Introduction

- Many birds perform two regular seasonal migrations from areas of low or decreasing resources to areas with high or increasing resources (Fig. 1).
- Most birds produce species-specific flight calls while migrating, which may organize individuals within flocks to minimize collisions, particularly under turbulent or low visibility conditions1-3.
- These calls may be used to identify species and estimate the minimum number of individuals moving through an area2.
- In particular, these calls may be used to establish presence of rare or secretive species in an area.
- Acoustic monitoring of nocturnal migrants provides a powerful tool for assessment of migratory behavior and routes4.
- We obtained usable recordings from 37 nights in Nov. and Dec. of 2012.
- On two occasions (Nov 23 and Dec 6) we identified the flight call of an American Tree Sparrow (Spizella arborea; Fig. 2-A-C).
- More Grasshopper, LeConte’s, and Henslow’s sparrows were detected by the acoustic monitoring (Fig. 2-D-L) station than were seen by birders submitting their observations to ebird in Lincoln and surrounding parishes, except LeConte’s Sparrows in Claiborne Parish (Table 1).

Fig. 1. General north-south migratory flyways of birds that breed seasonally in North America. The acoustic monitoring station on the LTU campus is on the western edge of the Mississippi Flyway. Image from USFWS11.

Objectives

- Establish an acoustic monitoring station for long-term assessment of nocturnal migrants through Northern Louisiana.
- Identify & establish presence of rare or secretive species in Northern Louisiana.

Fig. 2. Spectrogram of A) nocturnal flight call recorded at LTU, B) verified recording (Macaulay Library, Cornell, ML Audio 163319), and C) photo1, of an American Tree Sparrow. Spectrogram of D) nocturnal flight call recorded at LTU, E) verified recording6, and F) photo1, of a Grasshopper Sparrow. Spectrogram of G) nocturnal flight call recorded at LTU, H) verified recording5, and I) photo4, of a LeConte’s Sparrow. Spectrogram of J) nocturnal flight call recorded at LTU, K) verified recording5, and L) photo5, of a Henslow’s Sparrow. (All photos from The Cornell Lab of Ornithology, All About Birds Guide).

Table 1. Number (#) of Grasshopper, LeConte’s, and Henslow’s sparrows detected by the acoustic monitoring station (LTU) and by birders that submitted checklists to ebird in the surrounding parishes in Nov-Dec 2012. Parenthetical numbers next to location are number of recorded nights (LTU only) or number of checklists submitted by area birders to ebird, "bhp" is number of birds detected per hour of observation, and "na" is not applicable (no checklists were submitted).

<table>
<thead>
<tr>
<th>Sparrow</th>
<th>LTU (37)</th>
<th>Lincoln (5)</th>
<th>Union (68)</th>
<th>Ouachita (65)</th>
<th>Claiborne (64)</th>
<th>Bienville (0)</th>
<th>Jackson (15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grasshopper</td>
<td>22.0.1</td>
<td>0.0.0</td>
<td>0.0.0</td>
<td>0.0.0</td>
<td>na na</td>
<td>0.0.0</td>
<td>0.0.0</td>
</tr>
<tr>
<td>LeConte’s</td>
<td>92.0.2</td>
<td>0.0.0</td>
<td>32.0.6</td>
<td>13.1.3</td>
<td>93.9.0</td>
<td>na na</td>
<td>0.0.0</td>
</tr>
<tr>
<td>Henslow’s</td>
<td>8.0.0</td>
<td>0.0.0</td>
<td>1.0.0</td>
<td>0.0.0</td>
<td>na na</td>
<td>0.0.0</td>
<td>0.0.0</td>
</tr>
</tbody>
</table>

Results

- In November and December of 2012, we recorded the flight calls of American Tree Sparrows, a previously undocumented species in the state of Louisiana.
- In the same period of time, we identified several individuals of secretive grassland species which were rarely observed by birders in the local area (Table 1).
- The American Tree, Grasshopper, and LeConte’s sparrows are listed as species of least concern with decreasing populations, while Henslow’s Sparrow is listed as near threatened with decreasing populations by the International Union for the Conservation of Nature10.
- Acoustic monitoring is a relatively inexpensive method of providing presence and movement information of birds that are difficult to visually detect and study.
- These data are critical for establishing conservation corridors, placement of wind turbines or communication towers, and detection of altered migration behavior with changing climate.

Methods

- In late October 2012, we placed a pressure-zone microphone element (Knowles EK3026ci) mounted in a three gallon bucket and pointed toward the sky on the roof Carson-Taylor Hall the campus of Louisiana Tech University (LTU), Ruston, LA, USA (Fig. 3).
- The microphone is sensitive in the 2-12 kHz band and was attached via an audio cable to a desktop computer which recorded sounds continuously from 18:00 - 06:00 in a wav format.
- Wav files were analyzed with Tseep software (Old Bird, Inc.) that detects bursts of acoustic energy in the 6-10 kHz range, which covers the vocal range of most North American warbler and sparrow species2.
- Spectrograms of extracted calls were visually (using Raven Pro 1.5) and audially compared with calls of verified identity.
- We compared species and number of bird identified through our recordings with number of birds reported to ebird (www.ebird.org) to determine if we could detect birds that were not, or rarely, seen by birders in Lincoln (location of monitoring station) and surrounding parishes (Union, Ouachita, Claiborne, Bienville, & Jackson).
- Specifically, we compared numbers of a group of grassland birds that are secretive: Grasshopper (Ammodramus savannarum), Henslow’s (Ammodramus henslowi), and LeConte’s (Ammodramus lecontei) sparrows.
- Nights with rain and/or high winds were omitted from all analyses because these conditions interfere with call detection.

Literature cited

8LeSaw, G. W. CLO. Cornell Lab of Ornithology, Auburn County, MN, June 2000.
9Koziol, A. 2009.

Conclusions

- This study provides a powerful tool for assessing migratory behavior and routes4. The American Tree, Grasshopper, and LeConte’s sparrows are listed as species of least concern with decreasing populations, while Henslow’s Sparrow is listed as near threatened with decreasing populations by the International Union for the Conservation of Nature10. Acoustic monitoring is a relatively inexpensive method of providing presence and movement information of birds that are difficult to visually detect and study. These data are critical for establishing conservation corridors, placement of wind turbines or communication towers, and detection of altered migration behavior with changing climate.

Fig. 3. Directional microphone placed on the roof of Carson-Taylor Hall on the LTU campus.