Nocturnal Social Cues Attract Migrating Yellow-breasted Chats

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ABSTRACT.—We tested the hypothesis that migrating birds use nocturnal conspecific song when selecting stopover habitat using data from the Yellow-breasted Chat (Icteria virens). We broadcast nocturnal song in unsuitable habitat (i.e., a manicured orchard) and alternated broadcast nights with nights where no song was broadcast. We caught significantly more individuals (8 males, 7 females) on mornings following treatments relative to control nights when no songs were broadcast (2.5 vs. 0 birds/morning, respectively). Eleven of 15 (73%) chats were removed from the nets after sunrise (mean = 32 min after sunrise, range = 5–60 min), and birds were captured on overcast, cloudy, and clear mornings. Only one bird was recaptured at the site, and only one male was detected singing at the site, suggesting individuals quickly left the area. Conspecific nocturnal songs for chats appear to be an important cue for selecting stopover habitat.

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nocturnal song of Yellow-breasted Chats (Icteria virens) is also given at a frequency and amplitude that may allow detection farther than their diurnal song (Canterbury 2007). Female and male chats may use this song as an indicator of suitable habitat and mates. However, the relative importance of conspecific vocalization versus habitat cues is unknown.

We broadcast the nocturnal song of male Yellow-breasted Chats, a song that is consistently sung at night during spring migration (Canterbury 2007), in unsuitable habitat during spring migration. The shrubland habitat in which chats stopover is patchy, and the probability of a migrating individual quickly locating suitable habitat at dawn is unlikely; thus, birds would benefit by using pre-dawn cues to locate appropriate areas. We hypothesized that both male and female chats use nocturnal song as an indicator of suitable habitat, and that both males and females would select areas with conspecific nocturnal song regardless of habitat suitability. We predicted that chats attracted to unsuitable habitat would quickly leave the site once they found it was unsuitable.

**METHODS**

This experiment was conducted on University of Illinois property in southeast Urbana, Champaign County, Illinois, USA during spring migration between 29 April and 15 May 2009. The site was a 210 × 30 m linear strip of six rows of apple (Malus spp.) trees spaced 6.5-m apart with mowed strips of grass between each row of trees. The habitat north and east of the site was residential and commercial property, while the habitat to the west and south was a mixture of agricultural land with additional patches of apple trees and mature forest. The area was selected because it offers woody vegetation, but lacked the size and dense shrub layer that chats require for both breeding (Thompson and Nolan 1973) and stopover habitat (Parnell 1969). Yellow-breasted Chats are not known to nest within the Champaign city limits (Kleen et al. 2004), and the nearest shrubland with breeding chats is ~16 km away. The site is routinely monitored during statewide bird surveys and other research projects, and chats have yet to be recorded at this location.

We alternated between control nights, when no songs were broadcast, and treatment nights with song playbacks when the weather allowed (i.e., not raining). We used a mixture of commercially available chat songs (Elliott et al. 2000) and chat songs we recorded from individuals in east-central Illinois. The recording included a male whistle song, the song only used at night (Canterbury 2007). The entire recording was 100 sec in length and was repeated continuously using a Fox Pro FX3 playback system. The whistle song was imbedded in two locations during the 100-sec playback: 15 sec and 80 sec, and was 0.5 sec in duration. We placed the system in the center of the site in a weatherproof plastic container and directed the device at a 45° angle southward toward the sky. Songs were broadcast on treatment nights from sunset to 1.5 hrs after sunrise. We placed mist nets approximately every 30 m on the site to increase the probability of capturing all chats moving through the vegetation; nets were numbered 1 (South net) to 6 (North net) and were opened for 1.5 hrs before and after sunrise each morning for both treatment and control nights. Nets were checked every 20 min for birds. We banded all captured chats with a USGS band, recorded gender, and the net number in which each individual was captured prior to releasing them at the site. We conducted 5-min, unlimited-radius point counts each morning in two locations at the site after closing the nets to quantify the number of singing chats. One point was at the southernmost end of the strip while the other was at the northernmost end. We conducted a Chi-square test to examine if chats were captured more often than expected on mornings following treatments.

**RESULTS**

We captured 15 chats (8 males, 7 females) during four of six mornings that we broadcast chat song at night and captured no new individuals during any of the five control mornings ($\chi^2 = 12.5, P < 0.001$). Eight of 15 chats (53%) were captured in nets closest to the speaker (chat song), while seven (47%) were captured in the southernmost nets. Eleven of 15 (73%) chats were removed from the nets after sunrise (mean = 32 min, range = 5–60 min), and birds were captured on overcast, cloudy, and clear mornings. Only one male chat was heard singing during point counts and it was during the morning he was captured. No male chats were recorded singing on control days. Only one individual was recaptured; a female 3 days after initial capture.
DISCUSSION

Migrating chats were captured only on mornings following nights when conspecific vocalizations were broadcast; no birds were captured during mornings following nights with no song. Both migrating male and female chats responded to experimental addition of nocturnal male song, suggesting male chat song functions as a cue for selection of stopover habitat. Male chats did not establish territories and vacated the area. The lack of appropriate habitat did not preclude chats from briefly stopping, as long as conspecific songs were present.

Nocturnal song of diurnally active birds has been documented, primarily in species that breed in patchy or ephemeral habitat (Barclay et al. 1985, Walk et al. 2000). For example, male Common Nightingales breed in ephemeral habitat (Hewson et al. 2005) and also sing nocturnally for mate attraction (Amrhein et al. 2002). Male chats also appear to primarily use long-range whistle songs only at night (Canterbury 2007). Male chats will sing continuously at night for up to 6 days after arrival in breeding areas, potentially providing abundant social cues early in the season when most females are returning from wintering locations (Canterbury 2007).

We broadcast nocturnal song between sunset and 1.5 hrs after sunrise, and chats were attracted either during the night or shortly after sunrise. Selecting stopover habitats at sunrise may be adaptive if increased visibility allows for better habitat assessment (Bolshakov and Bulyuk 1999); these results suggest that, at least for chats, individuals are selecting habitat based on social cues. Visibility can also have a role in affecting the importance of social cues (Herremans 1990); birds in our study were captured during cloudy, overcast, and clear mornings, but whether visibility had a role in why birds were captured is unknown.

Conspecific attraction has received increasing attention in recent years, and is important for both habitat selection and planning conservation and management actions (Ahlering and Faaborg 2006). Several studies have demonstrated that birds use conspecific attraction to assess and select habitat (Mukhin 2004, Serrano et al. 2004, Ward and Schlossberg 2004, Ahlering 2005, Betts et al. 2008, Ktitorov et al. 2010). Most conspecific attraction studies have not attempted to attract birds to unsuitable habitat, nor have studies focused exclusively on nocturnal song (but see Mukhin et al. 2008, Ktitorov et al. 2010). Attracting birds to unsuitable rather than suitable habitat is a more reliable method of assessing the importance of acoustic social cues (Chernetsov 2006, Betts et al. 2008).

Heterospecifics may also use these cues while selecting habitat (Mönkkönen et al. 1999). We did capture other shrubland bird species on mornings following treatments, including Orchard Orioles (Icterus spurius), Brown Thrashers (Toxostoma rufum), and Field Sparrows (Spizella pusilla), but either did not capture or caught fewer individuals following control nights. These species do not commonly breed in developed areas. A separate playback experiment is necessary to examine if these species use chat song in addition to vegetation structure to select suitable habitat. Many of the bird species that breed in patchily distributed habitats in North America are known to sing at night (Barclay et al. 1985, Walk et al. 2000) and may be using nocturnal heterospecific song as a cue during migration; future research is needed to address conspecific and heterospecific attraction in shrubland birds.

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LITERATURE CITED


