Stranger Danger: Interspecific Vocal Responses of Selected Diurnal Passerines to Indirect Predator Alarm Calls

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Introduction

Background

- Soundscape ecology is a growing field with the explicit goal to study the function of sound in a landscape and its effect upon organisms (Pijanowski et al. 2011).
- For birds, sound (via vocalizations produced by conspecifics, other bird species, or non-bird species) is especially important because it provides information about environmental heterogeneity and predation risk (Schmidt and Belinsky 2013).
- Indirect predator alarm calls, such as those of the eastern tufted titmouse (*Baeolophus bicolor*- referred to as ETTI), signify a predation threat- a message from which other species can benefit via heterospecific eavesdropping to increase their survival and fitness (Contreras and Sieving 2011).
- This study investigates the response of avian dusk chorus species in a mixed oak eastern deciduous forest to alarm calls of a common community informant (ETTI) around dusk, a peak period for avian vocalization.

Hypotheses

1) Avian dusk chorus species will eavesdrop on ETTI alarm calls and reduce their song output to avoid attracting predators or signaling the relative location of a possible nest, offspring, and/or kin/mate.

2) Ground-nesting species such as the veery (*Catharus fuscescens*- VEER) will increase call output more than species that nest higher off of the ground such as the wood thrush (*Hylocichla mustelina*- WOTH) and the scarlet tanager (*Piranga olivacea*- SCTA) when exposed to ETTI alarm calls because of the vulnerability of their nest site to a wide array of predators.

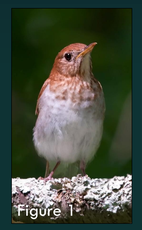
Figure 1


Figure 2


Figure 3


Figure 4

Figures 1-3. Focal species (left to right): veery, wood thrush, and scarlet tanager.

Figure 4. Playback alarm call species: ETTI.

Methods

Study Area

- The study was conducted at the Cary Institute of Ecosystem Studies in Dutchess County, southeastern New York, USA (41° 50' N, 73° 45' W), from 19 May to 6 July 2013.

Experimental Set-up

- Fourteen plots were selected based on the presence of singing male veeries (Figure 5).
- Song and call data was collected at each plot in response to two playback-recording trials over 2 consecutive days. The experimental treatment used playbacks of ETTI alarm calls, and the control treatment used "neutral" playback calls of the gray tree frog (*Hyla versicolor*). Trials started 20 min before sunset and ended 45 min after sunset.

Data Collection and Analysis

- RavenPro 1.4 was used to visualize the recorded sound files and counts were made of the number of songs for all dusk chorus species and the number of songs and calls for each of the three focal species.
- A Chi-squared test for independence was employed to examine relative changes between songs and calls for focal species among treatments.
- To test for treatment effects, paired t-tests or Wilcoxon paired sample tests were used for number of songs (dusk chorus as a whole and focal species) and calls (focal species only).

Results

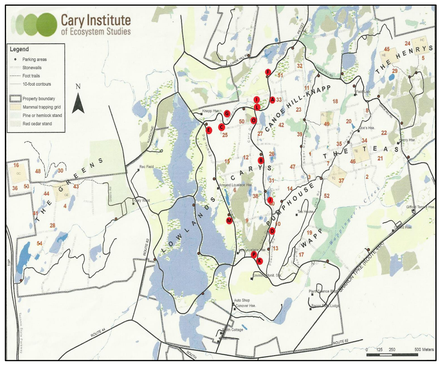

Figure 5. Study area with plot locations (red circles).

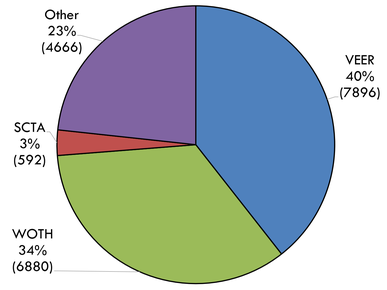

Figure 6. Percent of total songs contributed by individual avian dusk chorus species across all plots and treatments. Other includes 29 species.

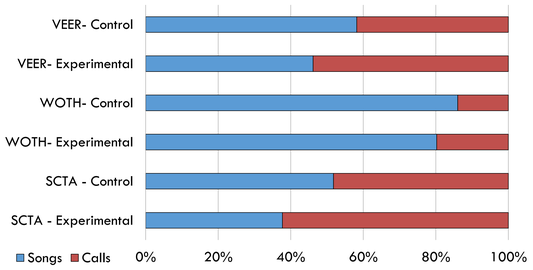

Figure 7. Song to call ratio (expressed as percent of total songs and calls) by treatment for each of the three focal species.

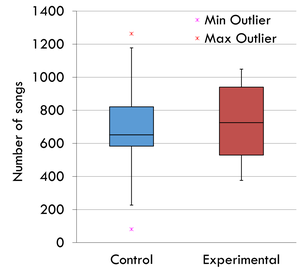

Figure 8. Boxplots of total number of songs per plot by treatment for the dusk chorus community.

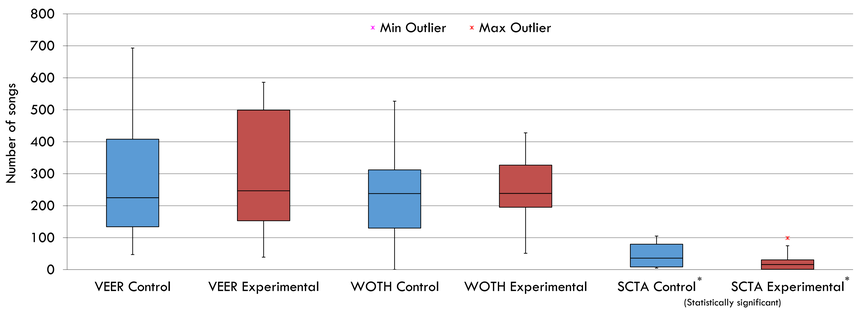

Figure 9. Boxplots of total number of songs per plot by treatment for the three focal species.

Figure 10. Boxplots of total number of calls per plot by treatment for the three focal species.

Results Summary

- The veery and wood thrush collectively contributed over 70% of >20,000 total recorded songs. 30 other species produced the remaining ~30% of recorded songs (Figure 6).
- The distribution of vocalizations between songs and calls was strongly associated with treatments in the form of a significant reduction in the song to call ratio in the experimental treatment for all three focal species (Figure 7).
- Neither the dusk chorus as a whole, nor the veery, or the wood thrush showed a significant response in song output to ETTI alarm calls (Figure 8, Figure 9). Only the song output for the scarlet tanager was significantly lower in the experimental treatment (Figure 9).
- Of the three focal species, only the veery showed a marked and significant increase in call output when exposed to ETTI alarm calls (Figure 10).

Conclusions

- The avian dusk chorus as a whole did not significantly or consistently reduce song output; however, the three focal species each exhibited a relative shift from songs to calls in response to ETTI alarm calls.
- The veery increased its call output, the scarlet tanager reduced its song output, and the wood thrush showed a small, disproportionately greater increase in calls versus songs in the experimental treatment.
- All three focal species seemed to be eavesdropping on ETTI alarm calls and adjusted their vocalizations accordingly. Only the veery acted as a (secondary) community informant.
- As hypothesized, the more vulnerable, ground-nesting veery reacted more strongly in call output than the wood thrush, which nests higher above the ground. The vividly colored scarlet tanager, which nests in the canopy, did not respond to ETTI alarms calls with an increased call output.

Implications

- Anthropogenic noise pollution associated with increasing urbanization threatens to interfere with intra- and interspecific communication systems. A disruption or masking of this auditory information may have cascading effects on species in an ecosystem, possibly leading to reduced fitness and loss of biodiversity.
- Conservation will be more effective if the preservation of soundscapes and the reduction of noise pollution are integrated criteria in the development of policy decisions and management strategies.

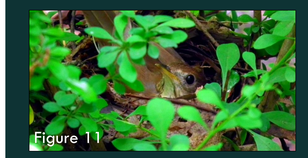
Figure 11

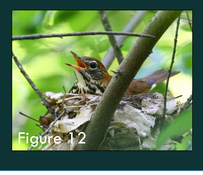
Figure 12

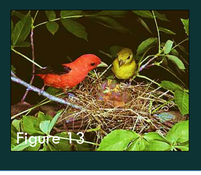
Figure 13

Figures 11-13. Nests of focal species (left to right): veery, wood thrush, and scarlet tanager.

Literature Cited

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