared models from all AIs to the best model based on our field observations. Using multiple acoustic indices, we detected changes in community signaling and found patterns of response. We also show that observed behavior in response to threats can be detected by some AIs. We find the responses to differing threat stimuli are not equal and that observations are not intuitively linked to changes in acoustic indices. Finally, we describe how habitat alters detection of community response, and discuss the viability of AIs for detecting behavioral change.

Anthropogenic noise alters temporal partitioning of acoustic space in a breeding warbler community

El ruido antropogénico altera la división temporal del espacio acústico en una comunidad reproductora de reinitas

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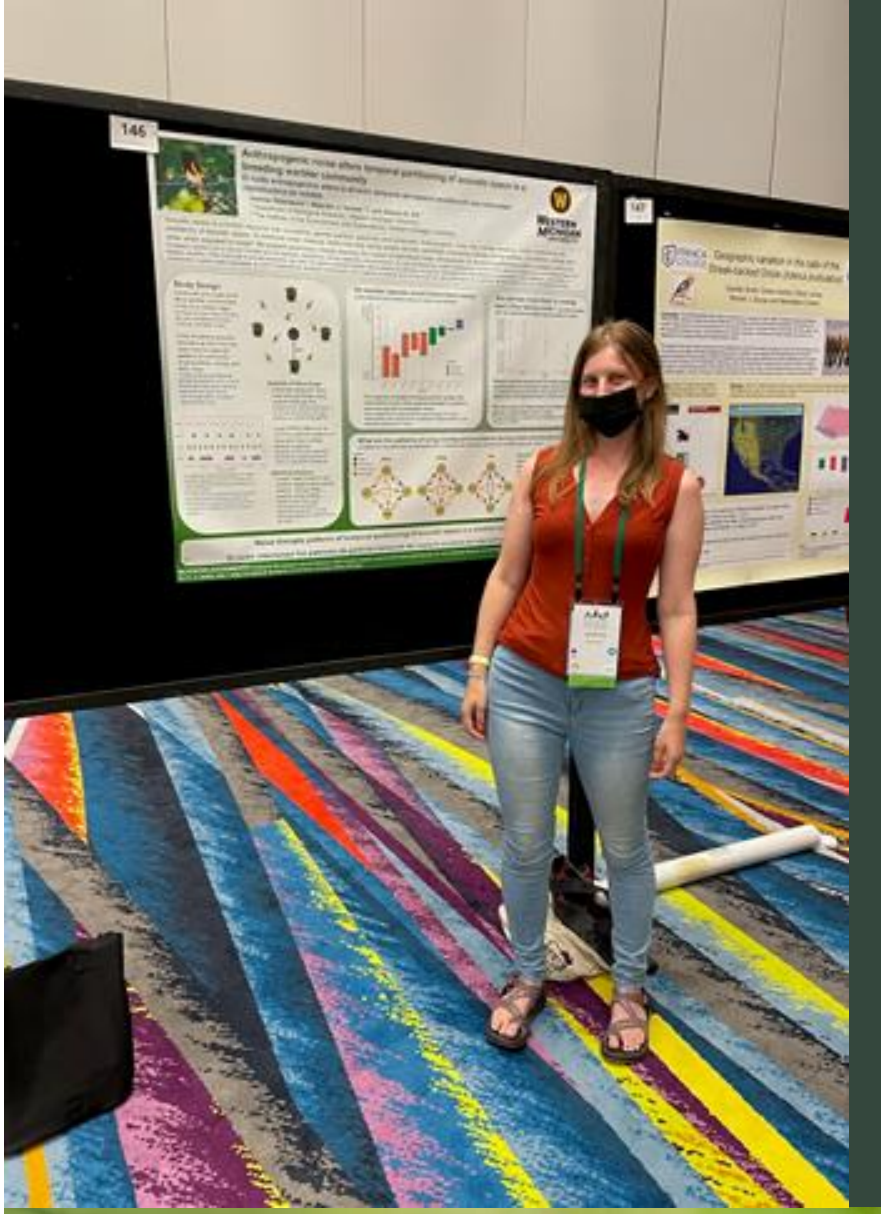
Since acoustic space is a limited resource, co-existing bird species have evolved unique song niches and behavioral modifications to partition the spectral and temporal use of acoustic space and promote recognition. Disturbances such as anthropogenic noise further constrain the availability of acoustic space. To minimize noise masking, birds may adjust song structure, fill gaps in noise, or sing during quieter periods. When noise intrudes on a community, species may vary in their strategies to maintain communication in noise, disrupting evolved partitioning patterns and leading to shifts in acoustic space by communities occupying novel acoustic environments. We hypothesized that anthropogenic noise constrains communication space and community species adjust their songs in noise, resulting in novel patterns of community-wide competition for acoustic space. We introduced randomized, intermittent noise to warbler communities (n=17) on a military base, and used grids of passive acoustic recorders to capture patterns of community singing before, during, and after noise. Warbler species' (n=9) singing behavior during noise exposure was idiosyncratic: one species actively avoided noise by singing during silent gaps, four ceased singing during noise, and four did not avoid noise. When considering partitioning among community members, warbler species were more likely to avoid overlapping their songs with other species in the community both during ($t=-3.8$, $p=0.001$) and after ($t=-3.7$, $p=0.001$) noise. Our study explores evolutionary processes associated with song divergence in dynamic environments and has critical implications for species persistence and signal evolution in noise-polluted areas.



Using referential alarm calls to investigate mental time travel in free-living songbirds

Uso de llamadas de alarma referenciales para investigar el viaje mental en el tiempo en aves canoras silvestres

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Mental time travel (MTT) is a cognitive process which combines episodic memory and future planning. Although MTT is well-understood in humans, studies of MTT in animals has largely been limited to lab experiments, which lack ecological relevance. We tested the hypothesis that hearing referential "seet" calls on one day causes yellow warblers (Setophaga petechia) to alter patterns of nest vigilance at dawn the following morning when brownheaded cowbird (Molothrus ater) brood-parasitism is most likely to occur. We exposed female warblers to three treatments: recordings of seet calls, chip calls (general alarm call), and control (silence). We presented playback recordings at warbler nests and monitored their extended vigilance patterns using remote-sensing trail cameras. Although preliminary findings suggest that warblers may alter vigilance patterns according to the type of stimulus they were exposed to the previous day, more research is necessary to obtain a larger sample.